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# INTERNAL INTEGRATION DURING ORGANIZATIONAL TRANSITION - A SUPPLY CHAIN PERSPECTIVE

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## ABSTRACT

### Internal Integration during Organizational Transition – A Supply Chain Perspective

Tighter internal supply chain integration has been posited to lead to several operational and performance benefits. In addition, it has also been seen to aid the elicitation of external integration. However, despite the potential benefits, achieving and maintaining tighter internal integration is a challenging task and demands considerable investments in time, money, and effort. Consequently, real, tight internal supply chain integration existing in real-life companies is rather rare than common.

Although the phenomenon of internal integration has aroused large interest in the academia, a single, accepted, and generalizable definition and operationalization for the concept have been lacking. The definitions have varied from researcher to researcher which has also been visible in various ways of operationalizing the concept. In addition, the discussion concerning various employees' skills as related to internal integration has been neglected by previous researches.

On the other hand, most of the existing knowledge concerning internal integration has been gained through utilizing a quantitative research approach and methods, by studying stand-alone opinions of managers or directors, in charge of single departments across several companies. The qualitative methods and utilization of multiple perspectives have largely been neglected. Moreover, all of the previous researches can be regarded to be snapshots of their time; no longitudinal researches have been executed.

The purpose of the research under scrutiny was to address both the theoretical and methodological gaps visible in the previous research literature. The research consequently aimed at answering the following research questions: How can the concept of internal integration be holistically defined, taking into account the different elements presented in previous research literature? How can (the level of) internal integration be holistically operationalized and analyzed, utilizing the new definition and taking into account the analyses models and approaches presented in previous research literature? Are the findings of the current research in line with the earlier findings or does it result in deviant and/or additional results? And, which skills are needed of different organization level employees in order to manage the internal supply chain successfully? While aiming at answering these questions, the research also aimed at answering three pragmatic research questions, directly discussing the operations of the case mill of the research: How do the case mill's production planning, production, and warehousing and dispatch departments operate functionally and how and in which occasions and forms do they interact with one another? What is the current level (spring-autumn 2015) of internal integration existing between the case mill's concerned departments? How does the current level of internal integration appear in the light of the mill's future operating environment?

The research was executed as a qualitative, longitudinal single case study research. A Finnish paper mill in a transformation process changing from one production mode to another acted as a case company of the research. The research studied the level of internal integration existing between case mill's three departments – production planning, production, and warehousing and dispatch – through the opinions of three organization levels – upper level white-collars, lower level white-collars, and blue-collars – and multiple respondents representing each of the concerned departments and employee groups, during three periods of time – in the old production mode and operating environment (2013-2014), during the mill's transition from the old production mode to the new (2014-2015), and in the new production mode and operating environment (autumn 2015 onwards).

The existing level of internal integration was researched and analyzed by utilizing a new definition and operationalization of the concept of internal integration created in the research under scrutiny, by utilizing four qualitative data collection methods – introduction discussions, a qualitative survey, consequent specifying interviews, and objective observations. The research was executed from the inside; operating within the case mill while still simultaneously maintaining a position of an external researcher.

The research resulted in clear additions to the existing research literature. It provides a new, more holistic definition for the concept of internal integration. In addition, it also provides a new operationalization for the concept. Moreover, it starts the discussion of relevance of various organization level employees' skills as related to the successful management of the internal supply chain.

Moreover, by utilizing deviant and new research methods, it consequently also provides additional, new theoretical information. It, for example, emphasizes the importance of researching several departments and organization levels while aiming at analyzing the true level of internal integration as the opinions of different departments and organization levels – not to mention individuals – proved to differ. Thus utilizing a too narrow research perspective can result in faulty analyses. The deviant methods utilized in the research themselves also provide clear methodological contributions, in form of researching several departments, through the eyes of several organization levels and multiple respondents, during a longer period of time – longitudinally.

Finally, from the case mill's managerial perspective, the research provides the mill representatives with deep descriptions of the mill's internal operations and analyses of its current and potential future level of internal integration, in addition to providing specific development suggestions.

**Keywords:** case study, collaboration, coordination, information sharing, internal integration, longitudinal, paper industry, skills, supply chain

## TIIVISTELMÄ

### Sisäinen integraatio organisaation murrostilanteessa - Toimitusketjunäkökulma

Yritysten sisäisten toimitusketjujen tiiviin integraation on esitetty johtavan useisiin toiminnallisiin ja tehokkuushyötyihin. Sen on myös nähty edesauttavan yritysten välisen ulkoisen integraation aikaansaamista. Tiiviin sisäisen integraation saavuttaminen ja ylläpito on kuitenkin haastava tehtävä, se vaatii yrityksiltä huomattavaa panostusta ajassa, rahassa ja vaivannäössä. Näin ollen, tiiviin integraation esiintyminen tosi elämän yrityksissä on ennemminkin harvinaista kuin yleistä.

Vaikka sisäinen integraatio on herättänyt ilmiönä suurta kiinnostusta tiedemaailmassa, yksi yleinen, hyväksyty ja yleistettävissä oleva määritelmä sisäisen integraation käsitteelle on puuttunut, kuten myös yhtenäinen operationalisointi. Kukin tutkija on määritellyt käsitteen omalla tavallaan, erot määritelmissä ovat myös nähtävissä erilaisissa tavoissa operationalisoida ilmiötä. Sisäisessä toimitusketjussa toimivien ihmisten osaaminen sisäisen toimitusketjun toimivuuden osatekijänä ja vaikuttaja on lisäksi jäänyt tiedemaailmassa toistaiseksi vaille huomiota.

Toisaalta, lähes kaikki sisäisestä integraatiosta olemassa oleva teoreettinen tieto on kerätty hyödyntämällä määrällisistä tutkimusotetta ja määrällisiä tutkimus- ja tiedonkeruumenetelmiä. Kyseiset tutkimukset ovat keskittyneet pääasiassa tutkimaan yksittäisten, eri yrityksiä edustavien, tietyistä osastosta vastaavien päälliköiden tai johtajien mielipiteitä. Laadullista tutkimusotetta ja monipuolisempaa näkökulmaa asiaan on hyödynnetty vain harvoin. Lisäksi, kaikki olemassa olevat tutkimukset ovat kuvauksia sen hetkisestä tilanteesta, aiheeseen liittyvää pitkittäistutkimusta ei ole suoritettu.

Tämän tutkimuksen tavoitteena oli pyrkiä täyttämään olemassa olevassa tieteellisessä kirjallisuudessa havaittuja sekä teoreettisia että metodologisia puutteita. Näin ollen tutkimus pyrki vastaamaan seuraaviin tutkimuskysymyksiin: Kuinka sisäisen integraation käsite voidaan määrittellä kokonaisvaltaisemmin, ottamalla huomioon olemassa olevassa tutkimuskirjallisuudessa esitetyt sisäisen integraation osatekijät? Kuinka sisäinen integraatio (ja sen taso) voidaan kokonaisvaltaisesti operationalisoida ja analysoida, ottamalla huomioon luotu uusi määritelmä sisäiselle integraatiolle ja olemassa olevassa kirjallisuudessa esitetyt erilaiset sisäisen integraation analysointimallit? Ovatko tutkimuksen tulokset samansuuntaisia aiempien tutkimusten tulosten kanssa vai tuoko se esiin jotakin uutta ja/tai erilaista? Ja, millaista erilaista osaamista eri organisaatiotasojen henkilöstöltä vaaditaan, jotta sisäinen toimitusketju toimisi mahdollisimman hyvin? Pyrkiessään vastaamaan kyseisiin tutkimuskysymyksiin, tutkimus myös pyrki vastaamaan seuraaviin pragmaattisiin, suoraan tutkimuksen case –tehtaaseen liittyviin kysymyksiin: Miten tehtaan tuotannonsuunnitelu-, tuotanto- ja varasto ja lähetysosastot toimivat ja missä tilanteissa ja miten ne ovat vuorovaikutuksessa keskenään? Mikä on kyseisten osastojen välinen, tämän

hetkinen integraation taso (kevät-syky 2015)? Miten kyseinen taso näyttäytyy tehtaana tulevaisuuden toimintaympäristön valossa?

Tutkimus toteutettiin laadullisena, yksitapauksisena pitkittäistapaustutkimuksena. Tutkimuksen kohteena toimi suomalainen, juuri tuotantosuuntaansa vaihtava paperitehdas. Tutkimus tarkasteli olemassa olevan sisäisen integraation tasoa tehtaana kolmen eri osaston välillä (tuotannosuunnittelu, tuotanto ja varasto ja lähetys), kolmen eri organisaatiotason (ylemmät toimihenkilöt, alemmat toimihenkilöt ja työntekijät) ja useamman, kutakin osastoa ja organisaatiotasoa edustavan vastaajan mielipiteiden kautta, kolmena eri aikakautena (vanhassa tuotantosuunnassa ja toimintaympäristössä (2013-2014), murrosvaiheessa (2014-2015) ja uuden tuotantosuunnan ja toimintaympäristön mukaisessa toiminnassa (syky 2015 eteenpäin)).

Olemassa olevan sisäisen integraation tasoa tutkittiin ja analysointiin hyödyntämällä tutkimuksessa kehitettyä uutta määritelmää ja operationalisointia sisäiselle integraatiolle, käyttäen neljää laadullista tiedonkeruumenetelmää – perehdytyskeskusteluja, laadullista kyselytutkimusta, sitä seuraavia tarkentavia haastatteluja sekä havainnointia. Tutkija toimi tutkimusta tehdessään tutkimuksen kohteena olleen tehtaana sisällä, säilyttäen kuitenkin koko ajan objektiivisen tutkijan aseman.

Tutkimuksella aikaansaatii selkeää teoreettista kontribuutiota. Tutkimuksen tuloksena syntyivät uusi, kokonaisvaltaisempi määritelmä ja operationalisointi sisäisen integraation käsitteelle. Tutkimus lisäksi aloittaa tieteellisen keskustelun henkilöstön osaamisen merkityksestä onnistuneessa sisäisen toimitusketjun johtamisessa. Tutkimus myös tuotti uutta teoreettista tietoa hyödyntämällä poikkeavia ja uusia tutkimusmenetelmiä. Tutkimus esimerkiksi painottaa useamman osaston ja eri organisaatiotason samanaikaisen tutkimisen tärkeyttä, mikäli halutaan todenmukaisia tuloksia sisäisen integraation tasosta. Tutkimus todistaa, että mielipiteet vaihtelevat organisaation eri osastojen ja tasojen, kuten myös yksittäisten yksilöiden välillä. Liian kapean fokuksen käyttäminen voi näin ollen johtaa vääriin analyysiin.

Tutkimuksessa hyväksikäytetyt, poikkeavat tutkimusmenetelmät toisaalta muodostavat metodologista kontribuutiota itsessään. Tutkimus tarkasteli useampaa osastoa, useamman organisaatiotason ja tiedonantajan kautta, pidempänä ajanjaksona – pitkittäistutkimuksena.

Lopuksi, tutkimuskohteen näkökulmasta katsottuna, tutkimus antaa tehtaana edustajille syväkuvauksen tutkimuksessa tarkasteltujen kolmen osaston toiminnoista kolmena eri aikakautena, sekä analyysin kyseisten osastojen välisestä tämän hetkestä (kevät-syky 2015) että oletetusta tulevaisuuden sisäisen integraation tasosta ja ominaispiirteistä. Lisäksi tehtaalle annetaan yksilöityjä ja suoria kehittämissuhteita toimintojensa järkevöittämiseksi ja tehostamiseksi.

Avainsanat: informaation vaihto, koordinointi, osaaminen, paperiteollisuus, pitkittäistutkimus, sisäinen integraatio, tapaustutkimus, toimitusketju, yhteistyö

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I wish to dedicate my work to my husband and son; I love you, thank you for being in my life.

From the shine of the lights of the navigation marks, by the lake Saimaa,  
9<sup>th</sup> September 2016

Minna Porasmaa

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# 1 INTRODUCTION

## 1.1 Motivation of Research Topic

The purpose of the current section is to present, why the topic of the research, internal integration, is worth researching and why it should be of both further academic and general managerial interest. The section begins by positioning the concept of internal integration within the larger supply chain management context and by presenting which potential positive and negative consequences creating and maintaining tighter internal integration could have.

Moreover, the section continues by presenting the current status of various definitions of the concept of internal integration and various analyses approaches used to analyze the level of internal integration discussed and found in previous supply chain management research literature. Finally, the section ends with presenting deficiencies in the existing research literature – by presenting research gaps needing further research.

### *1.1.1 Internal Integration in Supply Chain Management Context*

Already since the introduction of the concept of Supply Chain Management by Oliver and Webber (1982) in the early 1980s, researchers and practitioners have recognized the need and potential of supply chain integration. It has been noted that those companies that are able to manage their supply chains as single, seamless entities, are better at meeting the needs of the customers than their rivals. Consequently those companies and chains gain competitive advantage over their competitors and survive in the ever tightening competition. (Hayes & Wheelwright, 1984; Lynagh & Poist, 1984; Stevens, 1989.) It is not anymore the individual companies that compete, but the supply chains they form (Christopher, 1997; Christopher, 1998).

Supply chain integration has its background in the systems perspective (Parnaby, 1979) in which the optimization of the whole generates better end results than optimizing each of the individual sub-systems separately (Childerhouse & Towill, 2011). In the context of supply chain management (SCM) this means that ideally the supply chains – consisting of various parties and functions within and exceeding the company borders – should be treated, developed, and improved as single entities instead of developing separate individual links/functions along the

chain. In fact, in its essence the entire concept of SCM can be said to be built and lean on integration (Stank *et al.*, 2001b; Pagell, 2004; Chen *et al.*, 2007). According to Pagell (2004), “well managed supply chains are ones where all value creating processes work together to provide the highest level of customer value. Poorly managed chains [on the other hand] will have evidence of one or more value creating process working at cross-purposes to the others”.

Supply chain integration consists of *internal* and *external* integration where internal (intra-organizational, intra-functional, cross-functional) integration refers to integration across various parts/functions *within* an organization and external (inter-organizational) integration to integration existing *between* different organizations (Pagell, 2004; Gimenez & Ventura, 2005). In order to reach real supply chain integration – and a well-functioning supply chain –, both forms of integration should be addressed and successfully managed (Daugherty *et al.*, 1996; Stank *et al.*, 2001a; Stank *et al.*, 2001b; Gimenez & Ventura, 2003; Gimenez & Ventura, 2005).

Several researches have suggested that internal integration should precede external integration. Organizations should thus first “put their own houses in order” and ensure the existence of integration between their own, separate functions before engaging in integration activities with upstream (suppliers) and downstream (customers) partners in the supply chain (Gimenez & Ventura, 2003; Mentzer, 2004; Gimenez & Ventura, 2005; van Hoek *et al.*, 2008; Flynn *et al.*, 2010; Childerhouse & Towill, 2011; Huo 2012). Gained internal integration has additionally been seen to aid the elicitation of external integration (Gimenez & Ventura, 2005; Braunscheidel & Suresh, 2009; Huo 2012).

Internal integration discusses how well the different functions/departments within one organization work together as one single entity. The ideology of internal integration is to move from the traditional, functional “silo mentality”, where concentration is on each function separately, to combining the separate functions into and driving them as one, larger entity (Gimenez & Ventura, 2005; van Hoek *et al.*, 2008).

### ***1.1.2 Potential Positive Consequences of Internal Integration***

Whereas high levels of *overall* (internal plus external) supply chain integration have been linked with superior, winning performance (e.g. Daugherty *et al.*, 1996; Ellinger *et al.*, 1997; Lee 2000; Stank *et al.*, 2001a; Flynn *et al.*, 2010; Childerhouse & Towill, 2011; Huo 2012) – especially in environments of high supply chain complexity (Gimenez *et al.*, 2012) –, better decision making, (Ellinger *et al.*, 1997; Childerhouse & Towill, 2011; Prajago & Olhager, 2011) and rationalization of cost-efficiency, productivity, and customer satisfaction

(Daugherty *et al.*, 1996; Stank *et al.*, 2001a; Childerhouse & Towill, 2011), internal integration has also been posited to result in several operational and performance benefits (e.g. Flynn *et al.*, 2010; Huo 2012).

Gained internal integration has been seen to, for example, facilitate knowledge and information sharing across functions (Gimenez & Lourenco, 2008; Wong *et al.*, 2013; Swink & Schoenherr, 2014), enable better, faster, and more diversified decision making (Stank *et al.*, 2001b; Chen *et al.*, 2007; Swink & Schoenherr, 2014), help companies to develop a shared understanding across functions (Stank *et al.*, 1999; Swink & Schoenherr, 2014), and consequently to reduce cross-departmental conflict (Chen *et al.*, 2007). Gained internal integration has thus been seen to improve the organization's capabilities to coordinate/align/synchronize the operations of its different, individual functions/departments (Sheremata, 2000; Schoenherr & Swink, 2012; Swink & Schoenherr, 2014) and to both coordinate and exploit its internal resources (Wong *et al.*, 2013), leading to diminished effort redundancy and wasting of resources (Kahn & Mentzer, 1998; Stank *et al.*, 2001a; Stank *et al.*, 2001b ; Pagell, 2004).

In addition to the *operational* benefits mentioned above, internal integration has been linked with such *performance* benefits as, for example, better profitability (Chen *et al.*, 2007; Swink & Schoenherr, 2014), better overall company and financial performance (e.g. Kahn & Mentzer, 1998; Stank *et al.*, 2001a; Chen *et al.*, 2007; Flynn *et al.*, 2010; Solakivi *et al.*, 2015; Zhao *et al.*, 2015), increased productivity (Stank *et al.*, 2001b; Childerhouse & Towill, 2011), and increased organizational effectiveness and (cost) efficiency (e.g. Stank *et al.*, 2001a; Sawhney & Piper, 2002; Solakivi *et al.*, 2015; Zhao *et al.*, 2015). In addition, tighter internal integration has been seen to lead to, for example, greater customer satisfaction (e.g. Kahn & Mentzer, 1996; Ellinger *et al.*, 2000; Sawhney & Piper, 2002; Chen *et al.*, 2007), increased competitive advantage and capability (e.g. Ellinger *et al.*, 2000; Sawhney & Piper, 2002; Chen *et al.*, 2007; Kim, 2009; Cao & Zhang, 2011; Zhao *et al.*, 2015), and greater employee satisfaction (Kahn & Mentzer, 1996). Childerhouse & Towill (2011) summarize the meaning and importance of internal integration into one sentence: "It is difficult to envisage any circumstance where internal integration ... will not prove essential to enabling continuing competitiveness".

### ***1.1.3 Potential Implementation Challenges and Negative Consequences of Internal Integration***

Although the potential benefits of overall and internal supply chain integration seem to be evident, in practice the majority of the supply chains still are not inte-

grated internally and/or externally; on the contrary, real integration is very rare (Ellinger, 2000; Pagell, 2004; Childerhouse & Towill, 2011). Concentrating on the topic of the research, internal integration, this may be at least partly due to the fact that despite the tempting benefits, the implementation of internal integration in practice is not self-evident and unproblematic.

Creating tighter internal integration, for example, demands considerable time and effort (Song & Xie, 2000; Thai & Hsu, 2014; Zhao *et al.*, 2015). As time is money, the time consuming integration efforts, on the other hand, may turn costly for the company (Patrashkova-Volzdoska *et al.*, 2003; Gimenez *et al.*, 2012) and may lead to losses in efficiency and productivity (Zhao *et al.*, 2015). The integration efforts may also slow down the company's agility – decision making time and consequently reaction ability and time to, for example, market changes (Smith *et al.*, 1994; Uhl-Bien & Graen, 1998; Song & Xie, 2000; Das *et al.*, 2006; Fabbe-Costes & Jahre, 2008; Troy *et al.*, 2008).

The integration process also demands a devoted and determined leader; a person with both profound supply chain management knowledge and understanding in addition to high-level people management skills (Fawcett *et al.*, 2010). Such multi-talented persons are rare in nature and availability (Ibid.). Moreover, top management support is also crucial; without it, the endeavor is sure to fail (Zhao *et al.*, 2015).

Having achieved some level of internal integration, challenges still prevail. For example, conflicts between individuals and functions may still arise (Zhao *et al.*, 2015), decision making may be delayed (Smith *et al.*, 1994; Song *et al.*, 1998; Song & Xie, 2000; Troy *et al.*, 2008), flexibility of managing the operations may be restrained (Jahre & Fabbe-Costes, 2006), and consequently the company's efficiency, productivity, and reactivity may be decreased (Das *et al.*, 2006; Fabbe-Costes & Jahre, 2008; Zhao *et al.*, 2015). Additionally, the more pervasive decision making may also overload the company's information processing capabilities and consequently inhibit the company's performance (Zirger & Hartley, 1996; Grover *et al.*, 2006). The interfaces between the different departments also need to be constantly monitored and managed (Song *et al.*, 1998; Zhao *et al.*, 2015).

Other negative consequences that have been linked with internal integration include such factors as, for example, information overflow (Gunasekaran & Ngai, 2004; Villena *et al.*, 2011), increased coordination costs (Cuijpers *et al.*, 2011; Zhao *et al.*, 2015), budget overruns (Olson *et al.*, 2001), and project delays and terminations, caused due to conflicts between differing views and individuals (Swink & Song, 2007; Cuijpers *et al.*, 2011).

Zhao *et al.* (2015), finally, studied the relationship between the level of internal integration and firm performance, and tried to prove that exceeding a certain level of internal integration would in fact affect the firm's financial performance

negatively. Their research, however, proved oppositely. According to Zhao *et al.* (2015), internal integration has a linear and positive effect on a company's financial performance. Thus, the higher the level of internal integration, the better financial results the firm may be able to gain.

All in all, considering all the discussion above, tighter internal (and external) integration has tempting and explicit benefits. However, the creation and maintenance of tight internal integration is a challenging task, and demands devotion. Supposedly, at least partly due to this fact the level of internal integration existing in real-life companies is rare. Internal integration is thus a topic that deserves more concentration both theoretically – academic research – and managerially – implementing the results of the academic researches in practice.

#### ***1.1.4 Definitions of Internal Integration in Existing Research Literature***

Internal integration, also known as cross-functional, inter-functional, and inter-departmental integration (Swink & Schoenherr, 2014) or alignment (van Hoek *et al.*, 2008), discusses how well the different functions/departments within one organization work together as one single entity. The ideology of internal integration is to move from the traditional, functional “silo mentality”, where concentration is on each function separately, to combining the separate functions into and driving them as one, larger entity/process (Gimenez & Ventura, 2005; van Hoek *et al.*, 2008).

Although the basic ideology behind the concept of internal integration is presumably familiar and clear to most researchers, the definition of the concept varies considerably from researcher to researcher. Many authors, in addition, do not provide a formal definition for the concept although are clearly executing integration research. Consequently, although the phenomenon has aroused large interest in the academia, a single, accepted, generalizable definition or operationalization is lacking. Many of the given definitions, however, share some common elements and tend to overlap at least partly. (Kahn & Mentzer, 1996; Kahn & Mentzer, 1998; Ellinger *et al.*, 2000; Pagell 2004.) Different wordings are also used to describe and refer to the same elements of internal integration.

When defined, integration is usually defined around interaction, collaboration, coordination, or their combination. Kahn & Mentzer (1996), for example, define internal integration as “A process of interdepartmental interaction and interdepartmental collaboration that brings departments together into a cohesive organization”. They thus see that integration is formed through combining cross-departmental interaction and collaboration and contains such elements as, for example, verbal and documented information exchange (interaction), willingness of departments to work together, team work, mutual understanding, common vi-

sion, shared resources, collective goals (collaboration), and strategic and tactical coordination (Ibid.).

Murphy and Poist (1996), on the other hand, define internal integration as “A relationship in which both ... functions experience a high level of satisfaction”. In their discussion they use the terms integration, coordination, and cooperation interchangeably, referring to the same matters. Moreover, according to them, internal integration consist of such elements as, for example, information sharing, philosophy of cooperation, joint projects, mutual goals, a unified department, job switching or rotation, top management support, coordinating committees, and a joint system of incentives. (Ibid.)

To provide a third example, Mollenkopf *et al.* (2000) define internal integration as "Information dissemination and activity coordination". According to them, internal integration consists of such elements as, for example, formal and informal cross-functional communication, cross-functional education and training, cooperative attitudes, top and middle management support, strategic focus and goals, culture of integration, and a unified reward system (Ibid.). Basnet (2013), on the other hand, defines internal integration as “Working together for the benefit of the company” and as "The holistic performance of activities across departmental boundaries". He sees that integration is formed through coordination, communication, and affective relationships, and consequently regards internal integration to contain such elements as, for example, communication (including information exchange, consultation, and interaction), working together/holistically, unity of purpose, affective relationships, and coordination/synchronization (Ibid.).

These four examples already prove that despite the usage of various terms, in many cases the different definitions overlap at least partly and/or contain similar elements. Additionally, the same phenomenon may also be referred to by using different terms. For example, coordination discussed in one definition can be interpreted to include similar elements as interaction and collaboration in another (Kahn & Mentzer, 1996; Murphy & Poist, 1996). On the other hand, for example, Mollenkopf *et al.*'s (2000) coordination elements are needed to execute collaboration stated in other definitions (and in their own as well). For example, achievement of collective goals cannot be strived for unless the goals are first being set, based on corporate strategies, and disseminated by the top management.

Despite the actual wordings of the various definitions, integration is usually seen to entail such elements as, for example, building cross-departmental relationships, working willingly together/in teams towards collective goals, solving problems jointly, creating mutual understanding and respect, sharing ideas, information, resources, and responsibilities, and nurturing a culture of integration, where the concentration is rather on collaborative, process-like teamwork operat-

ed across functional borders instead of concentrating on operations of each functional silo separately. In addition, it is also seen that the actions of the different departments need to be coordinated in order to create a unified decision of/response to the different situations at hand. (See for more discussion Table 2.)

On the other hand, integration is seen to be enabled by such factors as, for example, top management support, suitable organizational structure, culture, and infrastructure, clear dissemination of common goals, set based on corporate strategies, unified evaluation and incentive/reward system, and cross-departmental education and training (for example job rotation). (See for more discussion Table 2.)

All in all, based on all the discussion above (and on more thorough discussion in Chapter 2), it can thus be recapitulated that based on earlier research literature, integration can be seen to consist of such elements as interaction/information sharing, collaboration, and coordination. Consequently the current research also concentrates on researching and discussing these three elements of integration, and aims at providing a new, holistic definition for the concept of internal integration based on them.

### ***1.1.5 Internal Integration Analyses Approaches in Existing Research Literature***

In order to understand and analyze the existing level of internal integration between different functions/departments of companies in different contexts, several analyses approaches have been presented and utilized in previous researchers throughout the years. Some of the models are presented as clear measurement models by their creators, whereas others are articulated, for example, to illuminate enablers and inhibitors of integration.

To present some of the models/analyses approaches, for example, Mollenkopf *et al.* (2000) executed an empirical research that was conducted with the purpose of exploring factors related to marketing-logistics integration within a firm. The target of the research was to build a statistically tested model of factors that may enable or hinder the creation of tighter internal integration; the focus of the research was thus on finding factors that are practically and managerially relevant when striving for tighter integration (Ibid.). Pagell (2004), on the other hand, executed an exploratory research that was conducted with the objective of building a comprehensive model of the drivers of internal integration. The target of the research was, thus, to find factors that either enable or inhibit the integration efforts across different functions, and consequently to build a testable model for the creation of integration between the different functions discussed (operations, purchasing, and logistics) based on the factors found (Ibid.). In addition to these

two, other analyses approaches have been presented, for example, by Ellinger *et al.* (2000) and Parente *et al.* (2002).

To present a later research, Basnet (2013), on the other hand, conducted a research with the target of developing an instrument for the measurement of internal integration. He identified, selected, and excluded scale items from existing research literature and tested the resulting survey instrument amongst a sample of New Zealand manufacturers. While executing the research, Basnet (2013) noted that as the different definitions of internal integration vary from researcher to researcher, as discussed in Section 1.1.4, so do also the different scale items for measuring the level of internal integration. The items found reflected the concept of internal integration from the researchers' perspective and the context considered by them (Ibid.).

Basnet (2013) thus aimed at building an analysis model that could be utilized in other contexts and settings as well, by utilizing and combining the scales identified by previous researchers. However, while reviewing Basnet's (2013) research, the researcher of the current research noticed that Basnet excluded such scale items from further processing in the beginning of his instrument development process that the current researcher found relevant in researching and analyzing the level of internal integration in the research under scrutiny. Basnet's (2013) model was thus not regarded to be suitable to be utilized as such but a new operationalization, how to analyze internal integration, combining the ideas of previous researchers was regarded to be needed. In addition, none of the models/analyses approaches reviewed addressed the matter of importance – and consequent potential benefits – of reciprocal collaboration in the eyes of the research subjects. This deficiency emphasized the need of a new operationalization.

### ***1.1.6 Gaps in Existing Theoretical Knowledge***

As discussed above in Section 1.1.4, a generally accepted definition for the concept of internal integration is lacking. The current definitions presented vary considerably from researcher to researcher, use different wordings to refer to the same matters/phenomena, and, despite the actual wordings used, still in many cases overlap at least partly. *Thus a new, more holistic and clearer definition for the concept of internal integration is needed.*

Moreover, several researchers have presented analyses models and/or approaches in order to identify the inhibitors and enablers of and how to analyze the existing level of internal integration. However, as discussed in Section 1.1.5, the separate analyses approaches reflect the researchers' perceptions of the concept of internal integration and as such are not able to comprehensively handle all aspects of the large topic of internal integration. Basnet (2013) aimed at creating

a generalizable model for analyzing the level of internal integration. However, also from this model some potentially relevant sub-factors of internal integration were excluded; *thus a new operationalization, how to analyze the level of internal integration, is needed.* The new operationalization should also address the importance of reciprocal collaboration, neglected by previous researchers.

In addition to these two gaps, a third gap in the existing research literature was also identified. According to van Hoek *et al.* (2008), none of the existing internal integration researches discuss human resources matters as linked to internal integration. However, by using common sense, it seems obvious that the employees of different companies and their skills *must* play a role in the formation and maintaining of (tighter) internal integration. *More academic discussion concerning the various organization level employees' role and skills in the internal integration endeavors is thus needed.*

## 1.2 Research Objectives and Questions

The objective of the research under scrutiny was to address the research gaps presented above – to develop and add to the existing theoretical discussion and knowledge concerning internal integration in supply chain management context.

The objective of the research was thus to *review and bring together the existing discussion concerning internal integration in supply chain management context* – how is the term defined in existing research literature, which elements is it seen to consist of, why is it seen to be of importance, and how has it been analyzed.

Consequently the objective of the research was to create *a more holistic definition for the concept of internal integration* utilizing the three elements of internal integration identified by previous researchers, information sharing, collaboration, and their coordination. In addition, *a new operationalization for analyzing the level of internal integration* was aimed at being created.

Finally, as the human resource matters and skills of different employees as linked to internal integration have been neglected by the previous researchers, the objective of the research was also to *bring the various supply chain skills needed of different organization level employees in order to manage the internal supply chain successfully to the discussion.*

On the other hand, looking purely from the managerial perspective, the objective of the research was also to *provide information for the case company concerning the status of internal integration existing between its different departments and to provide insights for its future integration endeavors.*

Consequently, the following research questions of the research under scrutiny were formulated: *How can the concept of internal integration be holistically de-*

*fined, taking into account the different elements presented in previous research literature? How can (the level of) internal integration be holistically operationalized and analyzed, utilizing the new definition and taking into account the analyses models and approaches presented in previous research literature? And, are the findings of the current research in line with the earlier findings or does it result in deviant and/or additional results?*

In addition, as the objective of the research was also to start the discussion concerning supply chain skills as an influencer in internal integration endeavors, the objective of the research was also to answer the following question: *Which skills are needed of different organization level employees in order to manage the internal supply chain successfully?*

Finally, when again looking purely from the managerial perspective, the research also aimed at answering the following, more pragmatic questions: How do the case mill's production planning, production, and warehousing and dispatch departments operate functionally and how and in which occasions and forms do they interact with one another? What is the current level (spring-autumn 2015) of internal integration existing between the case mill's concerned departments? And, how does the current level of internal integration appear in the light of the mill's future operating environment?

### **1.3 Research Approach and Design**

The research approach and methods of the research under scrutiny were chosen and utilized in order to answer the research questions presented above (Section 1.2). In addition, the research methods were also chosen to fill the methodological gaps visible in existing research literature concerning internal integration (Section 1.3.1 and 1.3.2). The actual research approach and methods of the current research are presented and justified in Section 1.3.3.

#### ***1.3.1 Methods Used in Existing Research Literature***

According to van Hoek *et al.* (2008), most of the existing information concerning the topic of internal supply chain integration has been gained through statistically analyzed quantitative surveys testing hypothesized relationships. Only very rarely the topic has been scrutinized through qualitative research approach and research methods – for example, through case studies and in-depth interviews –, providing more in-depth views to the various issues of implementing and creating internal integration in real life settings. (Ibid.)

Moreover, most of the researches discussing the topic have been executed through examining the one-sided opinions of managers and/or directors operating in charge of the same departments (for example, logistics) in various companies. Consequently, practically all of the existing discussion concerning the topic is gained from director or manager level; the views and perspectives of other organization levels have been largely neglected. Additionally, only a very rare minority of the researches has adopted a two-sided, not to mention multi-sided, perspective to the topic – researching the different views and perspectives of the different parties/functions/departments involved in the same chain to the same matters. Not to mention, utilizing several respondents from each function. (Ellinger *et al.*, 2006; van Hoek & Chapman, 2006; van Hoek *et al.*, 2008.)

Finally, all of the existing internal integration researches can be regarded to be snap-shots of their time; thus, internal integration research adopting a longitudinal perspective, examining the topic and its development over time, is nonexistent (van Hoek *et al.*, 2008).

### ***1.3.2 Methodological Gaps in Existing Research Literature***

Considering the discussion in Section 1.3.1, the field of internal integration research within supply chain context thus has clear methodological gaps. To begin with, *there is a need for more research utilizing a qualitative research approach and methods.* Moreover, *there is a need for studying the topic through the eyes of the other organization level employees* as well; not only through the manager and director level.

Moreover, *there is a need for research scrutinizing the elements of internal integration between several (three or more) functions/departments within one organization – through the eyes of different parties involved in the same chain –, utilizing multiple respondents from each function/department.* Finally, as all existing internal integration researches are snapshots of their time, *there is a clear need for longitudinal research* – researching the same matters and their development through the time, not only at one point of time.

### ***1.3.3 Research Approach and Design Used in Current Research***

As mentioned above, the research approach and methods of the current research were chosen to answer the research questions presented in Section 1.2 and with the aim of filling the methodological gaps visible in existing internal integration research. The research was consequently executed as a *qualitative single case study*, researching the three elements of internal integration – information shar-

ing, collaboration, and coordination –, discussed earlier, 1) existing between the case mill's *three departments* – production planning, production, and warehousing and dispatch, 2) through the eyes of *three organization levels* – upper level white-collars, lower level white-collars, and blue-collars – and 3) *multiple respondents in each department*, 4) *during three different time periods* – in the old production mode and operating environment (2013), during the mill's transition from the old production mode to the new (2014–2015), and in the new production mode and operating environment (autumn 2015 onwards). The unit of analysis of the research under scrutiny was thus the mill's internal supply chain from production planning to warehousing and dispatch, and it was researched and analyzed from several perspectives.

As the topic of internal integration has primarily been studied by using quantitative ideologies “incapable of providing the depth required for this complex interdisciplinary topic” (van Hoek *et al.*, 2008), the call and need for more qualitatively oriented research was thus answered by the research under scrutiny. The research was executed as a qualitative, descriptive, abductive single case study; the purpose of the research was to increase understanding of the research phenomena – elements of internal, cross-functional integration (for example, Golicic *et al.*, 2005; Eriksson & Kovalainen, 2008; van Hoek *et al.*, 2008; Sandberg & Alvesson, 2011).

The research aimed at creating thick-descriptions of the operations of the internal functions discussed in the research under scrutiny, from the perspectives of the various informants (Golicic *et al.*, 2005), in addition to utilizing several complementary data collection methods to triangulate the findings (Golicic *et al.*, 2005; Seuring, 2005; Eriksson & Kovalainen, 2008).

The purpose of the research was to study and understand the elements of internal integration in operation, affected, guided, and limited by the real-life context in which they exist; thus a case study research was regarded to be a suitable method to be adopted (Eisenhardt, 1989; Yin, 2003.) As mentioned above, the research was executed as a single case study. According to Yin (2003), a single case approach may be chosen and justified if the case 1) is unique or extreme, 2) represents an example of a wider group of cases, 3) is revelatory, enabling observation and analyzing of a phenomenon so far inaccessible to scientific investigation, 4) provides a possibility to longitudinal research, studying the same phenomenon during two or more points of time, or 5) operates as a pilot for a multi-case setting.

All of the five points mentioned above were at least to some extent applicable in the research under scrutiny. Originally the single case approach was chosen due to the possibility of receiving a very deep and wide access to the operations of case company. The author was given a possibility to work inside the company, while still maintaining the role of an external and objective observer. As accord-

ing to van Hoek *et al.* (2008) the internal integration research studying multiple functions in addition to various organization levels is practically non-existent, the chosen case can also be regarded to represent a setting so far inaccessible for scientific research (Yin's point 3 above). As discussed in Section 1.3.1, virtually all of the previous studies, despite the research method applied, have researched the manager or director level. In addition, none of the earlier researches utilizing case study method have studied the relationship between the three functions researched in the research under scrutiny, production planning, production, and warehousing and dispatch. (Ibid.)

The feasibility of a single case approach received further verification during the progression of the research. As the research was begun in spring 2013, in April 2014 the owner of the case-mill informed to invest 110 million Euros in changing the production mode of the mill from fine papers to carton board during year 2015. The investment decision consequently also made the situation of the mill unique (Yin's point 1 above); such conversions are very rare and unique in nature, even on a global perspective.

In addition, the investment decision also provided the author an opportunity to study the internal integration phenomena during three different time periods – in the old production mode (2013), during transition from the old to new (2014-2015), and in the new production mode (autumn 2015 forward). The unique situation of the mill thus enabled the author to perform a short-term form of longitudinal research (Yin's point 4 above).

Finally, although maybe not as evident, the chosen case may also be regarded to operate as an example of similar cases (Yin's point 2 above). Though the situation of each company/mill may be somewhat different, the basic setting and modes of operating between production planning, production, and warehousing and dispatch, however, can be regarded to be similar in different process industry contexts. Moreover, although not the target of the current research, the case may also be used as a pilot-case for a future multi-case study (Yin's point 5 above).

The actual empirical research actions were executed during years 2013 and 2015. The empirical research had clearly two distinctive, though closely related, parts – 1) a detailed description of the mill's production planning, production, and warehousing and dispatch operations during three eras, and 2) a survey research and additional interviews concerning the current level (spring-autumn 2015) of internal integration of the concerned departments.

The data collection methods of the research thus consequently included introduction discussions had with different case mill representatives, a qualitative www-survey sent to all white-collar and a sample of blue-collar employees of the concerned departments, and consequent specifying interviews. In addition, the researcher made objective observations during the duration of the entire empirical research. However, openly articulated observations originally planned to be

executed at each department had to be abandoned as it became evident that they did not suit their purpose.

During the progression of the empirical research, the researcher had approximately 200 contacts with the case company representatives (meeting, electronic mail, call), excluding some very minor contacts. A detailed description of the research approach and methods utilized in the research under scrutiny – including different data collection and analyses methods –, in addition to a detailed timeline and flow chart of the different research actions can be found in Chapter 3.

## **1.4 Research Demarcations**

The research was executed purely from a supply chain management perspective. Other possible perspectives, for example, marketing & information technology, were not utilized. The research was limited to discuss the concept of internal integration. The linkage of internal integration with external integration is briefly addressed; however, the focus is very tightly on internal integration.

In order to achieve managerially applicable results while simultaneously keeping the research area focused and concise, the research was limited to study the internal integration elements between the case mill's production planning, production, and warehousing and dispatch departments. Other departments involved in the case mill's internal supply chain were not addressed and researched. In addition, the focus of the research was purely cross-departmental. The level of internal integration existing within the concerned departments was not researched and analyzed.

## **1.5 Thesis Structure**

The thesis is structured as follows: Chapter 2 presents the theoretical foundation of the research – concept and composition of internal integration, why is it of importance, supply chain management skills needed in successful internal supply chain management, and previous internal integration analyses approaches applicable in the research under scrutiny. Chapter 2 ends with a framework for analyzing internal integration in the research under scrutiny.

Chapter 3, on the other hand, presents and justifies the research approach utilized in the research under scrutiny, in addition to presenting a detailed progression of the empirical research, including detailed descriptions of the data collection and analyses methods. Chapters 4-6 on the other hand, present the empirical findings of the research: A detailed description of the case mill's production planning, production, and warehousing and dispatch operations during three eras

(in old production mode (2013-2014), during transition (2014-2015), and in new production mode (autumn 2015 onwards)), in addition to the findings of the www-survey and consequent interviews concerning the level of internal integration existing between the case mill's concerned functions during spring-autumn 2015.

Chapters 7-8, finally, present discussion and conclusions of the entire research. The empirical findings are reflected back to the existing theories and theoretical and methodological contributions of the research are discussed. In addition, a discussion concerning whether the research questions have been answered is provided. Finally, the managerial implications of the research and suggestions for further research are presented.

## 2 INTERNAL INTEGRATION

The current chapter aims at providing a holistic overview of internal integration discussion existing in extant research literature. The discussion is begun by positioning internal integration in supply chain management context. After that, the various definitions and elements of internal integration found in earlier research literature are discussed in detail in Section 2.2.

Moreover, the positive and negative consequences and implementation challenges of creating tighter internal integration are discussed in Section 2.3. A discussion concerning the various supply chain skills needed of different organization level employees in order to manage the internal supply chain successfully is also included. None of the earlier internal integration researches reviewed during the current research discusses this topic; the nonexistent nature of research papers discussing human resource matters as linked to internal integration has also been noticed by other researchers (van Hoek *et al.*, 2008). However, as the role of the personnel in the integration endeavors is regarded to be important, the discussion on various skills is included in the current research.

Finally, in Section 2.4 the current research aims at providing a clear and uniform definition for the concept of internal integration, taking into account the multitude of somewhat differing, but simultaneously overlapping, earlier definitions.

Having presented the new definition for internal integration, Section 2.5 continues with presenting various approaches used in earlier research literature in order to analyze the level of internal integration. Consequently, the section is finalized by presenting a summary of analysis approaches applicable in the current research.

Finally, the chapter is concluded (Section 2.6) by presenting a framework, how internal integration is defined, understood, and analyzed in the research under scrutiny. A new operationalization, analyzing tool for analyzing internal integration, is also presented.

### 2.1 Internal Integration in Supply Chain Management Context

Already since the introduction of the concept of Supply Chain Management by Oliver and Webber (1982) in the early 1980s, researchers and practitioners have recognized the need and potential of supply chain integration. It has been noted

that those companies that are able to manage their supply chains as single, seamless entities, are better at meeting the needs of the customers than their rivals. Consequently those companies and chains gain competitive advantage over their competitors and survive in the ever tightening competition. (Hayes & Wheelwright, 1984; Lynagh & Poist, 1984; Stevens, 1989.) Since then the phenomenon has aroused increasing interest in the academia. This is visible in the numerous researches conducted on the topic, discussing the phenomenon from various angles (e.g. Murphy & Poist, 1992; Kahn & Mentzer, 1996; Kahn & Mentzer, 1998; Ellinger *et al.*, 2000; O’Leary-Kelly & Flores, 2002; Gimenez & Ventura, 2003; Pagell, 2004; Gimenez & Ventura, 2005; Pagell & Wu, 2006; Childerhouse & Towill, 2011; Swink & Schoenherr, 2014).

Supply chain integration has its background in the systems perspective (Parabaty, 1979) in which the optimization of the whole generates better end results than optimizing each of the individual sub-systems separately (Childerhouse & Towill, 2011). In the context of supply chain management (SCM) this means that ideally the supply chains – consisting of various parties and functions within and exceeding the company borders – should be treated, developed, and improved as single entities instead of developing separate individual links/functions along the chain. Cooper *et al.* (1997), for example, define SCM as “an integrative philosophy to manage the total flow of a channel from the earliest supplier of raw materials to the ultimate customer, and beyond”. Larson and Rogers (1998), on the other hand, state SCM to be “the coordination of activities, within and between vertically linked firms, for the purpose of serving end customers at a profit”. Considering these two examples, in its essence the entire concept of SCM can be said to be built and lean on integration (Stank *et al.*, 2001b; Pagell, 2004; Chen *et al.*, 2007). According to Pagell (2004), “well managed supply chains are ones where all value creating processes work together to provide the highest level of customer value. Poorly managed chains [on the other hand] will have evidence of one or more value creating process working at cross-purposes to the others”. In other words, it can thus be said that a well-managed supply chain is an integrated supply chain (Ibid.).

Achieving a fully integrated supply chain, however, is a challenging task. In fact, full integration has been posited as a supply chain utopia by many authors (Childerhouse & Towill, 2011); it has been regarded to represent supply chain management excellence (Christopher, 2005). Supply chain integration consists of *internal* and *external* integration where internal (intra-organizational) integration refers to integration across various parts/functions *within* an organization and external (inter-organizational) integration to integration existing *between* different organizations (Pagell, 2004; Gimenez & Ventura, 2005). Therefore, in order to reach real supply chain integration – and a well-functioning supply chain –, both forms of integration should be addressed and successfully managed (Daugh-

erty et al., 1996; Stank *et al.*, 2001a; Stank *et al.*, 2001b; Gimenez & Ventura, 2003; Gimenez & Ventura, 2005).

Several researches have suggested that internal integration should precede external integration. Organizations should thus first “put their own houses in order” and ensure the existence of integration between their own, separate functions before engaging in integration activities with upstream (suppliers) and downstream (customers) partners in the supply chain (Gimenez & Ventura, 2003; Mentzer, 2004; Gimenez & Ventura, 2005; van Hoek *et al.*, 2008; Flynn *et al.*, 2010; Childerhouse & Towill, 2011; Huo, 2012). Gained internal integration has been seen to aid the elicitation of external integration (Gimenez & Ventura, 2005; Braunschaidel & Suresh, 2009; Huo, 2012). On the other hand, some researches have also indicated that efforts invested in building external integration also push the companies towards pursuing higher levels of internal integration (Stank *et al.*, 2001b; Gimenez & Ventura, 2003; Gimenez & Ventura, 2005). The “two sides of the coin”, internal and external integration, thus seem to affect and support one another positively (Stank *et al.*, 2001b; Gimenez & Ventura, 2003; Gimenez & Ventura, 2005; Chen *et al.*, 2007).

High levels of overall supply chain integration have been linked with superior, winning performance (e.g. Daugherty *et al.*, 1996; Ellinger *et al.*, 1997; Lee 2000; Stank *et al.*, 2001a; Stank *et al.*, 2001b; Flynn *et al.*, 2010; Childerhouse & Towill, 2011; Huo, 2012); especially in environments of high supply chain complexity (Gimenez et al., 2012). It has been stated that through integration, the supply chain parties can make better, wider ranging decisions based on shared information and coordination (Ellinger *et al.*, 1997; Childerhouse & Towill, 2011; Prajago & Olhager, 2011) and gain cost reductions while increasing efficiency, productivity, and customer satisfaction (Daugherty *et al.*, 1996; Stank *et al.*, 2001a; Childerhouse & Towill, 2011). Though the benefits of supply chain integration seem to be evident, in practice the majority of the supply chains still are not integrated; on the contrary, real integration is very rare (Childerhouse & Towill, 2011). Companies that are struggling with their integration endeavors thus are not alone in their predicament (Ibid.).

As the dissertation and doctoral research under scrutiny focus on internal integration of the case company, the coming sections and chapters concentrate solely on discussing the concept, consequences, and analyzing methods of internal integration.

## **2.2 Concept and Definitions**

Internal integration (II), also known as cross-functional, inter-functional, and inter-departmental integration (Swink & Schoenherr, 2014) or alignment (van

Hoek et al., 2008), discusses how well the different functions/departments within one organization work together as one single entity. The ideology of II is to move from the traditional, functional “silo mentality”, where concentration is on each function separately, to combining the separate functions into and driving them as one, larger entity/process (Gimenez & Ventura, 2005; van Hoek et al., 2008).

Although the basic ideology behind the concept of II is presumably familiar and clear to most researchers, the definition of the concept varies considerably from researcher to researcher. Many authors, in addition, do not provide a formal definition for the concept although are clearly executing integration research. Consequently, although the phenomenon has aroused large interest in the academia, a single, accepted, generalizable definition or operationalization is lacking. Many of the given definitions, however, share some common elements and tend to overlap at least partly. (Kahn & Mentzer, 1996; Kahn & Mentzer, 1998; Ellinger *et al.*, 2000; Pagell 2004.) Different wordings are also used to describe and refer to the same elements of II.

The following sub sections will first provide an overall view of different internal integration definitions and components found in existing research literature and will thereafter concentrate more on discussing interaction, collaboration, and coordination as elements of internal integration.

### ***2.2.1 Different Definitions and Integration Elements Found in Research Literature***

As mentioned above, the definition of internal integration varies from researcher to researcher. To receive an overall view of the various integration definitions presented, Tables 1 and 2 present an overview of different integration definitions and/or integration elements found in earlier research literature. Table 1 presents a brief summary of the different researches, commenting whether a formal definition for internal integration is provided, whereas the actual, full definitions and individual integration elements discussed in each research are presented in Table 2. The target of Tables 1 and 2 is not to be exhaustive, but still representative.

Table 1 Different Integration Definitions Found in Research Literature  
(Summary)

Author(s)	Context of Integration	Formal Definition of Integration
Basnet (2013)	Manufacturing-Sales-Distribution	Yes
Childerhouse & Towill (2011)	Internal + External	No
Crittenden (1992)	Marketing-Manufacturing	No
Ellinger (2000)	Marketing-Logistics	No
Ellinger <i>et al.</i> (2000)	Marketing-Logistics	Yes
Gimenez & Ventura (2005)	Logistics-Production, Logistics-Marketing, External	No
Kahn & Mentzer (1996)	Logistics-Other departments	Yes
Mollenkopf <i>et al.</i> (2000)	Marketing-Logistics	Yes
Murphy & Poist (1996)	Logistics-Marketing	Yes
O'Leary-Kelly & Flores (2002)	Manufacturing-Marketing/Sales	Yes
Pagell (2004); Pagell & Wu (2006)	Manufacturing-Purchasing-Logistics	Yes
Parente <i>et al.</i> (2002)	Sales-Manufacturing	No
Sawhney & Piper (2002)	Marketing-Manufacturing	Yes
Stank <i>et al.</i> (2001a)	Internal + External	Yes
Stank <i>et al.</i> (2001b)	Internal + External	Yes
Swink & Schoenherr (2014)	Internal/Cross-functional	Yes
Wong <i>et al.</i> (2013)	Internal + External	Yes

Table 2 Different Integration Definitions And/Or Integration Elements Found in Research Literature

Author(s)	Context of Integration	Definition of Integration	Integration Elements Mentioned, For Example (In Random Order)
Basnet (2013)	Manufacturing-Sales-Distribution	"Working together for the benefit of the company"; "The holistic performance of activities across departmental boundaries"; integration = coordination + communication + affective relationship	Work together/holistically, optimizing a common outcome/unity of purpose, coordination (=cooperation + synchronization), communication (=information exchange + consultation + interaction), affective relationship
Chidambrou & Towill (2011)	Internal + External	No formal definition; integration = coordination + shared information	Systems perspective, shared information/information integration, coordination, organizational relationship linkages, resource sharing, relationship management
Crittenden (1992)	Marketing-Manufacturing	No formal definition; integration = coordination	Supportive organizational design & strategy, top management support, shared goals, cross-functional communication, reward system, models
Ellinger (2000)	Marketing-Logistics	No formal definition; integration = collaboration	Evaluation and reward system reflecting contribution of both parties/team-based pay and compensation, cross-functional collaboration, task interdependence, informal processes based on trust, mutual respect and information sharing, joint ownership of decisions, collective responsibility for outcomes, working together across silos/as a team, cooperation (willingness), ability of individuals to build meaningful, effective interdepartmental relationships, common goals aligned with business strategies, coordination, communication, mutual understanding of responsibilities, sharing ideas, information, and resources, mutual problem solving, culture that supports joint
Ellinger <i>et al.</i> (2000)	Marketing-Logistics	Integration = Collaboration + consultation + information exchange; "Collaboration is predominantly in formal behaviors that occur between interdependent departments, based on resource and information sharing. It reflects joint ownership of decisions and collective responsibility of outcomes. Consultation is mandatory, bidirectional interactions that require personal contact between representatives from interdependent departments. Information exchange is formal, structured, documented interactions that occur between interdependent departments and do not involve personal contact."	Interaction/communication, contact related activities/personal communication/consultation, exchange of reports & schedules, collaboration, cooperation, ability of individuals to build meaningful, effective interdepartmental relationships, willingness of departments to work together, understanding each other's point of view, sharing ideas, information, and resources, achieving collective goals, informal networks, coordination; top management support, clear delineation of collective responsibility, use of cooperation-enhancing techniques, suitable reward system, market orientation, firm's learning orientation
Gómez & Ventura (2005)	Logistics-Production, Logistics-Marketing, External	No formal definition; concepts used interchangeably/mixed, no definition given for either; integration = interaction = collaboration = coordination depending on the situation	Coordination of functional areas/activities, interaction with other functional areas, shared responsibility, collaboration of internal processes, changes in organizational structure, formal teams that share information, joint planning, incentive system

*Continued*

Table 2 Different Integration Definitions And/Or Integration Elements Found in Research Literature (Continued)

Author(s)	Context of Integration	Definition of Integration	Integration Elements Mentioned, For Example (In Random Order)
Kahn & Mentzer (1996)	Logistics-Other departments	"A process of interdepartmental interaction and interdepartmental collaboration that brings departments together into a cohesive organization"; Integration = interaction + collaboration	Communication/verbal and documented information exchange (interaction); willingness of departments to work together, team work, mutual understanding, common vision, shared resources, collective goals (collaboration); strategic and tactical coordination
Mollenkopf <i>et al.</i> (2000)	Marketing-Logistics	"Information dissemination and activity coordination"	Top and middle management support, strategic focus and goals, culture of integration, cross-functional education and training, cooperative attitude, formal and informal cross-functional communication, reward system
Murphy & Poist (1996)	Logistics-Marketing	"A relationship in which both ... functions experience a high level of satisfaction"; Integration = coordination + cooperation (terms used interchangeably)	Top management support, mutual goals, joint projects, distribution specialist, information sharing, coordinating committees, education and training, situational bargaining, system of incentives, unified department, job switching or rotation, joint outings, third-party intervention, philosophy of cooperation
O'Leary-Kelly & Flores (2002)	Manufacturing-Marketing/Sales	"The extent to which separate parties work together in a cooperative manner to arrive at mutually acceptable outcomes"; Integration=cooperation + coordination + interaction + collaboration	Collaboration, cohesiveness, cooperation, coordination, communication/information exchange/interaction, mutual agreement/supportive actions, agreement and assertiveness between two entities
Pagell (2004); Pagell & Wu (2006)	Manufacturing-Purchasing-Logistics	"Integration is a process of interaction and collaboration in which manufacturing, purchasing and logistics work together in a cooperative manner to arrive at mutually acceptable outcomes for their organization"; integration = interaction + collaboration	Interaction, collaboration, mutually acceptable outcomes; structure and culture of the organization, reward system (plant/organizational goal), amount of formal and informal communication across functions (cross-functional teams, job rotation, physical proximity), level of consensus, top management support
Parente <i>et al.</i> (2002)	Sales-Manufacturing	No formal definition; integration = interface	Relationship, connectedness, conflict, coordination
Sawhney & Piper (2002)	Marketing-Manufacturing	"At the heart of functional integration is the concept of an organization as an interrelated collection of processes rather than an interacting set of functional units"; Integration = interface = process	Close and collaborative relations, shared vision, processes that cut multiple functions in the organization, effective and timely communication, cooperation, unified approach, consultation, cross-functional objectives, managerial support for joint-working and training initiatives, daily meetings, common lunches, locating the departments close to one another
Stank <i>et al.</i> (2001a)	Internal + External	"The competency of linking internally performed work into a seamless process to support customer requirements"; "The core competence derived from linking internal activities to best support customer requirements at the lowest total systemcost."; Integration = coordination	Managing different functions holistically as part of interconnected system/process, process coordination, cross-functional unification, cross-functional work teams, standardized operational and administrative policies/procedures/practices, simplified operations, focusing resources to exceptional cases, structural adaptation, alignment, information sharing, communication

Continued

Table 2 Different Integration Definitions And/Or Integration Elements Found in Research Literature (Continued)

Author(s)	Context of Integration	Definition of Integration	Integration Elements Mentioned, For Example (In Random Order)
Stank <i>et al.</i> (2001b)	Internal + External	"Collaboration is a process of decision making among independent parties. It involves joint ownership of decisions and collective responsibility for outcomes"; Integration = collaboration (research in question concentrates on collaboration, however, it is also mentioned that research usually concentrates on either interaction, collaboration, or their combination)	Willingness and commitment to work together, relationships, trust, mutual understanding, common vision, shared resources, collective/common bond or goal, cross-departmental scope, intraorganizational coordination, esprit de corps, shared control over a dynamic and value-added process, information sharing
Swink & Schoenherr (2014)	Internal/Cross-functional	"Mutual alignment of cross-functional interdependencies through interaction, information sharing, and collaboration"; "Extent to which intra-firm functional teams (operations, logistics, sales, marketing, supply management) work together to accomplish supply chain planning and execution"; integration = interaction + collaboration + coordination	Effective and accurate information sharing/processing and dissemination, collaboration, connectivity, coordination, awareness of functional interdependencies and biases, utilization of each department's strengths and competencies, common goals/communication of and commitment to a single plan, team-oriented structures, cross-functional planning processes, rotational job assignments, liaison roles, integrated information systems, supportive organizational infrastructures and processes
Wong <i>et al.</i> (2013)	Internal + External	"The extent to which the internal functions are working collaboratively"; Integration = collaboration = coordination	Working collaboratively, coordinating internal resources and functions, removing functional barriers, encouraging cooperation, using cross-functional teams, sharing of knowledge across functions

As can be seen in Table 2, when defined, integration is usually defined around interaction, collaboration, coordination, or their combination. Despite the usage of various terms, in many cases the different definitions overlap at least partly and/or contain similar elements. Additionally, the same phenomenon may also be referred to by using different terms. For example, Murphy and Poist's (1996) *coordination* can be interpreted to include similar elements as Kahn & Mentzer's (1996) *interaction and collaboration* (for example, emphasis on cooperation, cross-functional relationships, and mutual goals). On the other hand, Crittenden's (1992) and Mollenkopf *et al.*'s (2000) *coordination* elements are needed to execute *collaboration* stated in other definitions (and in their own as well). For example, achievement of collective goals cannot be strived for unless the goals are first being set, based on corporate strategies, and disseminated by the top management.

On the other hand, as can be seen in Table 2, despite the actual wordings of the various definitions, integration is usually seen to entail such elements as, for example, building cross-departmental relationships, working willingly together/in teams towards collective goals, solving problems jointly, creating mutual understanding and respect, sharing ideas, information, resources, and responsibilities, and nurturing a culture of integration, where the concentration is rather on collaborative, process-like teamwork operated across functional borders instead of concentrating on operations of each functional silo separately. In addition, it is also seen that the actions of the different departments need to be coordinated in order to create a unified decision of/response to the different situations at hand.

On the other hand, integration is seen to be enabled by such factors as, for example, top management support, suitable organizational structure, culture, and infrastructure, clear dissemination of common goals, set based on corporate strategies, unified evaluation and incentive/reward system, and cross-departmental education and training (for example job rotation).

In other words, it can thus be recapitulated that, based on earlier research literature, integration contains elements of interaction, collaboration, and coordination. These three elements are consequently discussed in more depth in the following sub sections.

### **2.2.2 Interaction and Collaboration**

When defined, II is often defined around three perspectives: as 1) a series of interactions or 2) collaborative behavior occurring between different departments/functions, or 3) their combination (Kahn & Mentzer, 1996; Kahn & Mentzer, 1998; Ellinger *et al.*, 2000; Stank *et al.* 2001b). When the *interaction* element is emphasized, integration is used to refer to *communication activities*,

such as formal meetings and documented information exchange/flow occurring between different departments/functions (Kahn & Mentzer, 1996; Kahn & Mentzer, 1998). The ideology behind these definitions is that the more there is interaction, the higher is the level of integration.

According to Ellinger *et al.* (2000), the interaction activities tend to be *mandatory, formal* and *structural* in nature, and somewhat *tangible*. Consequently they can also be tracked, monitored, and measured (Ibid.). When the interactive nature of integration is supported, companies/managers tend to rely on increasing the number of formal meetings, amount of written documentation, and overall flow of information between the different departments as a means of gaining tighter interdepartmental unity (Kahn & Mentzer, 1996; Kahn & Mentzer, 1998). In other words, it is seen that the more there is information available and formal information sharing, the tighter will be the integration.

However, although the formal, interdepartmental information sharing/interaction can be regarded to be an important element of internal integration, communication alone may not provide integration (Kahn & Mentzer, 1996). In fact, it has been stated that emphasizing too much interaction and exchange of information may even hinder integration. Large amount of compulsory meetings, consultations, massive documentation efforts, and information overload may rather burden the personnel than create integration between the different departments. (Kahn & Mentzer, 1996; Kahn & Mentzer, 1998; Ellinger *et al.*, 2000.) Designated and compulsory interaction/information exchange points, for example monthly meetings, also do not guarantee the creation of internal integration. Though sitting regularly around the same table, different functions may rather still concentrate on optimizing their own, internal processes and use the common meetings to further their own agendas, instead of adopting a wider perspective on various matters. (Kahn & Mentzer, 1996; Kahn & Mentzer, 1998.)

Extensive compulsory and formal information sharing and interaction as such thus are not the keys to integration success. Though certain level of formal information sharing is obviously needed between the different departments/functions (Kahn & Mentzer, 1998), integration cannot be created by simply increasing the amount of information exchange executed in various forms between the different departments.

The second stream of definitions concentrates on the *collaborative behavior* between the different departments. The ideology between these definitions is that integration is achieved by the departments voluntarily working together (as opposite to the compulsory nature of communication emphasized in the interaction definitions), fostering teamwork, sharing information, resources, vision, goals and rewards, and building affective cross-departmental relationships (Kahn & Mentzer, 1996; Kahn & Mentzer, 1998; Ellinger, 2000; Ellinger *et al.*, 2000; Stank *et al.*, 2001b.) Compared to the first stream of definitions, collaboration is

seen to be a more *intangible, voluntary* process that cannot be mandated or formalized, nor easily measured or monitored (Ellinger *et al.*, 2000). It emphasizes cooperation and is built on various individuals' abilities of creating meaningful relationships (Ellinger, 2000). As opposed to interaction, "collaboration encourages *informal* interdepartmental efforts, which are *unstructured* in nature" (italics added by the author) (Kahn & Mentzer, 1998). Instead of establishing transactional information linkages (interaction view), it focuses on building long term, continuous relationships and *esprit de corps* between the different departments (Kahn & Mentzer, 1996; Stank *et al.*, 2001b).

The companies/managers supporting collaboration as a means of II put effort on setting and reaching collective goals, creating and maintaining mutual respect and understanding, and encouraging teamwork and relationship-building between the different departments. In an ultimate case, the "departments in a collaborative environment would view themselves as highly interdependent, working together to achieve mutual/shared goals. Such goals would stem from shared vision for the company to which all departments agree." (Kahn & Mentzer, 1998.)

Though potentially tempting, the adoption of a collaborative philosophy may require dramatic changes of organizational culture and climate from the adopting organizations. It, for example, requires authorization of decentralized decision making, investments in time and money to provide cross-functional training for the employees, and willingness to adopt new, and in the beginning possibly confusing, ways of behaving both from the management and lower level employees (Kahn & Mentzer, 1996; Kahn & Mentzer, 1998; Stank *et al.*, 2001b). As was the case with the interaction view, a question also remains whether collaboration alone can create tighter cross-functional integration and consequently help the company to reach its goals, or whether it is only able to improve relationships within the organization (Kahn & Mentzer, 1998).

A third set of definitions consequently suggests that integration is *a combination of interaction and collaboration*. According to these definitions, integration is achieved through balancing interaction and collaboration activities based on the situation at hand; both types of activities are needed and may provide "unique, significant contributions". (Kahn & Mentzer, 1998).

Kahn & Mentzer (1996), for example, define interdepartmental integration as "a process of interdepartmental interaction and interdepartmental collaboration that brings departments together into a cohesive organization". They regard interaction and collaboration as separate processes, where interaction represents the formal, information exchange aspects of cross-functional activities and collaboration the willingness of the different functions/departments to work together. In other words, interaction represents the formal and structured "hardware" and collaboration the attitudinal, affective, and volitional "software" of the interdepartmental activities and relationships. (Ibid.)

According to Kahn & Mentzer (1996), “different logistical situations might require different degrees of interaction and different degrees of collaboration to achieve successful performance”. Companies/managers adopting the composite view of integration should thus utilize the opportunities of each aspect and ponder case by case whether the situation at hand requires more or less interaction and more or less collaboration between different functions/departments (Ibid.) A model created by Kahn & Mentzer (1996), presenting the different options of interdepartmental integration based on interaction and collaboration, is presented in Figure 1.

<b>Interdepartmental interaction</b>	High interaction	<ul style="list-style-type: none"> <li>• Stable product lines</li> <li>• Stable markets</li> <li>• Available time</li> <li>• Lower uncertainty</li> </ul>	<ul style="list-style-type: none"> <li>• Complex products</li> <li>• Complex orders</li> <li>• Mission-critical items</li> <li>• Key customer accounts</li> </ul>
	Low interaction	<ul style="list-style-type: none"> <li>• Department-specific activities</li> <li>• Third-party logistics</li> </ul>	<ul style="list-style-type: none"> <li>• Product launches</li> <li>• New facility parameters</li> <li>• Special customer orders</li> <li>• High uncertainty</li> <li>• Short-term episode</li> </ul>
		Low collaboration	High collaboration
<b>Interdepartmental collaboration</b>			

Figure 1 Different Options of Interdepartmental Integration (Kahn & Mentzer, 1996)

As can be seen in Figure 1, more complex management situations require higher levels of interaction and collaboration. The X and Y –axes also entail “built-in” implications. Considering the interaction -axis, more interaction corresponds to “a more structured (bureaucratic) approach to managing interdepartmental relationships” as interaction adds formal structure. On the collaboration – axis, on the other hand, more collaboration corresponds to “a more relational (open organizational culture) approach” to managing cross-functional activities. (Ibid.)

Presenting a few examples from Figure 1 (see more from Kahn & Mentzer, 1996), stable markets and product lines – exacerbating so called “routine cases” – , can be handled by emphasizing interaction, that is by keeping the involved departments informed of all relevant details, extensive collaboration is not needed. However, in situations where the reaction time is limited, situations change

quickly, and documented information is unreliable or unavailable, interdepartmental collaboration should be emphasized. Such situations include, for example, new product launches, facility openings and/or shutdowns, and answering to sudden, surprise customer orders/needs. These types of cases are usually short-term, immediate and/or unique in nature. (Ibid.)

The biggest challenge for managing interdepartmental integration is presented in upper right corner of Figure 1. In situations where critical and/or complex products are being delivered to customers, orders are tailored to precise customer specifications, or orders are otherwise complex and entail a large amount of exceptions, both high interaction and high collaboration are needed to manage the situations successfully. The challenge in such situations is to find the right balance of interaction and collaboration to match each special case – neither should overly dominate nor be neglected. (Ibid.)

All in all, despite the situation, according to Kahn & Mentzer (1998) usually interaction alone – exchanging information through mandated, formal structures – is not a sufficient factor in creating interdepartmental integration and in achieving consequent better performance. Certain level of interaction is undoubtedly needed between the different departments; collaboration, however, appears to be the key factor in creating interdepartmental unity. Companies/managers striving to create internal integration should thus rather concentrate on supporting interdepartmental relationship building, informal teamwork, and achieving goals collectively, rather than organizing more formal meetings and forcing massive documentation efforts. (Ibid.)

Providing another example of a definition combining the interaction and collaboration aspects, Ellinger *et al.* (2000) propose that integration has three distinct behavioral dimensions: collaboration, consultation, and information exchange. According to them, “collaboration is predominantly informal behaviors that occur between interdependent departments, based on resource and information sharing. It reflects joint ownership of decisions and collective responsibility of outcomes.” Consultation, on the other hand, is “mandatory, bidirectional interactions that require personal contact between representatives from interdependent departments”. Information exchange, finally, refers to “formal, structured, documented interactions that occur between interdependent departments and do not involve personal contact”. (Ibid.)

Ellinger *et al.* (2000) thus principally follow the same ideology as Kahn & Mentzer (1996) but further divide the interaction characterization into two distinct parts, to contact-related activities that do and do not involve personal communication (for example, telephone conversations, meetings, electronic mails) and to exchange of reports and schedules. According to Ellinger *et al.* (2000), when personal communication occurs between the different departments, in one form or the other, the different parties can consult one another – ask for advice,

exchange relevant information – and gain wider perspectives on a myriad of topics.

As was the case with Kahn & Mentzer (1998), although Ellinger *et al.* (2000) comment that also the consultation and information exchange efforts may include interdepartmental teamwork and information sharing, only executed as part of the collaboration efforts will they be effective and lead to tighter integration. In a collaborative environment the teamwork and information sharing actions are *real* and executed willingly, not forced by, for example, the top management. Communication coupled with collaboration, rather than communication alone, will thus lead to integration and performance success. Informal networks (collaboration) rather than formal organization structures (interaction) are also seen to be more effective in influencing organizational activities and outcomes. (Ibid.)

### 2.2.3 *Coordination*

Instead of concentrating on interaction and collaboration, some researchers posit that internal integration is created through *coordination* of activities of different departments. Crittenden (1992), for example, does not provide an exact definition for the concept of integration but uses the term *interfunctional coordination* to equal with interfunctional integration. According to her, interfunctional coordination is gained through four facilitating mechanisms: organizational design, communication, reward system, and models. (Ibid.)

Organizational designs that drive towards tighter integration (coordination) are such that “nurture integrative activities and that replace functionally specialized structures”. Such designs are characterized by, for example, decentralized authority and decision making, usage of teams, rotation of people through functional roles, and matrix organizations. Integration, on the other hand, also demands improved and effective communication between the different parties. An example of a suitable method for improving communication is the usage of cross-functional workshops. Communication may also be improved by locating the different parties/functions/departments physically close to one another. Employee stability may also foster communication. (Ibid.)

Additionally, to reach integration, the used reward systems should be such that they reflect the concerns of all linked parties. Different departments should thus work towards reaching the same goals and be rewarded based on joint achievements. The joint goals should be clearly communicated by the top management and should be based on the corporate strategy and goals; that is, achieving the joint goals should lead towards fulfilling the corporate goals. Finally, different models could be used to advance internal integration. Unfortunately, many of the

designed mathematic models, however, fail to incorporate the dynamic nature of business operations or are too complex to be used. (Ibid.)

Murphy and Poist (1996) also use the term *interfunctional coordination* to describe interfunctional integration. According to them, coordination also equals with *cooperation*; they consequently use the terms interchangeably. They additionally also use the term *interfunctional interface* while discussing activities executed between the different departments. (Ibid.)

Murphy and Poist (1996) define cooperation (coordination/integration) as “a relationship in which both ... functions experience a high level of satisfaction”. According to their research (1996), the most commonly used technique to foster cooperation was top management support. Other popular methods included information sharing procedures and instilling a philosophy of cooperation. Moreover, according to them, other possible, adoptable interdepartmental coordination/integration methods include such elements as, for example, mutual goals, joint projects, coordinating committees, cross-functional training, situational bargaining/consulting, using neutral third-party negotiators, joint reward system, creation of a unified department, job switching or rotation, and informal get-togethers. (Ibid.)

According to Murphy and Poist (1996), the adoption of the techniques mentioned above demand rather change in corporate culture and attitudes than formal organizational change or substantial expenditures. While creating cooperation/coordination between the different departments, it should also be remembered that it is fact people who cooperate, not the departments as such. According to Murphy and Poist (1996), personality conflict is a potential obstacle to cooperation. “Interpersonal dynamics [thus] still represent an important determinant in the efficiency of corporate operations” (Ibid.).

Mollenkopf *et al.* (2000), on the other hand, define interfunctional integration to be based on *information dissemination* and *activity coordination*. Information dissemination refers to the sharing of information between the different functions, whereas activity coordination refers to the ideology that actions of various departments/functions need to be coordinated in order to create a unified response to customer demand and requests. Both information dissemination and activity coordination are needed to create functional integration. (Ibid.)

According to Mollenkopf *et al.* (2000), strategic management is a crucial enabler for the creation of functional integration. Achieving and fostering integration should thus be incorporate into the strategic focus of the organization. At the middle management level, on the other hand, managers can advance the creation of integration by encouraging cross-functional education/training (both formal education and, for example, periodic job swaps) of the employees and expediting and inciting cooperative attitudes. (Ibid.) All in all, according to Mollenkopf *et al.* (2000), both top and middle management play a very important role in creat-

ing functional integration. They can “influence the level of functional integration despite the firm’s structure of hierarchy” (Ibid.).

Integration can also be enhanced by keeping the barriers between the departments as low as possible and fostering both formal and informal contact across functions. The more the employees are accessible to one another, the more there will be contact, and the higher is the level of achievable integration. Cross-departmental coordination may also be furthered by the usage of common rewards. (Ibid.) Mollenkopf *et al.* (2000), however, note that the reward systems may not, in fact, induce actual integration. According to them, rewards cannot replace *a culture of integration* that stems from the top management and strategies of the organization (Ibid.).

## **2.3 Positive and Negative Consequences, Implementation Challenges**

The purpose of the current section is to present why internal integration is important, which potential benefits it could provide. On the other hand, also the potential negative consequences and challenges in implementing and maintaining tighter internal integration are presented. As the different employees are also regarded to play an important role in the (internal) integration endeavors of different companies, the different employee skills needed in successful internal supply chain management are also discussed.

### **2.3.1 Operational and Performance Benefits**

As the current research under scrutiny does not concentrate on researching the relationship between internal integration and performance, the potential operational and performance benefits gained through tighter integration are only briefly presented. It is, however, beneficial to discuss the potential consequences on a general level in order to illuminate the importance of internal integration and why it is worth researching and to be strived for.

Starting with the *operational benefits*, according to Swink & Schoenherr (2014), internal integration (II) “helps workers across functions to process gathered information better and faster, to develop a shared understanding, and distribute it to the most appropriate constituent within the firm, thus providing an important infrastructural support for value-creating processes”. Gained II thus facilitates knowledge and information sharing across functions (Gimenez & Lourenco, 2008; Wong *et al.*, 2013) and enables better and faster decision making by reducing the bounded rationality of various individuals (Stank *et al.*,

2001b; Chen *et al.*, 2007; Swink & Schoenherr, 2014). Bounded rationality refers to the phenomenon that employees working in different functions possess different world views, pursue different goals, and have differing priorities and thus possess biased preferences and make decisions based on incomplete information (Williamson, 1985; Swink & Schoenherr, 2014). As II aids organizations to better “synthesize information, put it into context, and facilitate more comprehensive decision-making”, it works towards reducing the bounded rationality of individual employees (Swink & Schoenherr, 2014).

Moreover, as mentioned above, II helps companies to develop a shared understanding across functions (Stank *et al.*, 1999; Swink & Schoenherr, 2014) and consequently reduce cross-departmental conflict (Chen *et al.*, 2007). Representatives of different functions/departments thus gain a broader and more comprehensive picture of the processes and objectives of the organization and are able to better locate and utilize the different resources that can be found in different departments (Keller, 2001; Swink & Schoenherr, 2014). II thus improves the organization’s capabilities to coordinate/align the operations of its different, individual functions/departments (Schoenherr & Swink, 2012) and to both coordinate and exploit its internal resources (Wong *et al.*, 2013), leading to diminished effort redundancy and wasting of resources (Kahn & Mentzer, 1998; Stank *et al.*, 2001a; Stank *et al.*, 2001b ; Pagell, 2004). “Greater connectivity and coordination across firm functions [on the other hand] can break down the “silo” mentality and local optimization, fostering a process view and enabling global optimization” (Swink & Schoenherr, 2014; based on Lawrence and Lorsch 1967). The commitment to achieving a common goal (global optimization mentioned above), on the other hand, leads to more internally consistent and synchronized actions (Sheremata, 2000) and promotes decision making which takes into account the possibly varying interests of different departments (Swink & Schoenherr, 2014).

Briefly summarizing, according to Pagell (2004), the achieved II helps the different functions/departments to better work together as a single, seamless entity and leads to enhanced cross-functional communication, collaboration, coordination, and utilization of each function’s strengths and competencies. In addition, II “may further foster unique relationships between individuals in the firm, going beyond simple or mechanistic connections” (Swink & Schoenherr, 2014).

It is thus interesting to notice that the same factors that are seen as prerequisites of internal integration – communication/interaction/information sharing, collaboration, and coordination –, are simultaneously also consequences of and enforced through the achieved internal integration. Once achieved, tight internal integration can thus be interpreted and seen to maintain and strengthen itself.

The claimed *performance benefits* achieved through tight internal integration, on the other hand, are multitude. For example, the benefits presented in Table 3

have been mentioned (categorized by the author of the dissertation, individual points may be overlapping).

Table 3 Performance Benefits of Tight Internal Integration

<b>Benefit</b>	<b>Authors</b>
<b>Financial/Organizational Benefits</b>	
Better profitability	Chen <i>et al.</i> , 2007; Swink & Schoenherr, 2014
Better overall company performance/business success	Kahn & Mentzer, 1998; Ellinger <i>et al.</i> , 2000; Stank <i>et al.</i> , 2001a; Stank <i>et al.</i> , 2001b; Chen <i>et al.</i> , 2007; Flynn <i>et al.</i> , 2010
Improved/better/superior financial performance (sales volume, profit margin, return on assets)	Chen <i>et al.</i> , 2007; Solakivi <i>et al.</i> , 2015; Zhao <i>et al.</i> , 2015
Better/increased productivity	Stank <i>et al.</i> , 2001b; Childerhouse & Towill, 2011
Increased economies of scale and broader trade-offs	Childerhouse & Towill, 2011
Better organizational effectiveness and efficiency	Sawhney & Piper, 2002; Stank <i>et al.</i> , 2001b; Zhao <i>et al.</i> , 2015
Reduced total costs, increased cost efficiency	Stank <i>et al.</i> , 2001a; Stank <i>et al.</i> , 2001b; Solakivi <i>et al.</i> , 2015
Lower logistics costs	Solakivi <i>et al.</i> , 2015
Higher forecast accuracy	Kahn & Mentzer, 1996
Lower need of asset buffers (cash, inventory) due to improved planning and forecasting	Swink <i>et al.</i> , 2007
<b>Customer Related Benefits</b>	
Better customer service/greater customer satisfaction/greater customer value	Kahn & Mentzer, 1996; Ellinger, 2000; Ellinger <i>et al.</i> , 2000; Stank <i>et al.</i> , 2001a; Stank <i>et al.</i> , 2001b ; Sawhney & Piper, 2002; Chen <i>et al.</i> , 2007
(Maximum/increased) competitive advantage and capability	Ellinger <i>et al.</i> , 2000; Sawhney & Piper, 2002; Chen <i>et al.</i> , 2007; Kim, 2009; Cao & Zhang, 2011; Zhao <i>et al.</i> , 2015
<b>Supply Chain Related Benefits</b>	
Greater/superior logistics performance	Stank <i>et al.</i> , 1999; Ellinger <i>et al.</i> , 1997; Ellinger <i>et al.</i> , 2000; Stank <i>et al.</i> , 2001a; Stank <i>et al.</i> , 2001b
Better distribution service performance (ability to meet quoted or anticipated delivery dates and quantities on a consistent basis, ability to respond to the needs and wants of key customers, ability to notify customers in advance of delivery delays or product shortages)	Ellinger, 2000; Ellinger <i>et al.</i> , 2000
Greater supply chain agility/responsiveness/flexibility	Stank <i>et al.</i> , 2001b; Sawhney & Piper, 2002; Braunscheidel & Suresh, 2009; Childerhouse & Towill, 2011
Better quality, delivery, flexibility, and cost performance	Sawhney & Piper, 2002; Schoenherr & Swink, 2012
Better delivery reliability/more on-time deliveries	Stank <i>et al.</i> , 2001a; Sawhney & Piper, 2002
Shorter lead-time promises/faster delivery speed/shorter cycle time	Ellinger, 2000; Stank <i>et al.</i> , 2001b; Sawhney & Piper, 2002
<b>Production Operations Related Benefits</b>	
Better product development and product management performance	Kahn & Mentzer, 1998; Wong <i>et al.</i> , 2013
More efficient utilization of production capacity, faster reaction ability to needed production changes	Sawhney & Piper, 2002
<b>Inventory Related Benefits</b>	
Better management of inventory levels/reduced inventories	Kahn & Mentzer, 1996; Stank <i>et al.</i> , 2001a
Maximized inventory turnover/expedited product flow	Stank <i>et al.</i> , 2001a
<b>Personnel Related Benefits</b>	
Greater employee satisfaction	Kahn & Mentzer, 1996

Considering the array of benefits presented in Table 3, it seems evident why internal integration is worth striving for in all companies. Childerhouse & Towill (2011) summarize the meaning and importance of II into one sentence: “It is difficult to envisage any circumstance where internal integration ... will not prove

essential to enabling continuing competitiveness”. Despite of its explicit benefits, internal integration, however, remains rather rare than common in real life corporations (Ellinger, 2000; Pagell, 2004).

As mentioned above, as the research under scrutiny does not concentrate on researching the link between internal integration and performance, the potential performance benefits and their veracity will not be more profoundly addressed. The list of benefits, however, aims to provide an overall view of what can be gained through the creation of tighter internal integration.

### **2.3.2 Potential Drawbacks and Implementation and Administration Challenges**

Though the positive consequences of tighter internal integration seem evident (see Section 2.3.1), its implementation in practice is not self-evident and unproblematic. The previous research literature discussing the implementation challenges and possible negative consequences of internal/cross-functional integration, however, is scarce. The challenges of creating and possible drawbacks caused due to external, supplier and customer integration have received more attention (for example, Sorenson, 2003; Enkel *et al.*, 2005; Das *et al.*, 2006; Grover *et al.*, 2006; Villena *et al.*, 2011), while the discussion concerning the negative sides of internal integration has been largely neglected.

Some researches addressing the topic, however, exist (for example, Zhao *et al.*, 2015); many of them discuss the link between functional integration or collaboration and new product development/innovation performance (for example, Song & Xie, 2000; Swink & Song, 2007; Cuijpers *et al.*, 2011; Tsai & Hsu, 2014). Some of the challenges of building tighter *external* integration, on the other hand, can also be regarded to apply while striving for tighter *internal* integration.

Starting with the implementation challenges, creating tighter internal integration demands considerable time and effort (Song & Xie, 2000; Thai & Hsu, 2014; Zhao *et al.*, 2015). In the process, people with possibly widely differing or even conflicting orientations, goals, values, and interests need to be made to work together towards common goals (Uhl-Bien & Graen, 1998; Cuijpers *et al.*, 2011). Numerous meetings or other forms of common gatherings may be needed to facilitate the cross-departmental flow of information and to reach commonly accepted ways of operating, taking into consideration – or compromising between – the possibly differing views and interests of different individuals and departments (Song & Xie, 2000; Cuijpers *et al.*, 2011; Thai & Hsu, 2014).

The integration process thus demands a devoted and determined leader; a person with both profound supply chain management knowledge and understanding

in addition to high-level people management skills (Fawcett *et al.*, 2010). The person needs to be able to coordinate and lead the different functions towards one seamless, though complex, entity and process, consisting of a diverse set of individuals and personalities (Song *et al.*, 1998; Fawcett *et al.*, 2010; Zhao *et al.*, 2015). Conflicts between different departments and individuals are likely to arise along the integration efforts; the leader of the process needs to be able to deal with and solve them (Zhao *et al.*, 2015). Such multi-talented persons, needed to successfully manage the integration process, are rare in nature and availability (Fawcett *et al.*, 2010). Moreover, in addition to the leader, top management support is crucial for the success of the integration process; without it, the endeavor is sure to fail (Zhao *et al.*, 2015).

As time is money, the time consuming integration efforts, on the other hand, may turn costly for the company (Patrashkova-Volzdoska *et al.*, 2003; Gimenez *et al.*, 2012) and may lead to losses in efficiency and productivity (Zhao *et al.*, 2015). The integration efforts may also slow down the company's reaction ability – agility – and time to, for example, market changes (Das *et al.*, 2006; Fabbe-Costes & Jahre, 2008). As decisions are made cross-departmentally, taking into consideration the different perspectives, the decision making time may be increased (Smith *et al.*, 1994; Uhl-Bien & Graen, 1998; Song & Xie, 2000; Troy *et al.*, 2008), and consequently also the company's reaction time to different situations (Das *et al.*, 2006; Fabbe-Costes & Jahre, 2008).

Having achieved some level of internal integration, challenges still prevail. For example, conflicts between individuals and functions may still arise (Zhao *et al.*, 2015), decision making may be delayed (Smith *et al.*, 1994; Song *et al.*, 1998; Song & Xie, 2000; Troy *et al.*, 2008), flexibility of managing the operations may be restrained (Jahre & Fabbe-Costes, 2006), and consequently the company's efficiency, productivity, and reactivity may be decreased (Das *et al.*, 2006; Fabbe-Costes & Jahre, 2008; Zhao *et al.*, 2015). Additionally, though the more pervasive decision making, taking into consideration the perspectives of different departments, may be seen to create new knowledge, it may also overload the company's information processing capabilities and consequently inhibit the company's performance (Zirger & Hartley, 1996; Grover *et al.*, 2006). The interfaces between the different departments also need to be constantly monitored and managed; which may be a challenging task (Song *et al.*, 1998; Zhao *et al.*, 2015).

Other negative consequences of internal integration (or external integration, applicable to internal integration) discussed in earlier research literature include, for example, information overflow, sharing of redundant information (Gunasekaran & Ngai, 2004; Villena *et al.*, 2011), increased coordination costs (Cuijpers *et al.*, 2011; Zhao *et al.*, 2015), conflicts over resources and technical issues (Troy *et al.*, 2008) in new product development projects, leading to budget

overruns (Olson et al., 2001), and project delays and terminations (Swink & Song, 2007; Cuijpers *et al.*, 2011). The project delays are potential due to difficulties in merging the views and approaches of different departments into one whole and the terminations, on the other hand, due to high conflict potential of cross-departmental projects (Cuijpers *et al.*, 2011). The conflicts between different individuals may bring the projects to a halt.

The negative consequences of opportunistic behavior and knowledge spillover, often linked with external customer and supplier integration (for example, Spekman *et al.*, 2002; Hallikas *et al.*, 2005; Lui *et al.*, 2006; Eurich *et al.*, 2010; Ertimut & Venkatesh, 2010; Porasmaa & Ojala, 2011), on the other hand, are not that applicable with internal integration. Though some opportunistic behavior may occur, the spreading of knowledge between the different departments, on the other, can rather be seen as a more positive than negative factor in the creation of tighter internal integration.

Zhao *et al.* (2015), finally, studied the relationship between the level of internal integration and firm performance, and tried to prove that exceeding a certain level of internal integration would in fact affect the firm's financial performance negatively. Their research, however, proved oppositely. According to Zhao *et al.* (2015), internal integration has a linear and positive effect on a company's financial performance. Thus, the higher the level of internal integration, the better financial results the firm may be able to gain.

All in all, while considering in engaging in internal integration efforts, companies need to weigh the potential, reachable benefits versus incurring costs, and make their decisions accordingly. Though it seems that the overall benefits may outweigh the costs, the process of building tighter internal integration, however, is not self-evident and easy. It demands a lot of time, effort, and energy, and a devoted and patient, multi-skilled leader with top management support. As the personnel plays an important – and often overlooked, based on the various researches reviewed – role in the creation and administration of tighter internal integration and overall successful internal supply chain management, the skills needed of various organization levels operating in different parts of the internal supply chain are discussed in the following section. According to van Hoek *et al.* (2008), the HR matters are an area that has received no interest from the internal integration researchers so far; this is visible in nonexistent research papers discussing human resources matters as linked to internal integration. This is therefore the first attempt to bring the human resources, and especially the skills of the employees, to the discussion.

### ***2.3.3 Personnel Skills Needed in Successful Internal Supply Chain Management***

Creating and maintaining tight internal integration demands a multi-skilled and devoted leader (Song *et al.*, 1998; Fawcett *et al.*, 2010; Zhao *et al.*, 2015); thus the topic of skills needed in successful internal supply chain management is more thoroughly, though briefly, discussed below.

In addition to the skills of the leader, also the skills of the other members of the chain are addressed. The leader cannot manage the whole chain – internal or external – on his/her own, thus also the skills of the other persons involved in the chain matter. It is the duty and challenge of the leader to locate and take advantage of the different skill sets existing in the chain and to make them work towards achieving the common targets as effectively and efficiently as possible.

In other words, the successful management of a supply chain demands that the chain has the right people with the right skills in the various roles within the chain (Collins, 2001). According to Fawcett *et al.* (2010), for a successful supply chain, it is of utmost importance to have “the right people on the bus”. In addition, the bus also needs to have a competent driver to take the bus, together with its contents, towards the wanted destination – a leader who is able to lead the other people towards superior performance (Fawcett *et al.*, 2010).

The following sections will first discuss the skills needed of a successful supply chain manager/leader and thereafter of lower organization level members involved in the chain. As the reachable information concerning the skills of the managerial level is much more comprehensive, the emphasis is put on presenting the skills, capabilities, and characteristics needed of an over-the-average supply chain manager. The needed skills of the lower organization level employees are consequently discussed based on the scarce amount of research information found on the topic and by adapting and utilizing the information concerning the managerial level.

While discussing the needed/wished attributes of various employees, the earlier researches usually find it important to divide the discussion into discussing the different skills and competencies the people possess separately (for example, Bramming, 1998; Bisogni, 2008). However, as this is the first attempt to bring the employee skills into the internal integration discussion, in the following sections the skills and competencies are discussed simultaneously. The term skill is thus used to refer to both the skills and competencies of the different level employees. This decision is based on the consideration that it is unworthy to possess a certain skill unless it can be applied in real life situations and context (competency). Thus all the skills discussed hereafter are expected to be such that they can also be used, applied, and utilized in real life context by the different em-

ployees. However, in order to guarantee rigorousness, in further future research on the topic the skills and competencies should be separated.

### ***2.3.3.1 Managerial Level – Supply Chain Managers/Leaders***

Both academic and business research has concentrated heavily on researching the needed skills and characteristics of successful supply chain managers/leaders. The emphasis put on researching the needed skill sets of the lower organization level employees, on the other hand, appears to be close to non-existent. According to Fawcett *et al.* (2010), the success of managing a company's supply chains is heavily dependent on the leader of the supply chain management processes. A great leader is thus seen to be the key to the company's supply chain success and to making the best out of the other employees involved in various parts of the chain. Thus, although the skill set of the lower level employees is also important, it only comes second in importance. (Fawcett *et al.*, 2010). Based on the almost non-existent nature of the research papers discussing the needed supply chain management skills of the lower organization level employees, it can be suspected that Fawcett *et al.*'s (2010) view is also shared by other researchers.

### ***2.3.3.2 Skill Categories Needed of Supply Chain Managers/Leaders, Profile of Successful Supply Chain Manager***

If the concept of supply chain management is taken literally and consequently the job description of a supply chain manager includes consideration of both the inbound and outbound flows of material and information of the company or chain, it can be said that the manager faces a very broad and demanding selection of various, though related, duties and responsibilities (Gammelgaard & Larson, 2001). Consequently he/she possesses a crucial role in successful management of both the various functions within the chain and the whole chain itself (Fawcett *et al.*, 2010). When operating successfully, a highly effective manager has "the ability to positively impact cash flow, reduce risk, and improve performance" (Richey *et al.*, 2006). A successful manager is thus able to improve and develop the overall operability and functionality of the supply chain and consequently to gain higher customer satisfaction and monetary rewards.

Discussing the needed skills of a highly effective and successful supply chain manager, as the work field of a "real" supply chain manager, accountable for a wide range of functions, responsibilities, and people, is very large, Ellinger *et al.* (2002) have commented that "to be an effective manager, supply chain positions require a broader set of skills than ever before". Additionally, Murphy and Poist

(2006, 2007) have stated that the “logisticians should be managers first and logisticians second”. In other words, in order to be a successful supply chain manager, it is not enough anymore that the manager possesses deep logistical knowledge of some or several logistical function(s) but he/she also needs to possess a wide range of different managerial skills. According to Gammelgaard & Larson (2001), “[SC] managers play an important role in defining the world their firms operate in. They must identify new concepts such as SCM, find out who uses it, and with what results. These managers must be able to promote SCM to the rest of the organization, both vertically and horizontally. At the same time, they must manage human resources, by reducing anxiety, by training, and by communicating new attitudes.”

In the widely known and applied BLM –framework, created by Poist (1984) and utilized, for example, in Murphy and Poist (2006; 2007), the needed skills of the SC managers are divided into three categories: business, logistics, and management skills. Razzaquez and Sirat (2001) have additionally stated the SC managers of today rather need to be multi-skilled generalist than technically oriented specialist. However, it should also be kept in mind that the emphasis of general, managerial skills should not be brought to the extremity – the possession of superior, general managerial skills cannot totally override the need of knowledge and understanding of the basic contents and fundamentals of supply chain management (Sunday Business Post 20.1.2013). Thus the fundamental knowledge of both overall business and supply chain related matters needs to be possessed. In addition, the managers must also be able to lead the other people involved in the chain and therefore various managerial and leadership skills are also crucial

Thus, to briefly summarize, in order to be able to manage the supply chains of today’s unpredictable and changing environment, a well-balanced combination of both hard and soft skills is needed of a successful supply chain manager (van Hoek & Wagner, 2013; Sunday Business Post 20.1.2013). He/she needs to possess broad, integrated cross-functional and deep, logistics focused knowledge and abilities (Trunick, 1998), in addition to good people management skills and common sense (Handfield & Nichols, 1999).

Fawcett *et al.* (2010) consequently describe and profile a successful supply chain manager with a term “indispensable supply chain leader”. According to them, such a leader acts as a promoter of positive change and possesses the following four roles: As a *cross-functional* the individual understands the key supply chain functions and can make them operate in sync. As a *choreographer* he/she can draw the big picture while simultaneously understanding how the individual pieces fit into the puzzle. As a *coach* he/she “teaches, mentors, and motivates others to contribute as part of a team”. And finally, as a *champion*, he/she is trusted and credited throughout all levels of the organization, and consequently operates as “an effective catalyst for supply chain change”. (Ibid.)

Fawcett *et al.* (2010) thus support the ideology that deep functional expertise alone is not a sufficient characteristic of a successful SC manager; he or she also needs to have cross-functional skills and be able to lead a collaborative effort by bringing different people to work together as a cohesive team. The cross-functional skills needed can have been learned and gained, for example, through effective and well-designed rotation programs, by experiencing and working in the various functions in practice, or by having earlier work experience of the separate functions.

The manager also needs to be able to identify the right persons for a team and get them perform together as one synchronized entity. A good manager thus needs to be able to use both senses and feelings while executing his/her duties; both hard analytical and softer, more empathetic and intuitive skills are needed. (Fawcett *et al.*, 2010.)

A successful manager also possesses abilities to teach and motivate the other persons involved in the chain to excel both individually and as a member of a team. He/she is able to give both positive and corrective feedback in a manner in which even the corrective or negative feedback is seen as an opportunity to improve one's skills and performance. A good manager empowers the other members of the team and consequently commits them to be personally more willing and eager to contribute towards the success of the organization. (Ibid.)

Finally, a successful supply chain manager "is perceived as credible by senior management and admired at all levels of the organization". He/she acts as a positive change agent and has a strong track record of success gained through working with and through other people. He/she is self-confident and willing and able to give credit for a good work for the persons who deserve it. (Ibid.)

To be a successful SC manager thus demands remarkably many different skills and personal characteristics even from an experienced manager, not to mention the newly recruits. Truly successful supply chain managers may thus consequently be scarce in nature. According to Fawcett *et al.* (2010), many supply chain managers of today are still unsure how to manage in a collaborative world, how to build trust instead of using power, how to rather teach than direct, and how to rather deal with the big picture instead of details. The presumably varied status of current, real-life supply chain managers thus most probably leaves room for improvement and extra education.

### ***2.3.3.3 Individual Skills Needed of Supply Chain Managers/Leaders***

As the previous section concentrated on presenting the skill categories needed of SC managers/leaders, the individual skills needed are consequently discussed below. As the amount of research literature discussing the topic is considerable,

the research results presented operate as representatives and examples of various skills and skill sets found to be of essence for the effective and successful supply chain managers.

Table 4 (pages 60-62) presents the findings of a selection of researches. The researches are presented in a yearly order (except for Murphy & Poist (2007)), whereas the needed skills are presented in an order of importance, if stated in the research. Approximately maximum ten most important skills per research or skill category are presented. The author has taken the freedom to group the skills under representative categories by using Poist's (1984) BLM (Business, Logistics, Management) categorization as a directional basis for the classifications. As Murphy and Poist (2007) use Poist's (1984) categorization, it is consequently presented first despite its year of publication. Using the BLM –categorization has led to renaming the categories presented in some of the researches and re-dividing the needed skills under representative titles.

As can be concluded based on the information in Table 4 and on all the discussion in Sections 2.3.3.1 & 2.3.3.2, a successful supply chain manager is thus a person who possesses overall knowledge and basic skills and understanding of the different business functions (for example, accounting, marketing, IT) and understands their linkage to the supply chain management process. He/she also possesses good project management skills and fosters innovative, strategic thinking.

He/she is a cross-functional multi-talent who thoroughly understands the cross-functional nature of supply chain management and has overall knowledge and/or experience of the various functions within the supply chain and sees their interconnected-ness. He/she is able to draw the “big picture” and consequently to direct both his/her own and his/her team's actions accordingly.

He/she is a good communicator, both verbally and in writing, and possesses good negotiation skills. He/she also knows how to listen and persuade. He/she has good leadership skills and is good at building teams and motivating both the team and its individual members towards superior performance. He/she is also a change agent who can take considered risks based on both intuition and analytical thinking and is able to make needed decisions. He/she is not scared of solving potential conflicts and problems.

He/she is a strategic operator aiming at results and continuous improvement through working with and through other people. He/she thus possesses both hard and soft skills and is able to apply them in different circumstances and to change his/her way of operating if needed.

Summarizing all the discussion, as has been mentioned earlier, it can be said that being a successful supply chain manager demands a great variety of different skills from the holder of the position. The person needs to be a multi-talent with both hard analytical and soft empathetic skills in addition to possessing

knowledge and under-standing of the various business and supply chain related functions and their connection to one another.

Table 4 Skills Needed of Successful Supply Chain Managers

	Business Skills	Logistics Skills	Managerial Skills & Personal Characteristics	Presented in Order of Importance
<b>Murphy &amp; Poist (2007)</b>	Supply chain management Transportation and logistics Business ethics Production management Business writing Accounting Electronic commerce Information systems management General business administration Financial management Labor relations	Customer service Inventory management Transportation and traffic management Logistics information management Warehousing management Forecasting Logistics related regulations Purchasing International logistics Order management	Motivating others Decision making ability Personal integrity Oral communication Persuasion Written communication Negotiation skills Acknowledge future threats/opportunities Interpersonal relationship skills Delegation skills	Yes
<b>Gammelgaard &amp; Larson (2001)</b>			Teamwork Problem solving Supply chain awareness Ability to see the "big picture" Listening Speaking/oral communication Prioritizing Motivation Cross-functional awareness Leadership Decision-making Critical reasoning Writing/Written communication	Yes
<b>Murphee (2006)</b>	Financial analysis & modeling Formal problem solving Process mapping & improvement Technical category knowledge Marketing & sales Project management Contract writing Customer focus	Process expertise (strategic sourcing, logistics, etc.) Managing supply base	Strategic thinking, ability to construct frameworks Managing change Managing risk "Out of the box" thinker Ability to conceptualize and visualize Facilitation & team building Communication, interpersonal communication Negotiation Ability to make decisions Influencing and persuasion Conflict resolution Analytical & problem solving Leadership	No

*Continued*

Table 4 Skills Needed of Successful Supply Chain Managers (Continued)

	<b>Business Skills</b>	<b>Logistics Skills</b>	<b>Managerial Skills &amp; Personal Characteristics</b>	<b>Presented in Order of Importance</b>
<b>Bernon &amp; Mena (2013)</b> (several sources, see Bernon & Mena (2013) for exact references)	Strategy formulation Accounting, activity based costing etc. Project management Information systems Human resources management	Transport Logistics Procurement Supplier selection Network design Materials management Inventory management Operations management Quality and service Simulations and modelling	Influencing Leading change, change management Negotiation Compromising Team building facilitation Innovation, creative thinking Entrepreneurship Goal setting, execution Decision making Problem solving Risk management Time management Communication (writing, presenting, listening)	No
<b>GSI Australia Supply Chain Futures Forum (2013)</b>	Technology literacy Project management Finance and budget management Policy and governance	Procurement and contract management Knowledge of SCM Strategic thinking in supply chains and logistics Related knowledge of SCM Contextualized knowledge of SCM Application of SC knowledge Knowledge and application of SC risk and sustainability Enterprise systems and SC technologies	Social interaction Analysis and problem solving Leadership and teamwork Ethics and social responsibility Diversity management Change management Continuous improvement	No
<b>Sohal (2013)</b>	Ability to make use of numerical techniques for decision making (e.g. forecasting, scheduling) Project management skills and ability to lead major projects Ability to apply continuous improvement and customer focus concepts Ability to develop and implement long term business strategies Understanding of contractual and legal/regulatory aspects of the business Understanding the importance and value of sustainable business practices Understanding of basic accounting and budgeting	Ability to apply supply chain technologies and application software Ability to solve complex and novel SCM problems (e.g. issues of track and tracing, product authentication) Understanding of the interconnection of SCM with other disciplines (e.g. information systems, HR)	Ability to work effectively with individuals and groups/teams - cross culturally, intra and inter organizationally Ability to manage relationships in diverse contexts - cross culturally, intra and inter organizationally Ability to manage risks in supply chain and their associated issues Ability to manage change within the local context Communicate effectively through different media and styles	Yes

Continued

Table 4 Skills Needed of Successful Supply Chain Managers (Continued)

	Business Skills	Logistics Skills	Managerial Skills & Personal Characteristics	Presented in Order of Importance
Wu <i>et al.</i> (2013)	International perspective Market sensitivity Analysis of industry trends Cross-cultural sensitivity		Foreign language Communication Decision making Risk management Application and integration of resources Negotiation Ability to make profit Integrity, honesty Leadership EQ management Logical thinking Social networks	Yes

#### ***2.3.3.4 Lower Organization Levels – Members Operating in Various Functions within the Supply Chain***

As has been discussed earlier, both the academic and business research addressing the needed skills of the lower organization level supply chain employees seems to be very scarce, close to non-existent. Some researches do also briefly mention the lower organization level employees – or their part can be read between the lines –, but the concentration has been heavily on researching the needed skills of the supply chain managers/leaders.

Picking the discussion concerning the other employees' part and needed skills from the research and business papers, Green (2010) comments that the “high performing businesses invest in educating employees across the supply chain, rather than focusing on a few leaders or high-potential employees”. Green (2010) thus acknowledges that also the other employees and their skills are of importance when aiming at a well-functioning supply chain, not just the managers.

According to Radford *et al.* (2010), on the other hand, the people forming today's supply chain teams must be more flexible and adaptable in their roles than before and be open to take extra responsibilities. People operating in various functions within the chain should thus have a positive attitude towards work versatility and possess a “can do” approach (Radford *et al.*, 2010). Van Hoek and Wagner (2013), on the other hand, discuss the “new DNA” approach adopted by Sony Mobile in its effort of reaching highly effective supply chains. The new approach emphasizes the need of such behavioral skills from/of the employees as advocacy for relationships, ability to listen and learn, and openness to different points of view and opinions (van Hoek and Wagner, 2013).

Sunday Business Post (2013) additionally emphasizes the importance of the employees' understanding of the fundamentals of supply chain management. The employees thus need to understand the basic meaning and contents of supply chain management in order to be able to make decisions that also affect the other parties of the chain (Sunday Business Post, 2013). Only when the fundamental supply chain knowledge and understanding is possessed widely amongst the lower level supply chain employees, can the chain truly operate as one, integrated entity where the different parties understand both their own role in addition to the roles of the other departments as a part of the chain.

In addition to the comments stated above, the previous research literature does not specifically discuss the needed skills of the lower level supply chain employees. Table 5 thus presents the needed skills of the lower level supply chain employees gathered, adapted, and selected subjectively by the author of the dissertation, based on research literature discussing the supply chain managers. The ideology behind the selection was to concentrate on and select such factors that enable the lower level employees to work as a part of a supply chain team under the

leadership of the supply chain manager. The information in Table 5 consequently concentrates heavily on the personal, softer skills needed of the different supply chain employees. The discussion on the harder functional/technical knowledge and skills is largely omitted on purpose as each function has its own requirements. However, some more generic harder skills, such as IT and language skills, are included. The different skills presented in Table 5 are not in order of importance; the author, however, aimed at grouping the individual skills into inter-related entities.

Table 5 Skills Needed of Lower Level Supply Chain Employees

<b>Personal Characteristics/Skills</b>	<b>Source e.g. (also other sources)</b>
Cross-functional awareness	Trunick (1998); Fawcett (2010)
Ability to solve problems as a part of a team	Chow (1998); Gammelgaard & Larson (2001)
Team player	Minahan (1998); Sohal (2013)
Interpersonal, social skills	Le May <i>et al.</i> (1999); Murphy & Poist (2007)
Communication skills (oral, written)	Le May <i>et al.</i> (1999); Wu <i>et al.</i> (2013)
Listening skills	Gammelgaard & Larson (2001); Murphy & Poist (2007)
Ability to gather and share information	Gammelgaard & Larson (2001)
Ability to compromise	Bemon & Mena (2013) (see exact sources from Bemon & Mena (2013))
Ability to think independently	Wu <i>et al.</i> (2013)
Ability to make decisions	Le May <i>et al.</i> (1999); Murphy & Poist (2007)
Time management skills	Gammelgaard & Larson (2001); Wu <i>et al.</i> (2013)
Ability to perform under pressure	Gammelgaard & Larson (2001)
Ability to adapt to change	Murphy & Poist (2007)
Motivation	Gammelgaard & Larson (2001)
Integrity, honesty	Murphy & Poist (2007); Wu <i>et al.</i> (2013)
Creativity	Richardson (1998); Murphee (2006)
<b>Generic Skills</b>	<b>Source e.g. (also other sources)</b>
Foreign languages	Wu <i>et al.</i> (2013)
Computer fluency/literacy	Copacino (1997); Melbin (1997)
Micro-computer/office equipment skills (word processing, spreadsheets, etc.)	Johnson <i>et al.</i> (1999); Le May <i>et al.</i> (1999)
Specific job related skills	Wu <i>et al.</i> (2013)

Reviewing all the discussion in Section 2.3.3.4, including the information in Table 5, in order for a supply chain manager to be able to lead his/her supply chain team towards superior performance, he/she needs the team to include such members who understand the basic ideologies of supply chain management and the interrelated nature of the various functions within the chain. The members must also be team players and possess good communication and relationship skills. While having cross-functional awareness, the members should also under-

stand that making good, collective decisions affecting the whole chain requires sharing of information and sometimes making compromises.

In addition to working in teams, the lower level supply chain employees should also be able to think independently and make decisions concerning their own duties. They should also be able to direct their own work according to the needed schedules and be able to deliver results under pressure. In today's ever changing environment, they should also be able and willing to change both their work field/duties and the way of working, if the situation demands. The personal characteristics needed of the lower level supply chain employees, on the other hand, include such factors as motivation, honesty, and creativity.

Discussing briefly the harder skills needed of the lower level supply chain employees, the employees should be fluent in using the computer and the different office tools and programs needed in their work. The employees should also be able to communicate with the foreign languages needed in their work. The needed, more technical and functional, job specific skills, on the other hand, depend on the position of each employee. Each employee should be able to execute his/her own duties and responsibilities as responsibly and efficiently as possible.

## 2.4 Definition of Internal Integration in Current Research

Based on all the discussion in the previous sections, Figure 2 presents the concept of internal integration as it is seen and applied in the research under scrutiny. As can be seen in Figure 2, in the current research internal integration is formed through formal and informal information sharing, collaboration, and coordination. All three elements are needed in order to be able to build and achieve tight internal integration.

As the title signals, **Formal and Informal Information Sharing** element consists of information shared in various forms between the different departments/functions. *Formal* information sharing includes, for example, information shared through various ERP (Enterprise Resource Planning) systems, in mandatory and structural cross-departmental meetings and formal consultations executed between different departments, and through exchange of various documents. The formal information sharing aspect thus corresponds with the *interaction* element of, for example, Kahn & Mentzer's (1996) and Ellinger *et al.*'s (2000) definition of internal integration.

However, as stated by Kahn & Mentzer (1996; 1998), the formal communication alone, though needed and valuable to a certain extent, is not able to generate integration. Cross-departmental/functional *informal* information sharing is thus needed to complement the information sharing efforts and to create tighter internal integration. As the name suggests, informal information sharing efforts refer

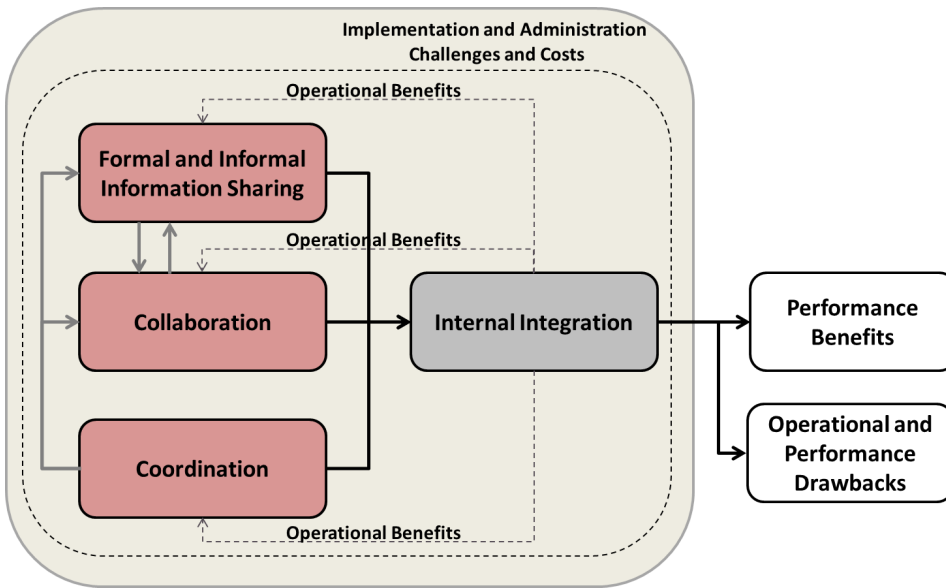


Figure 2 Concept of Internal Integration in the Current Research

to situations where the representatives of different departments/functions share information with one another willingly and in less formal circumstances and forms. In informal information sharing situations the employees also are more at ease and comfortable with dealing with one another, and consequently share information and solve joint issues more unconstrained. In order to be able to execute informal information sharing, the employees need to have established some form/level of reciprocal relationship. The informal information sharing aspect of the concept of internal integration applied in the current research thus corresponds with the informal information sharing occurring in the *collaboration* aspect of Kahn & Mentzer's (1996) and Ellinger *et al.*'s (2000) definition of internal integration.

The ideology of information sharing in the current definition of internal integration is that in order to create tighter integration, the representatives of different departments need *to share relevant information with one another both formally and informally* (the information sharing element of the current definition of internal integration), and *to use the shared information to make better, more informed, and more joint decisions to solve the situations at hand*. It is thus not enough that the information is available/ shared (for example, in IT systems, meetings, or informal discussions); it needs to be used to make better decisions.

The better decisions, on the other hand, are made in *collaboration* with the different departments *by using the shared information* (the collaboration element of the current definition of internal integration). The achievement of tight internal integration thus also demands active cross-departmental/functional **collabora-**

**tion.** In the current definition, collaboration can be defined to stand for working willingly together across departmental borders to reach collective goals and to actualize a common vision. It includes working in cross-departmental teams, building cross-departmental relationships, understanding and taking into account the viewpoints of other departments – and consequently being willing to make compromises jeopardizing own interests, if needed –, committing to the cooperation and reaching of collective goals, sharing resources between departments when needed, and accepting the collective responsibility for joint decisions and actions, in addition to their consequences. The collaboration aspect of the current definition thus mainly corresponds with the *collaboration* element of Kahn & Mentzer's (1996), Ellinger *et al.*'s (2000), and Stank *et al.*'s (2001b) definition of internal integration. It represents the affective, informal relationship aspects of cross-departmental cooperation. Only the aspect of informal information sharing is separated and moved together with formal information sharing to represent the information sharing aspects of cross-departmental actions as a whole.

Formal and informal information sharing and cross-departmental collaboration, however, are not enough to accomplish better/tighter internal integration. **Coordination** of activities is also needed. The individual and joint actions of different departments thus also need to be coordinated and aligned for them to be successful and to guarantee that they are heading towards the right direction, reaching the corporate goals. The different information sharing and collaboration efforts cannot (or at least should not) happen on their own, without direction, in a behavioristic manner. Some level of steering is imperative; in other words, some guidelines for operations must exist.

For example, the reaching of collective goals and fulfilment of a joint vision through collaboration is impossible unless the goals and vision are first being set and clearly disseminated by a strategic level facet, usually top management. On the other hand, different employees should also somehow be encouraged to share information and to collaborate. This can be done by, for example, designing a common evaluation and reward system that is based on corporate strategies and incorporates interest of different, though interrelated, departments. Also a decentralized organization structure and encouraging corporate attitude/culture can help the integration endeavors. The coordination aspect of the definition of internal integration applied in the current research thus contains similar elements as Crittenden's (1992) and Mollenkopf *et al.*'s (2000) definition of internal integration.

All in all, the top management of organizations is in a crucial role in both setting the guidelines for and spurring the integration efforts; in other words, in *coordinating* the integration efforts. Together with their subordinates they can guide and align the activities of different departments to fulfil the organizational targets. The grey arrows from Coordination to Formal and Informal Information

Sharing and Collaboration in Figure 2 describe that the aforementioned actions should be coordinated and follow guidelines and targets set by the corporate strategies and management. Table 6 presents in a tabular form how the concept of internal integration is defined, seen, and applied in the research under scrutiny; it discusses each element separately but also comments their reciprocal relationships.

Summarizing all the discussion above and as presented in Figure 2 & Table 6, in the current research internal integration is reached through cross-functional formal and informal information sharing and collaboration, guided, encouraged, and coordinated by the corporate strategies and management. Moreover, looking at Figure 2 and data in Table 6, it should also be noticed that the information sharing and collaboration efforts also affect one another (grey arrows between Formal and Informal Information Sharing and Collaboration in Figure 2). The relevant information must first be shared across departmental borders in order to be able to make decisions collaboratively cross-departmentally. On the other hand, especially informal information sharing usually necessitates the formation of some level of cross-departmental, personal relationships before it can be executed. These relationships, on the other hand, are usually formed while working in collaboration with one another.

The elements of formal and informal information sharing and collaboration are thus clearly interlinked. Moreover, it can also be posited that the more there are real collaborative actions (for example, willingly executed cross-departmental teamwork and close relationships), the more willing the employees will also be to share relevant information with one another, both formally and informally. On the other hand, the more there are close relationships (collaboration element) and consequently the more the information is shared cross-departmentally (information sharing element), the more willing the employees will also be to use it collaboratively to make better decisions (collaboration element). (See, for example, Prajago & Olhager, 2011.) In the current research the information sharing and collaboration efforts are thus seen to affect one another and coexist simultaneously.

Table 6 Concept and Definition of Internal Integration in the Current Research

Element of Internal Integration	Definitions	Forms/Contents	Extra Comments
<b>Formal and Informal Information Sharing</b>	<i>Sharing information</i> in various forms between different departments/ functions	ERP/IT-systems      Formal	Both forms of information sharing are needed.
		Mandatory, structural cross-departmental meetings      Formal	Information sharing and collaboration are interlinked; information needs to be shared in order to be able to utilize it in making better decision collaboratively.
		Formal cross-departmental consultations      Formal	On the other hand, some level of reciprocal, cross-departmental relationships (built in collaboration element) are needed to execute informal information sharing.
		Various documents      Formal	Better information sharing may enable better collaboration and vice versa.
		Free-will, unconstrained discussions      Informal	
<b>Collaboration</b>	Working willingly together across departmental borders to reach collective goals and to actualize a common vision. <i>Using the shared information</i> cross-departmentally to make better, more informed, and joint decisions.	Working in teams cross-departmentally	Collaboration = cooperation
		Building cross-departmental relationships	Collaboration and information sharing are interlinked; the better decisions cannot be made collaboratively unless the needed information is first shared cross-departmentally.
		Understanding and taking into account the viewpoints of other departments	Better collaboration may enable better information sharing and vice versa.
		Being willing to make compromises jeopardizing own interests	
		Committing to the cooperation and reaching of collective goals	
		Sharing resources cross-departmentally	
		Accepting collective responsibility for joint decisions and actions	
<b>Coordination</b>	Coordinating and aligning the individual and joint actions of different departments in order to guarantee that they are heading towards the common target, reaching the corporate goals.  Coordinating, setting the guidelines for, and spurring the cross-departmental information sharing and collaboration	Setting and disseminating the common vision and goals by the top management	To reach integration, information sharing and collaboration activities, in addition to their coordination, are needed.
		Designing a common evaluation and incentive system based on corporate strategies, incorporating the interests of different departments	Coordination is crucial and imperative; information sharing and collaboration activities should not happen without it.
		Fostering a culture of integration, showing top an middle management support on information sharing and collaboration activities	

Once achieved, the tighter internal integration, on the other hand can be seen to bring operational performance benefits by affecting its elements positively (grey dotted arrows in Figure 2). As has been discussed in Section 2.3.1, the tighter integration facilitates knowledge and information sharing across functions (Wong *et al.*, 2013), enables better and faster decision making (Stank *et al.*, 2001b; Chen *et al.*, 2007; Swink & Schoenherr, 2014), helps companies to develop a shared understanding and a broader and more comprehensive picture of the processes and objectives of the organization across functions (Stank *et al.*, 1999; Keller, 2001; Swink & Schoenherr, 2014), and consequently improves the organizations' capabilities to coordinate/align the operations of its different, individual functions/departments (Schoenherr & Swink, 2012). Once achieved, in the current research, the tighter internal integration is thus seen to enforce itself by affecting its predecessors/elements positively. It should, however, also be remembered that the interfaces between the different departments and cross-departmental information sharing and collaboration actions also need to be constantly managed and monitored (Administration Challenges and Costs in Figure 2). Though internal integration can be seen to enforce itself and bring positive operational outcomes, as discussed above, conflicts of interests, delayed decision making, and other inefficiencies may still occur.

Finally, the achieved tighter internal integration may also provide several performance benefits (see Section 2.3.1), in addition to some operational and performance drawbacks (see Section 2.3.2). However, as the target of the current research is not to concentrate on the potential performance benefits and/or drawbacks of tight internal integration, the performance related matters are separated by a dotted, black rectangle in Figure 2. The research under scrutiny concentrates on discussing and researching the elements of internal integration, information sharing, collaboration, and coordination.

## **2.5 Analyzing Internal Integration**

The current section concentrates on presenting various models created by different researchers that can be used to assess and/or analyze the level of existing internal integration. The emphasis is on presenting such models that in prescreening were found suitable to be at least partly applied in the research under scrutiny. Parts of all the models presented below are thus somehow used in the empirical research of the dissertation (see more in Methodology Chapter 3).

The concentration of the following discussion is on presenting the models themselves, not the actual results gained by using them in different real-life contexts. Some of the models are presented as clear measurement models by their creators, whereas others are articulated, for example, to illuminate enablers and

inhibitors of integration. Nevertheless, all of the models presented are seen to be suitable to assess and analyze the status of internal integration of the case company of the research under scrutiny.

### ***2.5.1 Analysis Approach by Basnet (2013)***

The purpose of Basnet's (2013) research paper is to present a research that was conducted with the target of developing an instrument for the measurement of internal integration. He identified, selected, and excluded scale items from existing research literature and tested the resulting survey instrument amongst a sample of New Zealand manufacturers. Consequently statistical analyses were made in order to purify and validate the instrument.

As has been discussed in Section 2.2 and as Basnet (2013) states, as the different definitions of internal integration vary from researcher to researcher, so did also the different scale items for measuring the level of internal integration, identified by Basnet (2013). The items found reflected the concept of internal integration from the researchers' perspective and the context considered by them (Ibid.). Hence Basnet's (2013) objective was to "identify a parsimonious set of scale items from previous literature that will capture the domain of [the] concept – ... – working together for the benefit of the company."

The scale items Basnet (2013) identified and selected to be used in his own instrument are listed in Table 7. Such items that were found to represent integration but not expose any particular aspect of it, to be antecedents of integration, to apply to different context than internal integration, or to be somehow in need of further explanations for the respondents of a survey questionnaire were excluded (Ibid.) and are consequently not presented in Table 7.

Basnet (2013) scrutinized the scale items presented in Table 7 in order to minimize the amount of individual items used in his own instrument, though still guaranteeing that the remaining items were able to represent different aspects of internal integration. He ended up with a list of 16 items for measuring the level of internal integration; the items are presented in Table 8. Each of the items is pre-worded with a sentence "In my company, the departments involved in production, sales, and distribution of products [...]" (see table 8). (Ibid.)

Table 7 Scale Items for Measurement of Internal Integration, Identified by Basnet (2013)

Scale item	Researcher (in Alphabetical Order)
My firm extensively utilizes cross-functional work teams for managing day-to-day operations	Chen <i>et al.</i> (2007)
Sharing ideas, information, and/or resources	Chen <i>et al.</i> (2007), Ellinger (2000), Ellinger <i>et al.</i> (2000), Gimenez & Ventura (2003, 2005), Kahn & Mentzer (1998)
Conducting joint planning to anticipate and resolve operational problems	Chen <i>et al.</i> (2007), Ellinger (2000), Ellinger <i>et al.</i> (2000), Gimenez & Ventura (2003, 2005)
Developing a mutual understanding of responsibilities	Chen <i>et al.</i> (2007), Ellinger (2000), Ellinger <i>et al.</i> (2000), Gimenez & Ventura (2003, 2005), Kahn & Mentzer (1998)
Making joint decisions about ways to improve overall cost efficiency	Chen <i>et al.</i> (2007), Ellinger (2000), Ellinger <i>et al.</i> (2000), Gimenez & Ventura (2003, 2005)
Information exchange through exchange of reports	Ellinger <i>et al.</i> (2000)
Information exchange through exchange of memorandums	Ellinger <i>et al.</i> (2000)
Information exchange through exchange of fax materials	Ellinger <i>et al.</i> (2000)
Consultation through committees/task forces	Ellinger <i>et al.</i> (2000)
Consultation through phone conversations	Ellinger <i>et al.</i> (2000)
Consultation through phone mail	Ellinger <i>et al.</i> (2000)
Consultation through electronic mail	Ellinger <i>et al.</i> (2000)
Consideration of the effect of own actions on other functions	Gimenez (2004)
Your department strives to maintain a good working relationship with manufacturing	Kahn & Mentzer (1994)
Interaction through meetings: 1) meetings, 2) committees/task forces, 3) phone conversations, 4) phone mail, and 5) electronic mail	Kahn & Mentzer (1998)
Interaction through documented information exchange: 1) exchange of forms, 2) exchange of report, 3) exchange of memorandums, and 4) exchange of fax materials	Kahn & Mentzer (1998)
Share the same vision for the company	Kahn & Mentzer (1998)
Informal teamwork	Gimenez & Ventura (2003, 2005)
Established teamwork	Gimenez & Ventura (2003, 2005)
Joint establishment of objectives	Gimenez & Ventura (2003, 2005)
Information is communicated between marketing and logistics	Mollenkopf <i>et al.</i> (2000)
Information regarding customers is given to logistics people	Mollenkopf <i>et al.</i> (2000)
Information regarding products is given to logistics	Mollenkopf <i>et al.</i> (2000)
Information regarding warehousing/transportation is given to marketing	Mollenkopf <i>et al.</i> (2000)
Marketing and logistics people do not discuss with each other the issues affecting marketing and logistics	Mollenkopf <i>et al.</i> (2000)
Marketing and logistics do not coordinate their activities	Mollenkopf <i>et al.</i> (2000)
Marketing and logistics do not spend time discussing future customer needs	Mollenkopf <i>et al.</i> (2000)
The utilization of periodic inter-departmental meetings among internal function	Narasimhan & Kim (2002)
In this business unit, it is easy to talk virtually with anyone you need regardless of rank or position	Parente <i>et al.</i> (2002)
In this business unit, I feel comfortable calling people in the manufacturing unit when the need arises	Parente <i>et al.</i> (2002)
People in our sales department are quite accessible to those in the manufacturing units	Parente <i>et al.</i> (2002)
Managers in manufacturing can easily schedule meeting with sales personnel	Parente <i>et al.</i> (2002)
Salespeople can easily schedule meeting with manufacturing	Parente <i>et al.</i> (2002)
Most departments in this business unit get along well with each other	Parente <i>et al.</i> (2002)
When members from sales and the production units get together, tension frequently runs high	Parente <i>et al.</i> (2002)
The objectives pursued by the sales department are incompatible with those of the manufacturing departments	Parente <i>et al.</i> (2002)
Both functions share information	Parente <i>et al.</i> (2002)
Operations consult marketing before making process changes	Sawhney & Piper (2002)
Marketing consults operations before accepting early	Sawhney & Piper (2002)
Marketing consults operations before accepting special feature requests	Sawhney & Piper (2002)
My firm effectively shares operational information between departments	Stank <i>et al.</i> (2001b)
My firm has adequate ability to share both standardized and customized information internally	Stank <i>et al.</i> (2001b)

Table 8 Scale Items Included in Basnet's (2013) Measurement Instrument

Item	Description	Category
1	Share ideas, information, and resources between them	Communication
2	Conduct joint planning to anticipate and resolve supply chain problems	Communication
3	Spend time developing a mutual understanding of responsibilities	Communication
4	Strive to maintain a good working relationship with each other	Communication
5	Interact with each other through meetings or phones or e-mails	Communication, Aff. relationship
6	Interact with each other through the exchange of forms, reports, or documents	Excluded from instrument
7	Spend time discussing future customer needs	Communication
8	Are quite accessible to each other	Aff. relationship
9	Share the same vision for the company	Aff. relationship
10	Establish joint objectives	Coordination
11	Get along well with each other	Aff. relationship
12	Share information regarding own department with other departments	Coordination
13	Consult with each other before making decisions affecting other departments	Coordination
14	Work frequently in informal cross-departmental teams	Coordination
15	Understand the pressures and concerns of each other	Coordination
16	Synchronize their activities with each other	Coordination

Basnet (2013) tested the designed instrument with a survey sent to 999 New Zealand manufacturing firms by analyzing the gained responses (273) statistically. The questionnaire was sent to the general manager or director level (responsible for sales, production, or distribution) in order to guarantee their knowledge of the status of internal integration within their company. In addition to the items mentioned above, a criterion question (Item 17) – “In my company the departments involved in production, sales, and distribution of products work together for the benefit of the company.” – was added on the questionnaire to work as an overall measure of integration. All items were asked to be evaluated on a seven-point Likert scale (1 – strongly disagree, 7 – strongly agree). (Ibid.)

After statistical analysis, Item 6 was dropped out as it did not prove to measure the level of internal integration (low correlation with criterion question). The rest of the items, however, appeared “to capture the domain of the concept and to pass the tests of reliability and validity”. (Ibid.) Based on factor analysis, Basnet (2013) also divided the accepted measurement items into three different categories describing internal integration: communication, coordination, and affective relationship. The classifications are presented in Table 8.

Looking at Table 8 it can be seen that the wordings of the classifications/categories represent Basnet's (2013) ideology of internal integration. The items categorized as "Communication", for example, would be called "Collaboration" by Kahn & Mentzer (1998) & Ellinger *et al.* (2000). This further verifies that the same elements of integration may be referred to by using different terms (see more discussion on the various definitions in Section 2.2) – "a dear child has many names".

To guarantee the full utilization of Basnet's (2013) research, the author of the dissertation went once more through the scale items found in earlier research literature that Basnet excluded in the beginning of his instrument development process. The scale items presented in Table 9 were still seen as worth extra consideration when designing the research instruments used in the research under scrutiny.

Table 9 Potential Extra Scale Items to be Used in Research Under Scrutiny

Scale item	Researcher (in Alphabetical Order)
The orientation of my firm has shifted from managing functions to managing processes	Chen <i>et al.</i> (2007)
Achieving goals collectively	Chen <i>et al.</i> (2007), Ellinger (2000), Ellinger <i>et al.</i> (2000) and Kahn and Mentzer (1998)
Organisational structure (presence of a customer service department responsible for complete order fulfilment process)	Gimenez (2004)
Managers here discourage employees from discussing work-related matters with those who are not their immediate superiors or subordinates	Parente <i>et al.</i> (2002)
Employees from sales and the production units feel that the goals in their respective departments are in harmony with each other	Parente <i>et al.</i> (2002)
There is little/no sales/production conflict in this business unit	Parente <i>et al.</i> (2002)
My firm's compensation, incentive, and reward systems encourage integration	Stank <i>et al.</i> (2001b)

### 2.5.2 Analysis Approach by Pagell (2004) and Pagell & Wu (2006)

The papers of Pagell (2004) and Pagell & Wu (2006) discuss the same research and are thus addressed simultaneously. All of the references mentioned below refer to Pagell (2004), as it was the first research paper where the actual research and the created model were presented. The same discussion/factors, however, can also be found in Pagell & Wu (2006).

The purpose of Pagell's (2004) research paper is to present an exploratory research that was conducted with the objective of building a comprehensive model of the drivers of internal integration. The target of the research was, thus, to find factors that either enable or inhibit the integration efforts across different functions, and consequently to build a testable model for the creation of integration

between the different functions based on the factors found. (Ibid.) The functions discussed in Pagell (2004) include operations, purchasing, and logistics.

Pagell (2004) and his research team conducted a series of case studies (11 plants, based on theoretical sampling) to gain deeper understanding of the factors enabling and inhibiting integration. A qualitative method was seen necessary as little was known about the processes used to create integration between the different functions beforehand. (Ibid.)

Pagell and this team used a structured interview protocol at all of the different plants/site visits; the protocol was updated and improved based on experience received in each interview. The protocol included questions of general company information, corporate and functional strategies and their alignment, cross-functional and external integration, personal and functional assessment and incentive systems, and functional and corporate performance. The original respondents consisted of managerial level employees in charge of production, purchasing, and/or logistics. When possible, additional interviews were also conducted with other, different level employees (at seven plants) to receive different viewpoints. (Ibid.)

In addition to the actual interview, the protocol also included a tour of the facility. The ideology of the tour was to give the researchers a deeper understanding of the companies' processes and, on the other hand, to give the researchers an opportunity to observe factors that may affect the level of integration within each plant (for example, facility layout, work design, and proximity of different functions – all affecting communication and teamwork between functions).

The data analysis consisted of within and across case analysis. Based on the within case analyses, the individual cases/plants could be categorized into three classes, having 1) no internal integration, 2) some internal integration, and 3) full internal integration. The different classes differed in terms of how much the departments involved interacted, collaborated, and worked to arrive at mutually acceptable outcomes: 1) the majority of the time the departments do not, 2) some of the time the departments, 3) the majority of the time the departments interact, collaborate and, work to arrive at mutually acceptable outcomes. The within case analyses were also done with the purpose of trying to determine the factors that influence the level of internal integration at each plant, and consequently to name the factors that either enable or inhibit the creation of cross-functional integration. (Ibid.)

During the cross case analysis, the different enablers and inhibitors of internal/cross-functional integration identified in separate within case analyses were compared and scrutinized in order to identify general patterns. Through a process of combining, renaming, and redefining, the researchers were able to identify five (six) main factors that were frequently noted to either enable or inhibit integration. (Ibid.) These five (six) factors, in addition to their sub-

components/factors discussed in Pagell (2004), are presented in Table 10 (in random order). Table 10 also presents whether the factors/components were seen to enable (+) or inhibit (-) integration.

As can be seen in Table 10, according to Pagell (2004) the five main drivers of integration include company *structure, culture, communication, measurement and rewards, and consensus*. Table 10 also includes a sixth driver, plant size, as based on intuition it was suspected to have an influence on the integration efforts. However, according to Pagell's and his team's research, plant size finally showed to have no linkage to integration. (Ibid.)

Reviewing briefly the different drivers and their subcomponents presented in Table 10, it can be seen that each driver may both be an enabler and inhibitor of integration depending how it is used/applied in each organization under scrutiny. Each driver may also contain subcomponents that may simultaneously both encourage and inhibit the integration efforts.

Table 10 Drivers/Enablers and Inhibitors of Integration by Pagell (2004)

Driver of Internal Integration	Component/Factor	Enabler (+)/Inhibitor (-)	
<b>Structure</b>	Centralization	-	
	Focused Factory structure	-	
	Same manager for several functions	+	
	Flexible responsibilities, overlapping jobs in different functions	+	
	Physical and managerial separation	-	
	Shared responsibilities (e.g. for purchasing)	+	
	Matrix organization	+	
<b>Culture</b>	Functional goals based on corporate goals	+	
	Top management team working tightly together, as one	+	
	Open environment/communication	+	
	No formal job boundaries, flexibly helping each other	+	
	Low level of interaction	-	
	Rewarding innovation, continuous improvement, and learning to help others	+	
	Placing blame/blame games instead of trying to find solutions to problems	-	
	Open communication of goals and needs	+	
	Silo/functional orientation	-	
	Varying cultures in different functions	-	
	Top down, authoritative culture	-	
	Management easily approachable	+	
	Encouraging teamwork	+	
<b>Communication</b>	Daily/weekly/regular/frequent formal cross-functional meetings	+	
	Limited formal communication across functions	-	
	Properly working ERP system	+	
	Paperless communication	+	
	ERP system providing false information	-	
	Bar coding to track items throughout the plant	+	
	Open cross-functional communication of problems and opportunities	+	
	Informal, real time cross-functional communication of problems and opportunities	++	
	Limited/no informal/real time communication across functions	-	
	Frequent informal/real time communication across functions	++	
	Company goals communicated to functions	+	
	No communication between production and sales (and customers)	-	
	Frequent informal/real time communication from plant manager to functional managers	+	
	Exclusive one way/top down communication, from management to subordinates	-	
	Management walking throughout the plant and talking to employees to discover what issues they are presently dealing with	+	
	<b>Antecedents/Facilitators of Communication</b>	Physical proximity of different functions, opportunities to informal communication	+
		Usage of cross-functional teams	+
Usage of job rotation for management		+	
Usage of job rotation for other employees		+	

*Continued*

Table 10 Drivers/Enablers and Inhibitors of Integration by Pagell (2004)  
(continued)

Driver of Internal Integration	Component/Factor	Enabler (+)/ Inhibitor (-)
<b>Measurement and Rewards</b>	Formal goal setting; functional goals, measures, and rewards based on corporate goals and their achievement	+
	Conflicting goals pursued at different functions (e.g. quality vs. price)	-
	Differing measuring & rewarding systems used at different functions	-
	Functional goal setting and measurement and reward system; no linkage to other/corporate goals	-
	Overall knowledge of other functions' goals, measures, and performance	+
	Bonus system based on corporate profits	+
	Non-existence of a formal measurement system	-
	Employee stock ownership plan	+
	System that encourages the achievement of one goal on the expense of another (e.g. quick deliveries vs. work quality)	+/-
	Poorly designed measurement and rewarding system, lacking the opportunity of really affecting one's bonuses	-
<b>Consensus</b>	All managers agree on the business strategy	+
	Managers have differing opinions of the business strategy	-
	Functional strategies support corporate strategy and one another (alignment)	+
	Functional strategies do not support corporate strategy and one another (alignment)	-
	Managers know and understand other functions' priorities and how the actions of separate functions affect one another; managers know that the functions are pursuing the same goals (critical criterion of consensus)	+
Managers do not know and understand other functions' priorities and how the actions of separate functions affect one another; managers do not know that the functions are pursuing the same goals (critical criterion of consensus)	-	
<b>Plant size</b>	Smaller/larger organizations/plants	No linkage to integration
	Single/multiple plant organizations	No linkage to integration

To extract a few examples from Table 10, although centralization may provide benefits on a corporate wide basis, it may hinder integration efforts at single plants, as the rules and measures for operating come “dictated” from an external corporate body. Company *structures* may, however, also enable integration. For example, “a shared manager”, responsible for several functions, and matrix organization are seen to further cross-functional integration. (Ibid.)

An open and teamwork oriented organization *culture*, on the other hand, also enables the creation of tight internal integration, whereas a culture concentrating on placing blame/finding the guilty party is a clear inhibitor of internal integration. Concentrating on operations of separate functional silos instead of the larger chain and having contradictory cultures in different functions also hinder integration. (Ibid.)

Discussing *communication*, according to Pagell (2004), communication on the whole is a key enabler of integration and its absence a serious inhibitor. Integration is best furthered through frequent informal, real-time cross-functional communication as the need/problems arise (two plusses in Table 10); in other words, real-time informal communication is preferable to formal scheduled meetings. However, as the realization of constant, informal, real-time communication may be difficult at least at larger plants, in “these settings formal communication, especially when augmented by well-designed and implemented information systems, seems to enhance integration”. What is also worth to be noticed, according to Pagell (2004), though they may be helpful in enabling paperless communication, the existence of information systems as such does not provide integration; “IT is no substitute for other efforts at integration”. IT systems should also be planned and designed in a manner that supports the creation of internal integration to be effective. (Ibid.)

Communication and consequently internal integration may also be fostered by locating the different functions close to another and by utilizing cross-functional teams and job rotation. (Ibid.)

The used *measurement and reward systems* may also both hinder and enable the integration efforts. If the different functions pursue different goals and are consequently measured and rewarded differently – maybe even contradictorily –, the applied measurement and reward systems hamper the formation of internal integration. Common goals, based on corporate strategies, on the other hand, push the different functions towards reaching the goals collectively and thus advance the creation of integration. Moreover, the lack of an incentive system may also hinder the integration efforts as “people tend to perform the activities for which they are rewarded”. (Ibid.)

Finally, although presented in Table 10 as a driver of integration, Pagell (2004) in effect state that *consensus* is in fact a key indicator of integration; the higher the level of consensus within a company, the higher is the level of integration. According to Pagell (2004), high level of consensus – and integration – prevails in a situation where all managers agree on the business strategy, functional strategies are built on/aligned with corporate strategies and one another, and managers know and understand that the alignment exists and that common goals are being pursued. Medium level of consensus exists when the managers agree on the business strategy and majority of the functions are pursuing the common goals. Low level of consensus, on the other hand, is visible in situations where there is no agreement and/or alignment between the functions. (Ibid.)

Although the different drivers are presented separately in Table 10, many of the items are interrelated. For example, a company that has a very silo oriented culture most probably is not utilizing cross-functional teams and informal, real-time problem solving too extensively. Or, in order to understand how other func-

tions make decisions, demanded to reach a high level of consensus, the representatives of different functions need to communicate with one another or take part in job rotation programs. Or, if a company is using differing measurement and reward systems in different functions, managers and employees generally tend to prioritize their own interest, although they would have knowledge of the other functions' goals and how their own operations affect the achievement of those goals. In addition to the interrelatedness, companies may also simultaneously be executing activities some of which enable and some of which inhibit the formation of internal integration. (Ibid.)

Based on earlier research literature and the findings of their research, Pagell and his team created a model of internal supply chain integration presented in Figure 3.

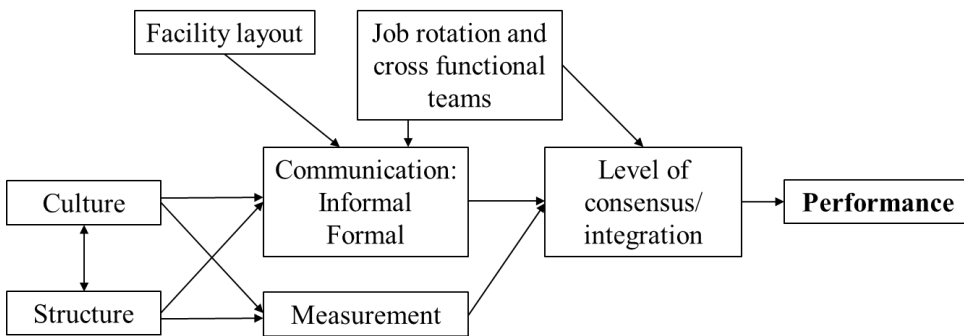


Figure 3 Model of Internal Supply Chain Integration by Pagell (2004)

As can be seen in Figure 3, the model tries to capture both the drivers of internal integration and their connection/interrelatedness to one another (Ibid.). As Pagell (2004) states, “The constructs identified and their interrelationships further our understanding of how managers can enable and inhibit the development of integration across operations, purchasing and logistics within a plant”. The arrows in Figure 3 present quite clearly that, for example, corporate structure and culture affect one another, amount and style of communication is affected by both organizational structure and culture, in addition to the physical layout of the facility and cross departmental programs executed, and so forward.

In addition to the drivers presented in Figure 3, Pagell (2004) also addresses the importance of top management support in integration endeavors. According to him, in order to reach higher levels of internal integration, top management support is also required (Ibid.). Moreover, it should be noted that Pagell (2004) does not address the linkage between level of integration and performance; the

connection presented in Figure 3 is suspected to exist based on earlier research literature.

Although commenting that the model created is the first attempt at building a comprehensive model that could be used to prescribe managerial actions creating tighter internal integration, Pagell (2004), however, also notes that as the exploratory research has its limitations, the model is far from definitive and is most useful for stimulating theory testing research. According to him, “large sample data collection efforts will be needed to test the proposed model and provide sufficient support to make prescriptions” (Ibid.).

Although being a result of an exploratory research and unconfirmed through following research efforts, the model created by Pagell and his research team is seen very useful in analyzing the status and level of internal integration within the case company of the current research. The drivers and their separate subcomponents provide a large set of individual items on which to concentrate while conducting the empirical research.

In addition to the actual model designed, the interview protocol applied by Pagell (2004) in order to create the model contains questions that are worth considering while designing the research instruments of the current research. The full interview protocol (somewhat adapted) is presented in Appendix 1.

### ***2.5.3 Analysis Approach by Mollenkopf et al. (2000)***

The purpose of Mollenkopf *et al.*'s (2000) research paper is to present an empirical research that was conducted with the purpose of exploring factors related to marketing-logistics integration within a firm. The target of the research was to build a statistically tested model of factors that may enable or hinder the creation of tighter internal integration; the focus of the research was thus on finding factors that are practically and managerially relevant when striving for tighter integration (Ibid.).

Mollenkopf *et al.* (2000) started their research by building a proposed model of factors affecting the creation of tighter internal integration based on earlier research literature. These factors included managerial issues on two decision making levels (top management, middle management) and structural issues (interdepartmental and organizational factors). The proposed model is presented in Figure 4. The pluses and minuses after each individual item presented in Figure 4, express whether the item was suspected to enable or hinder the integration efforts. (Ibid.)

Mollenkopf *et al.* (2000) tested the hypotheses created based on the factors presented in Figure 4 with a cross-sectional mail survey amongst multi-industry, B-to-C New Zealand firms. The final survey was sent to 464 marketing or logis-

tics managers; these two groups were targeted in order to receive the opinions of both parties of the marketing-logistics relationship. The questionnaire used included multi-item scale for all of the constructs; the scales were created based on earlier research literature in addition to new scales developed by the authors. The scales utilized handled such matters as information dissemination, coordination of activities, strategic management, cooperative attitudes, liaison activities, cross education and training, conflict, connectivity, formalization, centralization, and reward system. The respondents were asked to answer each item on a seven-point Likert scale (either 1 – strongly disagree, 7 – strongly agree or 1 – never, 7 – often). (Ibid.) The full list of questionnaire items is presented in Appendix 2.

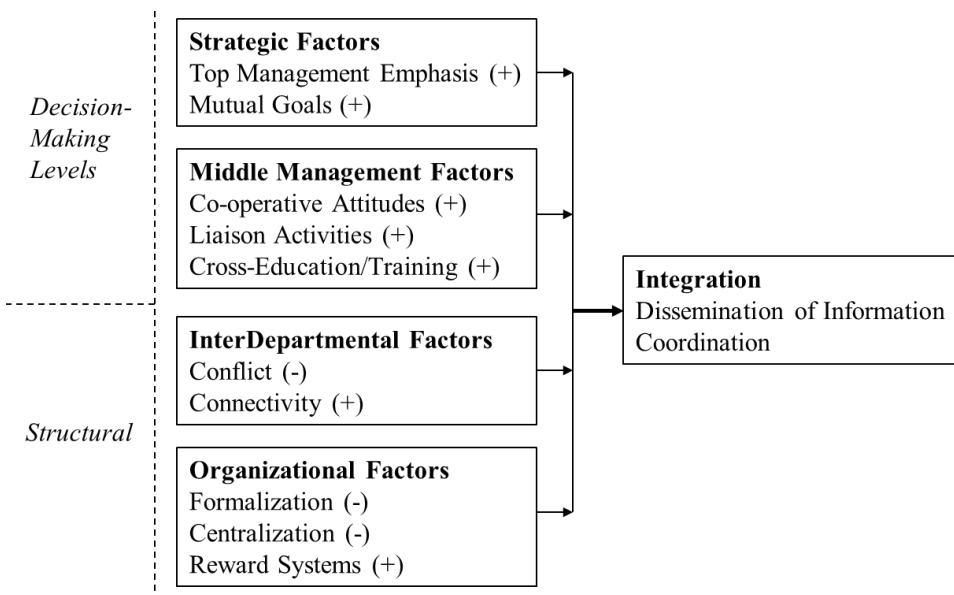


Figure 4 Marketing-Logistics Integration Model by Mollenkopf *et al.* (2000)

Mollenkopf *et al.* (2000) received 155 usable responses which were statistically analyzed both for their representativeness and contents. Based on the analyses, the original marketing-logistics integration model was refined. The refined model, presenting the factors that were found to be significantly related to integration in the statistical analyses, can be seen in Figure 5.

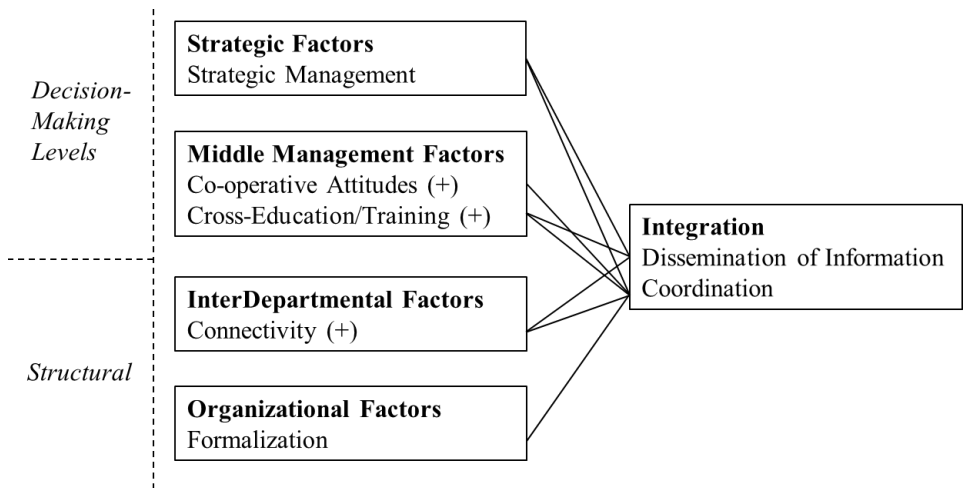


Figure 5 Significant Factors in the Marketing-Logistics Integration Model by Mollenkopf *et al.* (2000)

Reviewing Figure 5, in the course of analyses, the two strategic factors – top management support and mutual goals (see Figure 4)– were combined into a single factor of strategic management that proved to be very important in the creation of internal integration. The revised variable was significant in the overall model and also in sub-models testing its linkage to the two separate dimensions of integration, dissemination of information and coordination of activities. At the middle management level, on the other hand, co-operative attitude and cross-education/training proved to further the integration efforts. Both of these factors were also significant in the overall model and the separate sub-models. The liaison activities (see Figure 4) were found insignificant, and thus are not visible in Figure 5. (Ibid.)

Considering the structural factors, conflict was dropped from further analysis as it showed no relation to integration in factor analysis; moreover, centralization and reward system (see Figure 4) were found insignificant in regression analysis. Therefore, only connectivity and formalization are presented as significant influencers of internal integration in Figure 5. (Ibid.)

“Connectivity refers to the direct contact between or accessibility of employees in the marketing and logistics areas. When the barriers between departments are low, and employees have both formal and informal contact across functions, integration is enhanced.” Connectivity thus acts as an enabler of integration. (Ibid.) Formalization, on the other hand, showed mix results in Mollenkopf *et al.*’s (2000) research. As shown in Figure 4, formalization was expected to hinder integration efforts. This was the case with the responses received from the marketing managers. However, from the point of view of the logisticians, formalization was found to enhance integration. This finding was directly opposite as what

was expected and no clear reason could be identified. Mollenkopf *et al.* (2000) thus comment that this issue should be further researched and caution should be utilized when making judgements concerning the role of formalization in the integration process.

Another issue that Mollenkopf *et al.* (2000) noted interesting was the lack of significance of the reward system in the final model. They interpreted this to communicate that “rewards can be used to foster coordination in the integration process but probably do not work as bribes to induce integration” (Ibid.).

The integration model created by Mollenkopf *et al.* (2000) mainly follows the general research discussion concerning internal integration. The main benefit of the model for the current research is the questionnaire, with its various scales, used in developing it. The separate items researched can be considered when designing the research instruments of the current research. Some of the individual items have already been discussed when addressing the research of Basnet (2013). However, as Basnet (2013) omitted a large part of the individual questions, Mollenkopf *et al.*'s (2000) research was decided to be presented in its entirety separately.

#### **2.5.4 Other Applicable Analyzing Instruments**

While not presenting actual models for measuring or analyzing the level and/or status of internal integration, the researches of Ellinger *et al.* (2000) and Parente *et al.* (2002) were in prescreening seen to contain elements that could be applied in the research under scrutiny. Therefore, the researches, concentrating largely on their research instruments, are presented briefly below. Both of the researches have already been briefly mentioned while discussing Basnet's (2013) measurement instrument in Section 2.5.1. However, the researches and their research instruments were still seen worth to be discussed separately.

##### **2.5.4.1 Analysis Approach by Ellinger *et al.* (2000)**

The purpose of Ellinger *et al.*'s (2000) research paper is to present an empirical research that was done with the target of examining the relationship between marketing-logistics interdepartmental integration and performance. The individual integration elements researched contained collaboration, consultation, and information exchange in addition to perceived effectiveness of interdepartmental relations, formed as their consequence. The relationship between the elements, distribution service performance, and overall company performance was researched. (Ibid.)

The research was executed as a mail survey sent to 512 American logistics managers using the (adapted) questionnaire presented in Appendix 3 (Ibid). As the research under scrutiny does not study the relationship between integration and performance, performance related questions were omitted from Appendix 3.

According to Ellinger *et al.* (2000), the scales used for information exchange, consultation, and perceived effectiveness of interdepartmental relations were adapted from Van de Ven and Ferry (1980), whereas the scales for collaboration were newly constructed by themselves. The “measurement items captured the degree to which personnel from marketing and logistics engage in a series of activities and behaviors” and “the nature of relationship between the marketing and logistics departments in the respondents’ firms”. All measurement constructs were tested for validity and found valid. (Ellinger *et al.*, 2000.)

The constructed hypotheses and responses received (309) were analyzed by applying Structural Equation Modelling (SEM). As the main benefit of Ellinger *et al.*'s (2000) research for the research under scrutiny is the questionnaire used in the research, the final results received by the research are not profoundly discussed. While analyzing the current status of the internal integration of the case company, the following findings are, however, worth considering:

- Collaboration is the key to more effective interdepartmental relations and integration.
- Forced, extensive information exchange (interaction) may be somewhat worthless unless the different parties regard the information exchanged valuable and are somehow motivated to use it.
- Increasing forced interdepartmental consultation (interaction) may affect negatively the interdepartmental relations. Frequent consultation may rather be seen as a burden than a benefit. “Unless participants in the process see value in the consultation opportunities and are motivated to put them to good use, increasing consultation frequency may be unproductive and even harmful.” (Ellinger *et al.*, 2000.)

#### ***2.5.4.2 Analysis Approach by Parente et al. (2002)***

The purpose of Parente *et al.*'s (2002) research paper is to discuss an exploratory research that was done with the target of studying the effect of sales-production relationship on customer satisfaction. In other words, the overall target of the research was to study the causal relationship between sales-production relationship and customer satisfaction. The ideology of the research was that if a positive causal relationship is found, improving the internal sales-production interface should improve customer satisfaction. (Ibid.)

The internal integration variables researched in the sales-production dyads (sales representative – production manager pairs) included connectedness, conflict, and coordination; the relationships between the two functions/persons were studied by using a survey instrument. The level of customer satisfaction, discussing each sales – production combination, on the other hand, was researched by using a separate survey. The type of production (MTS, MTO, ETO) was used as a moderating variable. (Ibid.)

The hypotheses presenting the causality of the different internal integration variables and customer satisfaction, in addition to the effect of the type of production applied, were tested in three manufacturing companies producing multiple products and applying multiple production types. All together 30 unique sales representative –production manager dyads were surveyed; in addition, 79 customers reported on 128 product situation. Each internal dyad thus had an average of 1,6 corresponding customer evaluations. (Ibid.)

The internal integration variables were researched by a questionnaire presented in Appendix 4. As again the target of the current research is not to study the relationship between internal integration and performance – in this case customer satisfaction –, the questions enquiring customer satisfaction are not discussed.

According to Parente *et al.* (2002), the measures used in the questionnaire (Appendix 4) were developed based on previously validated scales created by Jaworski & Kohli (1993) and Narver & Slater (1990); all constructs were also analyzed for reliability and face validity.

As again the greatest benefit of the research of Parente *et al.* (2002) for the current research is the questionnaire used to study the sales-production relationship, the final results of the research are not thoroughly discussed. However, while analyzing the current status of the internal integration of the case company, the following findings are worth considering:

- Interdepartmental connectedness has a positive impact on customer satisfaction and conflict negative. Coordination was surprisingly not found to influence customer satisfaction. Parente *et al.* (2002) strive to explain the lack of importance of coordination by commenting that “coordination may be less likely and possible due to the inevitable power struggles that occur in such [sales-production] long-term relationships within organizations”. (See the questions concerning each variable in Appendix 4. As discussed in Section 2.2, different researchers have different definitions for the various integration elements.)
- However, interdepartmental conflict, though usually thought to be detrimental, may also lead to better decisions and consequently to better customer satisfaction, if functional and task oriented.
- Informal cross-functional “get-togethers” enhance interpersonal relationship and consequently cross-functional business relationships.

- The sales-production relationship is important for both parties. Sales may need “favors” from production to be able to deliver extra orders to customers, whereas production may need “favors” from sales in low demand circumstances, in order to keep the production running.
- Production type affects which relationship is most important for the creation of customer satisfaction, sales-production (MTO), sales-customer (MTS), or production-customer (ETO). In ETO situations production may need help from sales in dealing with the customer. (Ibid.)

### ***2.5.5 Summary of Analysis Approaches Applicable in Current Research***

Table 11 presents a summary of the different internal integration analysis scales and items discussed in the approaches presented above. The individual items are classified according to the definition of internal integration formed in the research under scrutiny (see Section 2.4), under formal and informal information sharing, collaboration, and coordination, and gathered under new entities/sub-classes, formed in the research under scrutiny. The full operationalization of the different items, how internal integration is seen and analyzed in the research under scrutiny, is presented in more detail in the following section, Section 2.6.

Table 11 Summary of Analysis Approaches Applicable in Current Research

Analysis Elements Discussed	Discussed in
<b>FORMAL AND INFORMAL INFORMATION SHARING</b>	
<b>Overall Status of Information Sharing</b>	
Sharing of information cross-departmentally	a); i); j); k); l)
Protection of departmental, internal information	i)
Effectiveness of information sharing	n)
Adequacy of information sharing	n)
<b>Form and Regularity of Information Sharing</b>	
Usage of established/formal teamwork and information sharing	d); f)
Usage of formal consultation	d); f)
Usage of informal teamwork and information sharing	d); f); i); j); k)
Regularity of and opportunities to formal and informal information sharing	d); f); i); j); k)
<b>Information Sharing Climate, Approachability and Usability of Other Members of the Organization</b>	
Openness of atmosphere towards information sharing	j); k); l)
Encouragement of atmosphere towards information sharing	l)
Approachability of other members of the organization, including top management	i); j); k); l)
Accessibility of other members of the organization	a); l)
<b>COLLABORATION</b>	
<b>Formal and Informal Cross-Departmental Teams, Purpose of Teamwork</b>	
Usage of formal, cross-functional teams (operational/managerial) (formal teamwork)	j); k)
Usage of informal, cross functional teams (informal teamwork)	a); d); f); i)
Purpose of teamwork	b); d); j); k)
<b>Mutual Understanding, Synchronizing of Activities, Common Vision and Goals</b>	
Mutual understanding of responsibilities, priorities, pressures, and concerns within the chain	a); b); c); d); f); h); j); k)
Usage of job rotation for management and other employees	j); k)
Possibilities to cross-departmental education	i)
Consideration of effects of own/own function's actions on other functions	e); j); k)
Usage of cross-departmental consultation in decision making	m)
Overall supply chain mentality - synchronized chain vs. functional silos	a); b); i); j); k)
Sharing of common vision and goals	a); b); c); d); h)
<b>Collaboration Atmosphere, Overall Satisfaction with Cross-Departmental Collaboration</b>	
Getting along cross-departmentally	a); g); i); l)
Cross-departmental conflicts and tension	i); l)
Culture of placing blame vs. finding common solutions to problems	j); k)
Overall satisfaction with cross-departmental collaboration	d)
<b>COORDINATION</b>	
<b>Top and Middle Management Support</b>	
Top management support on cross-departmental information sharing and collaboration	i); j); k)
Middle management support on cross-departmental information sharing and collaboration	i); j); k); l)
<b>Departmental Goals, Evaluation and Incentive System</b>	
Setting and alignment of corporate and functional goals	a); f); i); j); k)
Knowledge of different goals	i); j); k)
a) Basnet (2013); b) Chen et al. (2007); c) Ellinger (2000); d) Ellinger et al. (2000); e) Gimenez (2004); f) Gimenez & Ventura (2003, 2005); g) Kahn & Mentzer (1994); h) Kahn and Mentzer (1998); i) Mollenkopf et al. (2000); j) Pagell (2004); k) Pagell & Wu (2006); l) Parente et al. (2002); m) Sawhney & Piper (2002); n) Stank et al. (2001b)	

## 2.6 Internal Integration Framework Used in Current Research - Definitions and Operationalization

In Section 2.4 it has been presented how internal integration is defined in the research under scrutiny. Internal integration consists of formal and informal information sharing, collaboration, and coordination – all of which are needed in order to be able to create and maintain tighter internal integration.

Figure 2 (page 66) and Table 6 (page 69) aim at clearly describing the definition of each of the above mentioned three elements of internal integration, what they consist of, how they are linked to one another, and which positive and negative consequences executing the three elements – that is, striving for tighter internal integration – may have. Briefly summarizing, in the current research **formal and informal information sharing** is defined as “*Sharing information in various forms between different departments/ functions*”. **Collaboration**, on the other hand, stands for “*Working willingly together across departmental borders to reach collective goals and to actualize a common vision. Using the shared information cross-departmentally to make better, more informed, and joint decisions.*” **Coordination**, finally, is defined as “*Coordinating and aligning the individual and joint actions of different departments in order to guarantee that they are heading towards the common target, reaching the corporate goals*”. Or in other words, “*Coordinating, setting the guidelines for, and spurring the cross-departmental information sharing and collaboration activities*”. For full discussion concerning the definition of internal integration in current research, see Section 2.4.

Creating the operationalization, how internal integration is seen and analyzed in the research under scrutiny, on the hand, was begun by gathering possible scales from previous researches analyzing internal integration (see Section 2.5) and classifying the possible scales under the internal integration elements defined in the research under scrutiny. After all potential scales were identified and categorized under 1) formal and informal information sharing, 2) collaboration, and 3) coordination, they were further regrouped to represent smaller elements within each category. Consequently, a common nominator/title was formed for each smaller group. The starting measures of the operationalization process are presented in Appendix 5; stating the original, individual scales and their sources, in addition to their regrouping.

In addition to the scales used in previous researches analyzing the level of internal integration, a small amount of operationalization items were also designed based on existing theoretical discussion concerning supply chain skills (see Section 2.3.3). Such items were included that were seen to affect and be relevant in the formation of internal integration, for example, overall supply chain understanding. However, in the beginning of the research it was promised to all case

mill employees that the purpose of the research in its entirety was not to evaluate the individual employees. Therefore, item/scales discussing the skill levels of different employees were not included. Finally, a very important item/scale discussing the importance of working together cross-departmentally was added based on discussion concerning the potential performance benefits of tighter internal integration (Section 2.3.1). None of the actual internal integration analyses approaches reviewed (Section 2.5) specifically addressed this issue.

The final operationalization – and consequent survey scales – of internal integration created and utilized in the research under scrutiny is presented in Appendix 6 (in English) and Appendix 7 (in Finnish). The starting point of the operationalization process (Appendix 5) was utilized to create newly worded scales, combining the ideas of previous researchers, under each element of internal integration and their sub-categories. The end result was an operationalization containing 50 individual items/scales discussing formal and informal information sharing (13 items), collaboration (30), and their coordination (7). As discussed above, a contribution of the new operationalization to the previous operationalizations of internal integration are, in addition to the newly worded scales, the items discussing supply chain skills and the perceived importance of cross-departmental teamwork – all representing items neglected by previous analyses approaches.

The operationalization was created both in English and Finnish as a survey that was to be directly based on the operationalization and to be executed amongst the case mill employees, was to be executed in Finnish. Due to the planned direct usage of the operationalization, the answering scales of each item are also presented in Appendix 6 and 7. The utilization of the operationalization is further discussed in the methodology chapter, Section 3.2.2.

## 3 METHODOLOGY

### 3.1 Rationalization of Research Approach – Longitudinal, Qualitative Single Case Study Research

As the purpose of the research was to increase understanding of the research phenomena – elements of internal, cross-functional integration – choosing a qualitative research approach was regarded to be appropriate (for example, Golicic *et al.*, 2005; Eriksson & Kovalainen, 2008; van Hoek *et al.*, 2008; Sandberg & Al-vesson, 2011). As a means of increasing the understanding, the research aimed at creating thick-descriptions of the operations of the internal functions discussed in the research from the perspectives of various informants (Golicic *et al.*, 2005), in addition to utilizing several complementary data collection methods to triangulate the findings (Golicic *et al.*, 2005; Seuring, 2005; Eriksson & Kovalainen, 2008). According to Golicic *et al.* (2005) and Halldórsson & Arlbjorn (2005), the field of supply chain management research has been prone to utilize the quantitative approach; therefore more qualitative research is needed in order to truly understand the supply chain phenomena. Moreover, according to van Hoek *et al.* (2008), especially the topic of internal integration has primarily been studied by using quantitative ideologies, which “are incapable of providing the depth required for this complex interdisciplinary topic”. The call and need for more qualitatively oriented research was thus answered by the research under scrutiny.

The research was conducted as a descriptive, abductive single case study. According to Yin (2003), “a case study is an empirical enquiry that investigates a contemporary phenomenon within its real life context, especially when the boundaries between the phenomenon and context are not clearly evident”. A case study, thus, “focuses on understanding the dynamics present within single settings” (Eisenhardt, 1989). As the purpose of the research was to study and understand the elements of internal integration in operation, affected, guided, and limited by the real-life context in which they exist, a case study research was consequently regarded to be a suitable method to be adopted. On the other hand, as the aim of the research was to present a thorough and deep description of the elements of internal integration within their context – and to make conclusions based on the description –, the research can be classified as being a descriptive case study (Eisenhardt, 1989; Yin, 2003).

According to Yin (1994), case studies can involve single or multiple cases; multiple levels of analysis can also be entailed within single cases. As multiple

cases enable replication and offer a possibility to cross-case analysis and consequently to testing of existing/forming theories in several settings (Eisenhardt, 1989), a multiple case logic was first considered. However, as it became evident that unusually deep access could be gained to the operations of the case company of the research – Diamond Mill –, the idea of multiple cases was abandoned and concentration was decided to be put on researching the single case as thoroughly as possible.

According to Yin (2003), a single case approach may be chosen and justified if the case 1) is unique or extreme, 2) represents an example of a wider group of cases, 3) is revelatory, enabling observation and analyzing of a phenomenon so far inaccessible to scientific investigation, 4) provides a possibility to longitudinal research, studying the same phenomenon during two or more points of time, or 5) operates as a pilot for a multi-case setting. As mentioned above, originally the single case approach was chosen due to the possibility of receiving a very deep and wide access to the operations of case company. The author was given a possibility to work inside the company, while still maintaining the role of an external and objective observer. The author was not an employee of the case company and neither signed any kind of work contract for the duration of the research. Despite the status of the external, objective researcher, the author was given full access to the company – admittance tags, keys, own office, and even own computer and usernames and passwords to the mill's various IT –systems. In addition, perhaps most importantly, the author was given the Mill Director's blessing and support for operating freely within the company and researching the various departments and organization levels from the top management to the blue-collar employees. Without the positive and welcoming attitude of the Mill Director the whole research could not have been possible.

As according to van Hoek *et al.* (2008) the internal integration research studying multiple functions in addition to various organization levels is practically non-existent, the chosen case can be regarded to represent a setting so far inaccessible for scientific research (Yin's point 3 above). Virtually all of the previous studies, despite the research method applied, have researched the manager or director level. In addition, none of the earlier researches utilizing case study method have studied the relationship between the three functions researched in the research under scrutiny, production planning, production, and warehousing and dispatch. (Ibid.) The mill's internal supply chain from production planning to warehousing and dispatch thus operated as the unit of analysis of the research under scrutiny.

The feasibility of a single case approach received further verification during the progression of the research. As the research was begun in spring 2013, in April 2014 the owner of the case-mill informed to invest 110 million Euros in changing the production mode of the mill from fine papers to carton board during

year 2015. This decision led to redirecting the aim of the research and reshaping the research questions; representing a potential and/or common phase of a case study research (Eisenhardt, 1989). The investment decision also made the situation of the mill unique (Yin's point 1 above); such conversions are very rare and unique in nature, even on a global perspective. In addition, the decision also provided the author an opportunity to study the internal integration phenomena during three different time periods – in the old production mode (2013-2014), during transition from the old to new (2014-2015), and in the new production mode (autumn 2015 forward). The unique situation of the mill thus enabled the author to perform a short-term form of longitudinal research (Yin's point 4 above).

As according to van Hoek *et al.* (2008) previous longitudinal internal integration research is nonexistent, the opportunity to execute such longitudinal research can be regarded to be exceptional and significant. It could provide the academia with information that has not been earlier available. According to Voss *et al.* (2002), longitudinal research can prove to be particularly valuable as it provides the researcher an opportunity to observe the research phenomena at first hand during a longer period of time. Consequently longitudinal research may result in great in-depth insights (Voss *et al.*, 2002) and can be regarded to represent an ideal setting for theorizing (Jia *et al.*, 2016). The investment decision made by the owner of the case mill thus gave the author an exceptional opportunity to follow and research the internal integration elements during a unique, longitudinal transformation process. Having access to the case company – a common problem of executing longitudinal research (Karlsson & Åhlström, 1997; Voss *et al.*, 2002) – at any time of the research process did not form into a problem; the researcher was given the permission to operate at the mill for the duration of the entire research, despite the changing conditions.

Although maybe not as evident, the chosen case may also be regarded to operate as an example of similar cases (Yin's point 2 above). Though the situation of each company/mill may be somewhat different, the basic setting and modes of operating between production planning, production, and warehousing and dispatch, however, can be regarded to be similar in different process industry contexts. Although not the target of the current research, the case may also be used as a pilot-case for a future multi-case study (Yin's point 5 above).

As mentioned above, the main enabler of the research was the case mill's Mill Director by granting the deep access to the company. However, in order to truly utilize the opportunity given, personal investments were also demanded from the researcher/author. As researching the phenomenon "from the inside" demanded long-term presence at the mill, the researcher took two years' un-paid leave of absence from her own work duties.

### 3.2 Progression of Empirical Research, Data Collection and Analysis

The discussion concerning the research began with the case company in November 2012. As the target of the research was to provide pragmatic contribution in addition to theoretical and/or methodological contribution, the case mill was given an opportunity to affect the focus setting of the research. The final focus was set together with the case company representatives in March 2013 after several meetings, after which the actual empirical research actions were begun. The purpose of the focus setting was to keep the scope of the research concise and manageable, though wide enough to provide useful and exploitable information.

The actual empirical research was begun by informing the mill employees of the researcher's existence and reasons for being at the mill. The mill was facing co-operation negotiations simultaneously with the commencement of the research actions; therefore it was seen to be of utmost importance to inform all employees of the researcher's position – an external researcher, not employed by the case company, executing a research concerning the internal integration elements of the three concerned functions. The employees were also informed that the purpose of the research was not to evaluate the individual employees or to otherwise operate as the employer's "agent", but to perform objective research, hopefully providing useful information for developing the operations of the mill. In addition, the employees were also reminded of the researcher's status and motives of staying at the mill during the progression of the research.

The research was on a halt during year 2014. In addition, in April 2014 Pearl Group, owner of the case mill, informed of investing in changing the case mill's production mode from fine papers to carton board during year 2015. This decision led to refocusing the research and reshaping the research questions. The main topic, internal integration, remained the same, as did the three subject functions (unit of analysis). The research entity, however, was decided to be divided into three separate eras – in researching the research phenomena in the old production mode (2013), during transition from the old mode to new (2014-2015), and in the new production mode (autumn 2015 onwards). As mentioned earlier in Section 3.1, Pearl Group's investment decision thus provided the researcher an opportunity to execute short-term, longitudinal research.

During the progression of the empirical research (years 2012-2015), the researcher had approximately 200 contacts with the case company representatives (meeting, electronic mail, call), excluding some very minor contacts (for example, very short electronic messages). Figure 6 presents the progression of the different research actions as a simplified flowchart. The empirical research had clearly two distinctive, though closely related, parts – 1) a detailed description of the mill's production planning, production, and warehousing and dispatch opera-

tions, and 2) a survey research and additional interviews of the internal integration of the three concerned functions. The design process of the description of the mill's supply chain operations from production planning to warehousing and dispatch is described in more detail in Section 3.2.1. On the other hand, designing and executing the survey research and additional interviews concerning the internal integration elements of the three concerned functions is described in more detail in Section 3.2.2.

As can be seen in Figure 6, the theoretical framework of the research was refined several times during the research. Before the first introduction discussions at the mill in year 2013, a preliminary, theoretical understanding of the research topic was gathered and formed. In the end of year 2013, on the other hand, the accuracy and relevancy of the original theoretical framework was checked, and individual, relevant topics were added. Finally, in spring 2015 the final shape and contents of the theoretical framework was decided, based on which the survey and interview instruments were designed.

In accordance with the case study research principles, new theoretical knowledge was thus brought into the picture as the research progressed and demanded (Eisenhardt, 1989). The theoretical platform of the research was not conclusively decided and determined in the beginning of the empirical research, but theoretical and empirical discussion and consideration took turns during the research. The research therefore presents a real-life example of Gummesson's (2000) hermeneutic research spiral where understanding of a topic and its needed and relevant theoretical background is increased through empirical findings and experience. The research can consequently also be classified as using abductive research logic (Eriksson & Kovalainen, 2008). Finally, applying classifying methods presented by Vafidis (2007), the research can be classified as having progressed from theory (T) to methods (M) (introduction questions, survey & interview guides) and from there to empirical observations (O) – three times during the progression of the research (T-M-O-T-M-O-T-M-O).

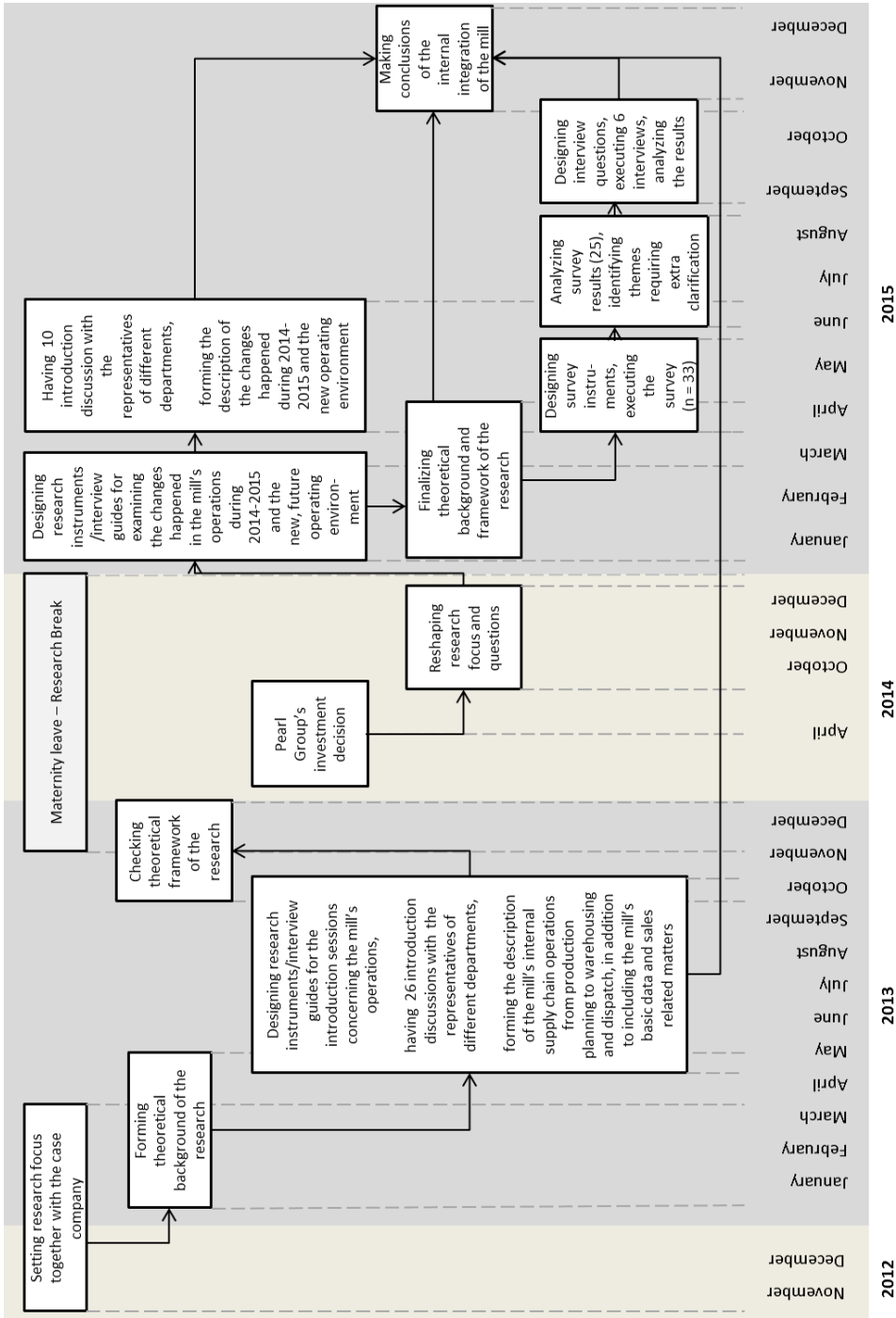


Figure 6 Progression of the Empirical Research

### ***3.2.1 Description of Diamond Mill's Internal Supply Chain during Three Eras – In Old Production Mode (2013), During Transition (2014-2015), in New Production Mode (2015-)***

As has been discussed earlier in Sections 3.1 & 3.2, Pearl Group's positive investment decision lead to researching the research phenomena during three distinctive eras: in the old production mode (2013-2014), during transition (2014-2015), and in the new production mode (2015-). Consequently the description of the mill's production planning, production, and warehousing and dispatch operations was also designed to contain a description of all the different eras.

The final description was written based on 36 introduction discussion had with the different mill representatives during years 2013 and 2015. The total duration of the discussions was 59 hours 15 minutes; a full list of the discussions, their dates, informants, topics, duration, and so forward can be found in Appendices 8 & 9. Some of the discussions were recorded, others not, in order to guarantee as fluent and free discussion as possible. Extensive notes were, however, written of each discussion; the notes proved to be sufficient for writing the description. All formed texts were also double – or triple – checked and approved by the informants in order to guarantee their correctness and validity.

The purpose of the discussions was to form an as detailed and deep description of the operations of the three concerned departments – production planning, production, and warehousing and dispatch – as possible, including work descriptions of the different employees involved in different parts of the internal supply chain, in addition to their information sharing and collaboration partners. The mill's sales related matters were also decided to be included as they were seen to largely affect the operations of the concerned three departments. In addition, a brief description of the mill's history and overall data was also included as a provider of background information and enabler of a holistic overview.

An extensive array of questions and sub-questions was used in each discussion. The questions/scales used in the discussions were newly developed by the researcher based on the preliminary theoretical understanding of the research topic gathered earlier, in addition to the researcher's own previous work experience in and knowledge of the paper industry. The individual questions were designed in Finnish, and thus they are not included in the dissertation. The discussions were also held in Finnish and the contents of the discussions were translated to English while writing the description.

The description concerning the mill's operations in the old production mode (2013-2014) was written on a very detailed level. On the other hand, the purpose of the description concerning the transition period (2014-2015), was to discuss the changes that had taken place in the mill's operations during year 2014, in addition to changes brought about the conversion project from fine paper to carton

board production. Finally, the last part of the description was written to illuminate the mill's operations in the new production mode. The future operating environment (autumn 2015 forward), however, could not be described on an as detailed level as the old operating environment, as the new operations had not yet started, nor had the future organizational structure reached its final form, while writing the description.

The created description of the mill's operations during the three eras can be found in Chapters 4-6. In addition to the description, Chapter 5 also includes results of a survey and interviews discussing the internal integration elements of the concerned three departments (Sections 5.3 & 5.4), as the survey and the interviews were executed during the transition period. The discussion and conclusions of the description, made by comparing the empirical findings with the existing theoretical discussion, can, on the other hand, be found in Chapters 7 & 8.

### ***3.2.2 Survey and Interviews of Diamond Mill's Internal Integration (Spring-Autumn 2015)***

#### ***3.2.2.1 Survey Process***

A www –survey was conducted in spring 2015 in order to analyze the level of internal integration between the concerned three departments – production planning, production, and warehousing and dispatch. The survey instrument was directly based on the operationalization of internal integration of the research under scrutiny, presented in Section 2.6. The final survey included 50 questions/statements, out of which 13 discussed information sharing, 30 collaboration, and 7 their coordination. Before the final scales were conclusively determined, they were checked and commented by three practitioners and one academic. As the survey was to be executed in Finnish in order to guarantee understanding and receiving of responses, the scales were also formulated both in English and Finnish.

The final scales are presented in Appendices 6 (in English) and 7 (in Finnish). While reviewing Appendices 6 & 7, it should be noted that the numbering of the scales does not proceed logically. This was due to the requirements and limitations set by the Webropol –program in which the survey was published and executed.

Depending on the question/scale, the statements were asked to be answered on a five (six) point scale – fully disagree, somewhat disagree, do not agree or disagree, somewhat agree, fully agree, and cannot state my mind – (for example, questions/statements 1-4, 8-13) or on a five (six) point scale – daily, weekly, 1-2

times per month, more sparsely, never, cannot state my mind (questions/statements 5-7). Additionally, some of the questions were asked to be answered by choosing between yes/no/cannot state my mind (for example, questions/statements 14-15, 49). On the other hand, in some questions where it was obvious that the respondents should know their situation/opinion conclusively, only options yes/no were provided (questions/statements 32-38, 46-48, 50). Finally, in some questions/statements the respondents were also asked to provide a written, extra explanation for their answers (open questions in statements 14-15, 19, 20, 32, 33, 36, 38, 46, 48, & 50).

In addition to the actual scales, the survey included background questions of the respondents; the respondents' department (production planning, production, warehousing and dispatch, overall management) and organization level (upper level white-collar<sup>1</sup>, lower level white-collar, blue-collar) were enquired.

Once the scales had been finalized, the survey was turned into a www –form in the Webropol –program and two cover letters were designed. The actual survey was equal for all respondents, whereas separate cover letters were designed for the white-collar and blue-collar respondent groups. This was due to the fact that the survey was sent to all white-collar employees involved in the mill's internal supply chain from production planning to warehousing and dispatch (17 respondents; 5 production planning, 8 production, 3 warehousing and dispatch, 1 general management; 6 upper level white-collars, 11 lower level white-collars) whereas only part of the blue-collar employees were targeted (16). The purpose of choosing only 16 blue-collar respondents from a larger population of potential respondents (55; 40 production, 15 warehousing and dispatch) was to somewhat equalize the sizes of the two respondent groups. In addition, the blue-collar respondents were chosen to represent all production and warehousing and dispatch shifts; two blue-collars were chosen from each production shift (altogether 10 respondents; 25 % of population) and one from each warehousing and dispatch shift plus one extra respondent (altogether 6 respondents; 40 % of population). Fewer respondents were chosen from warehousing and dispatch as the department is clearly smaller in manpower than the production department. The production planning operations do not employ blue-collars. The actual selection process of the blue-collar respondents was executed based on suggestions received from four mill representatives; the purpose of the selection was to target both more positively and negatively tuned respondents. As the survey did not aim at making generalizations but at increasing understanding, theoretical sampling was thus favored instead of random sampling. The cover letter designed for the blue-collar respondents informed that only part of the employees of each shift has been targeted and consequently received the survey.

The final survey, presented in a www –form, can be found in Appendix 10 (only in Finnish). The survey, together with its cover letters, was sent to a per-

<sup>1</sup> Generalizing, upper level white-collars are manager/director level office employees, lower level other office employees

sonal e-mail address of each respondent – also of the blue-collar respondents. The mill had earlier provided e-mail addresses for all blue-collar employees and encouraged their usage. Thus it was decided that also the blue-collar respondents would receive the survey through their personal e-mail addresses.

Table 12 presents the schedule of the survey process. Before the actual survey was sent, the Mill Director sent all respondents a message informing that such a survey would arrive and encouraged the respondents to answers. The respondents were given two weeks' time to answer the survey, two reminders were sent during that time – one by the Production Manager to the production department Shift Supervisors and one by the researcher to all respondents (also to those who had already answered).

Table 12 Progression of Survey Process

Date	Action
5.5.2015	Mill Director's message of the coming survey to all respondents.
6.5.2015	Sending the survey to all respondents; beginning of response time.
13.5.2015	Production Manager's reminder of the survey to Shift Supervisors.
18.5.2015	Researcher's reminder of the survey to all respondents.
21.5.2015	End of response time.

Once the originally stated response time ended, it was decided that no extra time would be given. 16 out of 17 (94.1 %) white-collars and 9 out of 16 (56.3 %) blue-collars had answered the survey; this corresponded well with original expectations. It was, however, still additionally tried to be examined, whether some of the unanswered blue-collars would actually have opened the survey and left it unanswered. The Webropol –program, however, failed to provide such information. The amount of opened and closed surveys could be found; however, it could not be determined whether the ones closing the survey at one point would not be the same that would have filled the survey later on.

The received responses were analyzed statement by statement by comparing the responses given by the representatives of different departments (production planning, production, warehousing and dispatch, general management) and organization levels (white-collars, blue-collars, in some questions upper level and lower level white-collars were also separated). The purpose of the analyses was to find similarities and differences in the opinions, and consequently to form an overall view of the elements of internal integration of the case mill's concerned functions. A summary of analyses was also formed after each analyzed topic. Usage of actual statistical analysis methods was not regarded to be suitable and to provide relevant information. The detailed findings of the survey are presented in Section 5.3. The discussion of the survey findings, made by comparing the

empirical findings with the existing theoretical discussion, can, on the other hand, be found in Chapter 7.

### ***3.2.2.2 Interview Process***

While analyzing the survey responses, it became evident that certain topics divided the opinions either within and/or between the two respondent groups (white-collars and blue-collars). As the survey responses, however, could not explain the reasons behind the differences, extra interviews were decided to be organized in order to receive explanations for the dispersion of opinions.

The interview guide was consequently designed based on the survey responses received. Such topics were chosen to be included that showed dispersion of opinions. If applicable, some survey statements were combined into larger themes, whereas some survey statements were decided to be further discussed as such. The actual interview guide (translated into English) can be found in Appendix 11. In order to guarantee understanding and getting the potential interviewees to agree to be interviewed, the interview guide was originally designed in Finnish and the interviews were also held in Finnish.

Seven persons were decided to be interviewed based on the answers they had given to the survey; the selection was done subjectively by the researcher. It was also considered whether such persons should be asked to be interviewed that had actually not answered the survey. The idea was, however, abandoned as it was regarded to be highly likely that if the persons did not want to answer the survey, they would not want to be interviewed either.

The selection of interviewees aimed at guaranteeing that persons representing different departments (production planning, production, warehousing and dispatch), different organization levels (white-collars, blue-collars), and different opinions (more positive, more negative) would be targeted. A personal e-mail was sent to each potential interviewee asking their approval to be interviewed. In addition, a reminder was sent to those respondents that did not react to the first message. Finally, six persons agreed to be interviewed – four white-collars (representing all departments) and two blue-collars (both from production departments). Representation from the warehousing and dispatch blue-collars could not be received despite the attempts.

The interview questions were sent to each interviewee beforehand for them to be able to familiarize themselves with the questions before the actual interview. All interviews were held in the researcher's office in order to standardize the situation and to prevent potential disturbance. The researcher's office was also located in a bit more secluded location than the mill's meeting rooms. This was seen to lower the barrier to be interviewed; the interviewees were promised ano-

onymity concerning their answers. The details of the interviews are presented in Table 13.

Table 13 Interview Details

	Date	Time	Department	White/Blue-Collar	Duration of the interview w/h	Recorded (Y/N)	Notes (Y/N)
1	17.9.2015	13.00-13.35	Production	Blue	35 min	N	Y
2	22.9.2015	13.05-13.40	Production	White	35 min	N	Y
3	23.9.2015	12.15-12.52	Production planning	White	37 min	N	Y
4	23.9.2015	13.00-13.35	Warehousing & Dispatch	White	35 min	N	Y
5	23.9.2015	14.00-14.55	Production	Blue	55 min	N	Y
6	7.10.2015	8.55-9.35	Production	White	40 min	N	Y

The total duration of the interviews was 3 hours 57 minutes; as can be seen in Table 13, majority of the interviews lasted 35-40 minutes. The interviews were aimed at being concise though comprehensive, as the mill was undergoing the process changes from the old production mode to the new while keeping the interviews.

None of the interviews were recorded in order to enable free flow of discussion. Extensive notes were, however, written of each interview. The researcher's understanding of the interviewees' opinions was checked and confirmed during the interviews, separate individual reports were not written.

The interview results, on the other hand, were analyzed question by question by combining the answers of all respondents into one entity. The answers were combined as the interviewees were promised anonymity. If a clear distinction between the answers received from the white-collars and blue-collars could be seen, a note of the matter was, however, presented. Otherwise the combined answers aimed at providing examples of explanations and/or reasons behind the dispersion of opinions. For some topics explanations could be found, whereas the dispersion of opinions in some themes remained unexplained. Moreover, some persons had also changed their opinions between the execution of the survey (May 2015) and the interviews (September-October 2015). The reason behind the change was addressed with some persons, whereas in some cases it was left untouched. The change of opinions was discussed, if the interviewee brought it up him/herself.

The interview results are presented in detail in Section 5.4. The discussion of the findings can, on the other hand, be found in Chapter 7.

### ***3.2.3 Other Data Collection Methods Used in Empirical Research***

In addition to the data collection methods mentioned above, the original aim of the research was to use articulated, openly executed observations as a means of gaining relevant information concerning the internal integration elements of the three departments under scrutiny. As the researcher had the possibility of spending long time spans at the case mill, unarticulated, objective observations could consequently be done continuously during the duration of the research. The planned articulated observations, however, had to be abandoned.

The purpose of the articulated observations would have been to spend a certain time period at each of the concerned departments and to openly express the different employees that the purpose of the researcher's existence at the department is to follow the daily actions and to gather material for the empirical research. Some articulated observing was done at the production planning department but as it became obvious that the researcher's existence as an external follower of actions felt unnatural and caused unwanted friction amongst the employees, the articulated observation actions decided to be discontinued and abandoned. A better way of making observations could have been, for example, to really work at each of the departments for a longer period of time, for example, one month. This, however, was not timewise possible. The changing operating environment would also have set its challenges and limitations for such operations. All in all, despite the forced abandonment of articulated observations, some objective observing could still be executed due to the long presence at the mill.

Finally, the researcher could also have had access to several case mill's IT programs and the information within them. However, as it was seen that the information available in the systems would not increase understanding of the research phenomena, elements of internal integration, the data available in the different systems was not utilized.

### **3.3 Research Quality - Validity and Reliability, Research Limitations**

The quality of a research can be evaluated through considering its validity and reliability; in other words, by considering whether the evidence stated in the research is valid (validity) and whether it is correct (reliability) (Yin, 2003; Seuring, 2005). Moreover, the discussion concerning research validity can be further divided into discussing three forms of validity – internal, external, and construct validity (Yin, 2003).

Internal validity, also called as logical validity, discusses the emergence and presence of causal relationships between the research variables and results, initi-

ating from the research data (Yin, 1994; Gibbert & Ruigrok, 2010). To guarantee internal validity, clear relationships, in which variable  $x$  cogently leads to outcome  $y$ , should be found from the research data, utilizing a research framework explicitly drawn from the previous research literature and incorporating all research data (Yin, 1994; Silverman, 2005; Gibbert & Ruigrok, 2010).

However, as the aim of the research under scrutiny was not to find and establish causal relationships between the research phenomena, the internal validity of the research will not be extensively discussed. Some factors ensuring internal validity are, however, also applicable and utilized in the research under scrutiny. For example, the research framework of the study was explicitly derived and drawn from the existing research literature (Yin, 1994) concerning internal integration. Multiple literature sources and consequently multiple perspectives – theory triangulation – were also utilized to build the research framework and to guide the data gathering and making of analyses and interpretations (Yin, 1994; Gibbert & Ruikrook, 2010). The empirical findings of the research were, additionally, in the end compared with the existing research literature to see whether the findings match with the previous findings or whether some abnormalities could be identified (Eisenhardt, 1989; Denzin & Lincoln, 1994; Strauss & Gorbun, 1994; Gibbert & Ruikrook, 2010).

External validity, or generalizability, on the other hand, refers to whether the findings of a research are generalizable to a larger population or are valid as such in other settings/contexts as well, in addition to the one where it was originally executed (Gibbert & Ruikrook, 2010). According to Yin (1994) & Lee (2003), case studies, single or multiple, are incapable of providing results that could be statistically generalized. Consequently, the research under scrutiny resulted in findings that cannot be statistically generalized.

However, according to Gibbert & Ruikrook (2010), case studies may instead be utilized for making analytical generalizations. “Whereas statistical generalization refers to the generalization from observation to a population, analytical generalization denotes a process that refers to the generalization from empirical observations to theory, rather than a population” (Ibid.). Case studies can thus be seen as a starting point for theory development (Eisenhardt, 1989; Yin, 1994; Yin, 2013). Whereas Eisenhardt (1989) favored a multiple case, comparative approach for theory development, Yin (1994) noted that theories can also be built by having a more focused approach, by conducting different case studies or multiple levels of analysis within one organization. The research under scrutiny adopted the multiple level, single case approach and aimed at developing the existing theories concerning internal integration by utilizing triangulation of theories (discussed above), methods, and data sources (Eriksson & Kovalainen, 2008). The triangulation of methods and data sources is further discussed below while discussing construct validity.

In addition to the analytical generalization, the findings of the current research can at least to some extent be regarded to represent the situation in similar kinds of process industry contexts (Yin, 1994). Though the prevalent situation in each company may be somewhat different, the basic setting and modes of operating between production planning, production, and warehousing and dispatch departments can be regarded to be largely similar in different process industry contexts. The case of a current research may thus be regarded to operate as an example of similar cases (Ibid.)

The construct validity, on the other hand, refers to the extent to which the research investigates what it is supposed to investigate and how truthful and accurate descriptions of the researched reality the research process is able to generate (Denzin & Lincoln, 1994; Gibbert & Ruikrok, 2003). Two main strategies have been proposed to ensure construct validity, 1) using triangulation and 2) establishing a clear chain of evidence how the researcher proceeded from the initial research questions to the final conclusions (Denzin & Lincoln, 1994; Yin, 1994; Gibbert & Ruikrok, 2003).

Triangulation refers to using multiple angles and perspectives to look at the same research phenomenon in order to refine and clarify the research findings (Denzin & Lincoln, 1994; Yin, 1994; Gibbert & Ruikrok, 2003; Eriksson & Kovalainen, 2008). Triangulation may be utilized in several forms, by triangulating the methodologies (combining qualitative and quantitative approaches), methods (utilizing several data collection methods, for example, interviews, surveys, observations), data sources (utilizing information gained through different data collection methods, having multiple respondents), theories (utilizing several theories in explaining, understanding, and interpreting the case), and researchers (having several researchers researching the same case) (Gibbert & Ruikrok, 2003; Eriksson & Kovalainen, 2008). In addition to various forms of triangulation, in order to guarantee construct validity, it is also recommended to have the evolving case study materials reviewed by peer academics, to utilize the help of “external eyes”, and to have the evolving transcripts and drafts reviewed by the actual informants to ensure accuracy and understanding (Gibbert & Ruikrok, 2003; Eriksson & Kovalainen, 2008).

As has been discussed above, the research under scrutiny utilized triangulation of theories, as the theoretical framework of the research was built based on a large amount of existing research literature concerning internal integration. In addition, the construct validity of the research under scrutiny was tried to be guaranteed by triangulation of methods and data sources. The research utilized several, complementary data collection methods – introduction discussions, reviewing internal written case company material, a www-survey, interviews, and observations (triangulation of methods). Consequently, the usage of several data collection methods resulted in an opportunity to use and combine information

gained from several different sources; in addition, multiple respondents/informants, representing different organization levels, were also targeted and researched in each of the concerned case mill's three departments (triangulation of sources).

In addition to triangulation, in order to guarantee validity of the research findings, all description texts written based on the introduction discussions were also checked, commented, and accepted by the different informants. Moreover, understanding and accuracy of the internal integration interview discussions and their findings, following the more wide scale www-survey, was confirmed in the end of each interview. Regular interim report discussions were also held with the representatives of the case company to inform them the status and progression of the research. The aim of all these actions was to ensure that all different matters had been correctly understood and recorded.

In addition to these informant verifications, the help of "external eyes" was utilized when constructing the www-survey. The final form of the survey was confirmed only after it had been reviewed and commented by one academic and three practitioners (all possessing a master level university degree).

To continue the discussion with the second strategy to ensure construct validity, according to Yin (1994) and Eisenhardt (1989), construct validity refers to establishing a chain of evidence between the research questions, evidence, and conclusions; it has to be guaranteed that the route from the research questions and data to the conclusions is clear and justified (McCarthy & Golicic, 2005).

To guarantee construct validity and to demonstrate the chain of evidence, the researcher held systematic and thorough bookkeeping of all research actions executed during the progression of the research. The records state explicitly what has been done, with whom, how, and when. All separate actions have been recorded from November 2012 until the beginning of year 2016; the bookkeeping includes approximately 200 separate records. The advancement from the research questions and data collection to the conclusions can thus be precisely tracked by following the records documented.

In addition, the data collection and analyses procedures are thoroughly described (Gibbert & Ruikrog, 2010) in the dissertation; including, for example, detailed description of the www-survey design and execution process, in addition to explicit records and explanations of all introduction discussions and interviews held during the research. Also the problems utilizing openly articulated observations, that had to be abandoned, are reported. Moreover, the thesis also openly discusses the changed situation at the case company that led to redirecting and re-planning both the focus and research questions of the research under scrutiny. Also the deep organizational access is discussed. According to Gibbert & Ruikrog (2010), "whether a clear chain of evidence is provided depends on careful explication of the data collection procedures, including a reflection on the

planned versus actual process, as well as on a discussion of data analysis procedures. A case study's indication of data collection circumstances, such as organizational access, time frame, and interviewee selection approach should be reported. Authors are also encouraged to be explicit about how the planned data collection different from the actual process." Following this ideology, the research under scrutiny aimed at having systematic records of all research actions in addition to explaining the progression of the research and data collection and analysis methods as thoroughly and clearly as possible. Considering all the discussion above concerning triangulation and establishing a clear chain of evidence, in the subjective opinion of the researcher, the construct validity of the research under scrutiny is good and guaranteed.

Finally, reliability refers to the extent to which the research could be repeated by other researchers resulting in same results and findings (Denzin & Lincoln, 1994; Eriksson & Kovalainen, 2008; Gibbert & Ruikrog, 2010). The repeatability is largely dependent on the researcher's description of the research process (Silverman, 2005); the keyword in achieving replicability and consequent reliability is "transparency" (Gibbert & Ruikrog, 2010).

According to Yin (1994), the transparency and repeatability – and consequent reliability – can be enhanced by utilizing a case study protocol describing all research actions; by creating a report explaining how the whole case study has been conducted. In other words, the reliability of a research can be enhanced by carefully documenting and clarifying all research procedures (Gibbert & Ruikrog, 2010). In addition, the reliability can also be improved by carefully archiving all research data – to be available for further researchers to use (Yin, 1994; Gibbert & Ruikrog, 2010).

By following the research bookkeeping kept by the researcher, discussed above, and by utilizing the research instruments developed during the progression of the research, the data collection procedures of the current research could be repeated by other researchers. In this sense the reliability of the research under scrutiny is good. All research data is also archived in the researcher's personal notes and computer files, and could consequently be utilized by other researchers as well. However, as the case mill's operating environment is currently facing extensive changes, the results gained by using the same instruments and targeting the same respondents could still differ from the current research, even without researcher bias.

To close the discussion, although the validity and reliability of the research under scrutiny should thus be guaranteed by different means, the research also has its limitations that should be noted. First of all, the three eras discussed in the research are not comparable as such to one another. Although the focus has all the time been on researching the elements of internal integration, the actual research actions and ways of presenting the findings vary between the eras. As has

been discussed earlier, the situation at the case mill changed totally during the duration of the research. These changing conditions led to redirecting research entity and means; similar data was also not possible to be gained of all eras (for example, of future operations and operating environment). Consequently, the descriptions of the three eras should rather be seen as one entity, as a transformation process from one production mode and operating environment to another, rather as separate and comparable descriptions of the different eras.

In addition, the research has only addressed a part of the case mill's internal supply chain functions, production planning, production, and warehousing and dispatch; several functions largely affecting the operability of the mill's internal supply chain have been ruled out, for example, pulp production, power production, and purchasing. In addition, the concentration has been on researching the internal integration elements between the concerned departments. The formal and informal information sharing and collaboration actions executed within the departments have not been studied. Moreover, the various skills needed of different level employees in order to manage the internal supply chain successfully are also very briefly discussed; the aim was mainly to bring the skills to the discussion as linked to internal integration. All these limitations are topics deserving and needing further research.

## **4 DIAMOND MILL, PM 3 – IN OLD PRODUCTION MODE (2013-2014)**

Diamond Mill, PM3, operated as a case company of the dissertation. The following Chapters 4-6 will thus concentrate on providing a comprehensive picture of the operations of the case mill. The description is divided into three parts, describing the operations and internal supply chain of the case mill in the old production mode (fine papers, years 2013-2014; Chapter 4), during transition from fine papers to carton board (2014-2015; Chapter 5), and in the new, future production mode (carton board, autumn 2015 onwards; Chapter 6). The description is based on a multitude of discussions/interviews held together with different mill representatives, in addition to a qualitative survey and un-published and published material received. The main source of information is presented once in each section; if some additional source is also utilized, the source is presented in each, relevant paragraph.

The current chapter discusses first briefly the history and operations of the Diamond Mill Integrate and the Diamond Mill itself and concentrates thereafter on profoundly describing the different operations executed at the mill in the old production mode (fine papers), during years 2013-2014. The chapter is written in year 2013; however, the description also represents the current status of operations in year 2014. This is due to the fact that while the description was being written, the mill was currently changing some of its modes of operating (for example, the sales process); the new operating modes were subject to being adopted a few months after. Therefore it was decided together with the mill representatives that the concentration would rather be on describing the coming modes of operating rather than on the modes soon to be abandoned. On the other hand, the modes of operating that were expected to stay as such in the near future (2013-2014), were presented in detail as such (for example, production and warehousing and dispatch operations). The chapter aims at describing the various operations, duties, internal collaboration and information sharing, and so forward, as realistically and truthfully as possible.

To lay a foundation for the case, according to the Mill Director (3.5.2013) and unpublished case mill material (Unpublished Mill Presentation slides, received 6.5.2013), *The Diamond Mill Integrate* has a long and eventful history in the Finnish paper making industry; the integrate has undergone several significant changes during the last years and decades. Once very prosperous and large integrate has had to face the consequences of industrial restructuring and consequent

closing of several paper machines. One paper machine, PM3, however, still remains and operates in a profitable manner. The current (2013) mill integrate also includes an operative sawmill and a pulp mill.

The operations of the integrate started in year 1912 in the form of a power plant, around which the multifaceted integrate started forming mill after mill, paper machine after paper machine. During the best years the integrate employed approximately 2500 employees and produced virtually everything that can be produced out of wood: news-print, fine paper, core board, timber, plywood, houses, egg carton, etc. Due to the multi-faceted nature of the integrate, it aimed at recycling and reusing all production residuals and rejects.

Concentrating on the paper industry, the paper machines that were built in Diamond Mill Integrate represented the high-tech machinery of their times. When built, PM1 (1921) and PM2 (1926) were the largest and widest paper machines in the world; PM3 (1961), on the other hand, was the widest paper machine in Europe. In addition, when built, PM4 (1977) was the fastest paper machine in the world. PM4 also formed a part of in an ideally operating supply chain; the production line of PM4 was directly joint to the printing works' operations. Therefore, the newsprint produced at PM4 went directly to printing, without a need for intermediate warehousing.

The paper mills changed owners two times during the years; the real changes, however, started in year 2006. In 2006 PM1 was closed and this closing was followed by the closings of PM2 and PM4 in 2010. In addition, other shutdowns were taking place simultaneously within the integrate; for example, the board mill was closed in 2008. Thus, as mentioned above, the current (2013) integrate only includes one paper mill, PM3, in addition to a sawmill and a pulp mill.

The current (2013) integrate employs consequently approximately 400 employees, i.e. approximate one sixth of the peak years' figures. New businesses have evolved within the integrate borders and have filled some of the empty production halls. Many premises, however, still remain unused and empty after the restructuring and closing operations. New reuse is wished to be found for the empty facilities.

Concentrating on the case mill, *the Diamond PM3* itself was built in year 1961 (Mill Director, 3.5.2013; Unpublished Mill Presentation slides, received 6.5.2013). During the first 25 years it produced newsprint and in year 1985 was converted to produce fine papers. Since then, the PM3 has concentrated on producing fine papers and has a current (2013), yearly capacity of approximately 300,000 tons. Despite the restructuring of the industry, PM3 has received several significant investments during the past years in order to improve and maintain its functionality and productivity. The paper machine is therefore in good technical condition.

PM3 produces different office papers: form, envelope, writing/notebook, and offset papers in addition to thin print and ink jet papers. Approximately 97 % of the production consists of the “old, traditional products”, form, envelope, notebook, and off set papers. Thin print and ink jet papers are seen as future potentials and possibilities. The bleached pulp, used as raw material for the paper, remains relatively stable for all different products. The different qualities needed for the different papers are produced by changing the chemical and filler structure and amounts in the pulp, in addition to adjusting the paper machine settings. The mill produces 100 percent of its production in reels and has no sheet cutting facilities. 98 percent of the produced goods are exported; three quarters to Europe, one quarter to the rest of the world.

Diamond Mill is part of Pearl Group’s Printing Division and has two sister mills, Sapphire Mill in North Finland and Ruby Mill in South Sweden. Pearl Group aims at running the three sister mills as one entity. The mills produce some similar qualities, but also have their own special specifications. Of the three mills, Diamond and Sapphire can swap their envelope and offset orders between the mills according to the market needs and production schedules and capacities. Additionally, Sapphire and Ruby can swap their A4 copy paper sheet cutting orders. However, Diamond and Ruby do not have prominent possibilities for order swapping.

Diamond Mill’s production is challenged by great seasonal fluctuations. The demand peaks during the spring and slows down towards the end of the summer and autumn. The demand curve, however, remains quite similar and stable from year to year; therefore the demand structure is quite well known. The overall level of the total demand may, however, naturally vary according to the market conditions and consequently sets its own challenges for the mill’s production and capacity planning. In addition to the seasonal fluctuations, the mills production planning and productivity is also challenged by the multitude of different products and qualities produced; the more there are quality and setting changes, the less there is production and the less efficient is consequently the production.

In addition to the actual fine paper products, the mill produces several side products, such as pine oil and turpentine. The mill also sells its excess pulp on a European market and its excess heat is used to heat the local houses using district heating in the nearby urban areas. The amount of pulp to be sold is expected to increase in the future.

The mill employs currently (2013) approximately 260 employees, out of which 60 are white-collar and 200 blue-collar workers. Most of the employees are very experienced; the employees who have served the company more than 30 years form the largest personnel group. The average age of the personnel is 48 years. On the other hand, employees aged between 25-40 years form a clear mi-

nority of the personnel. The age distribution of the mill is thus inclined. 80 percent of the employees are male.

The employees working in the offices mainly hold specialized, constant positions, whereas the personnel working in the production utilize more job rotation. The mill also fosters operator maintenance; the paper machine operators thus also take part in the maintenance tasks of the paper machine.

## **4.1 Diamond Mill's Sales and Customer Related Matters**

The following sub-sections present brief overviews of Diamond Mill's sales and customer related matters. The topics are gathered under representative titles, though some topics are also discussed in relation to other topics. The sub-sections are written based on discussions had with Diamond Mill's Director, Product Segment and Senior Manager, Master Planning on 16.5.2013, 5.6.2013, 19.6.2013, and 3.7.2013. In addition, unpublished office paper sales presentation material was also utilized (received 7.6.2013). In addition, Section 6.1.6 is also partly based on discussions had in mill-internal sales process training (16.5.2013-17.5.2013) and unpublished sales process guidelines (received 5.6.2013) and job descriptions of the sales superiors (received 7.6.2013).

### ***4.1.1 Customers and Segmentation***

As mentioned earlier, 98 percent of the mill's production tonnage is exported. The mill has approximately 200 customers (ca. 400 different buyers) worldwide; approximately two thirds in Europe and one third in overseas markets (e.g. USA, South America, Middle East, Australia, and Africa). Some of the overseas customers are regular customers to whom the deliveries continue throughout the year. Some of them, on the other hand, are spot customers, whose orders are irregular and are used to moderate and fill the production capacity. The price level of the European orders is usually higher than the price level of the overseas orders. The differences in prices are, however, moderated by the lower transportation costs to overseas markets than to Europe, lesser need for inventory management, and lack of cash discounts and other rebates for the overseas markets. The profitability of the overseas business is also affected by the exchange rate of the US dollars. All of the customers are usually direct converters, i.e. they refine the fine paper produced at Diamond PM3 to various end products. The mill does not usually sell through wholesalers.

The mill's customers are segmented according to products segments, to users of business form, envelope, notebook, off set, and specialty papers. The mill also

utilizes segmentation based on importance and loyalty of the customers. The most important and loyal key account customers receive better service compared to other customers. They may, for example, be promised larger quantities, longer warehousing, and quicker deliveries in addition to e.g. building own business concepts with the customers. Out of the total of 200 customers, only a few are regarded as key accounts.

#### ***4.1.2 Demand – Seasonal Fluctuations and Their Consequences, Three Sister Mills***

The mill's production is run according to orders, utilizing MTO (make-to-order) principles. No production is run to stock (MTS, make-to-stock) without orders. The highest demand exists for business forms that make approximately 47 percent of the budgeted and produced tonnage. The corresponding figures for the other product segments are 22 percent for envelope, 16 percent for offset, 12 percent for notebook, and three percent for the specialty papers.

As mentioned earlier, the mill's demand has high seasonal fluctuations. The demand is continually highest in the spring time, when most of the produced tonnage and deliveries are directed to the European customers. In addition, as mentioned in the previous section, the demand of the regular overseas customers is also fulfilled during the spring's peak time. However, the amount of the overseas deliveries increases towards the end of the summer and autumn, when the European demand settles and decreases. The irregular, overseas spot orders are thus utilized to moderate the seasonal demand fluctuations and to help the mill to maintain constant, continuing production.

The demand fluctuations affect the mill's operations in several ways. The level of European demand, for example, sets the guidelines for the need of overseas orders. The more there is European demand, the less there is need for the overseas, spot orders and vice versa. The demand fluctuations and changing market conditions thus guide the mill's sales operations. The variations in demand and delivery addresses also reflect on the mill's modes of delivery. As most of the spring's demand, that can be fulfilled, comes from Europe, the mill also has a great deal of direct truck deliveries to the customers during the spring time. On the other hand, when the demand and deliveries turn more to overseas markets, the amount of direct truck deliveries decreases and the amount of maritime transports correspondingly increases.

The demand fluctuations also set challenges on the mill's inventory levels. As the highest demand peak continuously settles to a period starting from the end of January, the mill is constantly struggling how to answer the customer demand and to serve the customers with low, year-end inventory levels. The low, year-

end inventory levels are due to the needs of the quartile economy; no excess paper should stand in the stock when the books are closed. This contradiction between high demand and low inventory levels would suggest that temporary, seasonal stocks could be allowed to exist also during the turn of the year in order for the mill to survive the high demand season.

In addition to the demand fluctuations, the mill's capacity and production planning is also challenged by the fact that the mill does not operate individually but is run in combination with the two other sister mills, Sapphire and Ruby. As has been mentioned earlier, the mills may swap orders with one another and their overall, rough capacity planning is managed by two master planners, one for paper reels and one for paper sheets. The operations of the Diamond Mill are thus affected by the market and production conditions of the two sister mills. Consequently, a solution that would be the best for the Diamond Mill may not be the best from the perspective of the combination of the three mills. Therefore the Diamond Mill needs to be flexible in its production and sales, and may have to consent to compromises.

#### ***4.1.3 Delivery Modes and Main Harbors***

The mill delivers its Central European orders either by direct trucks from the mill to the end customer or by liner ships through Hietanen harbor in Kotka, Finland. The Spanish orders, on the other hand, are delivered through Hamina harbor, in Hamina, Finland. All of the mill's overseas orders are delivered by sea; the main export harbor used is Mussalo, in Kotka, Finland.

If pre-carriage to the different domestic harbors is needed, the mill delivers the goods either by truck or rail. The Finnish state railways, VR, has reduced its services in Diamond Mill's location and therefore the pre-carriage deliveries have turned to use more road transport instead of rail transport. The current ratio between road and rail pre-carriage is approximately 50/50, but the amount of road transport is expected to continue to increase.

All in all, the mill has started to use more road transport and has received remarkable savings by, for example, using the direct truck deliveries to Central Europe. The mill has also received considerable savings through utilizing return deliveries of empty import containers.

#### ***4.1.4 Inventories***

The mill maintains inventories virtually for all European customers in addition to customers from the United States of America. For these customers the goods are

delivered using D –terms (Incoterms 2011). Other overseas customers are not provided this service; their orders are delivered using CPT –term and are thus invoiced after the vessel sailing (Incoterms 2011).

The inventories are held either at foreign harbors or inland terminals. The customers are sent an invoice of the goods when they call them off from the terminal. The customers also have a so called sunset clause; i.e. if the customers do not take the goods from the terminal in an agreed period of time, the goods will, nevertheless, be invoiced. After the invoicing, the customers have an agreed time period to take the goods. The mill does not hold actual consignment stocks for any of its customers, nor holds any customer inventories at the mill.

The inventory levels are currently under very close control; all mills have been given very tight targets from the corporation. The new targets for the Diamond Mill are seen as very challenging. Experience has proved that the customers have difficulties in forecasting their own demand and therefore expect their suppliers to be flexible and maintain higher inventories for them, to match their possibly changing demand. Diamond Mill's supply chains thus present clear bull-whip conditions that set their challenges for the sales operations, capacity and production planning, and inventory management of the mill. In order to fulfill the new inventory targets, the mill sees that the warehousing contracts, agreed with the customers, need to be reviewed and the agreed warehousing periods shortened. The mill should also receive better information from the customers concerning their actual demand.

The mill's current un-invoiced stock corresponds approximately to one month's production tonnage. In addition, the mill also has a few thousand tons invoiced goods in its different terminals. Due to the new corporate targets, the mill aims at cutting this tonnage and has calculated new inventory amount targets for different markets and product segments. The targets are aimed to be reached in co-operation with Pearl Group's international field sales representatives and the customers. One means of cutting the inventory levels is to offer the customers a discount if they accept direct truck deliveries instead of deliveries through the terminals. Another, a more drastic means is to plan production standstills. As the paper machines are standing, no new material is brought to the terminals and the inventory levels diminish due to customer call-offs.

#### ***4.1.5 Competition, Diamond Mill's Competitive Advantages and Disadvantages***

The competition between the different fine paper producers is regarded to be quite hard, but fair and honest. Despite the relatively tight competitive situation, the Diamond Mill regards its own competitive situation to have been quite posi-

tive during the past years. The current global competitive balance is, however, expected to change as some previously closed fine paper capacity is about to be reopened. The demand-supply situation is thus expected to change due to the reopenings and slightly decreasing demand. Consequently, the changing situation is expected to set its challenges on the current price levels of the different fine paper products.

Diamond Mill regards its main competitive disadvantage to be its location. The competitors, that have operations in Central Europe, are much closer to the customers. However, the mill is also regarded to have several competitive advantages/edges that are believed to overcome the disadvantages set by the location:

- The mill has a good reputation as a reliable, trustworthy supplier. It has a long track-record in the business and is a part of a large, known corporation.
- The mill concentrates on producing fine paper reels only; no sheets are produced. The mill is seriously committed to the reel business.
- The mill is financially sound and develops its operations constantly.
- The mill operates in an environmentally sound manner.
- The mill is in the business to stay.

#### ***4.1.6 Division of Duties – Roles of Different Parties in Diamond Mill's Sales Process***

Pearl Group is currently (summer 2013) restructuring the sales processes of its fine paper mills and consequently these changes will also affect the operations at the Diamond Mill. As the current modes of operating will be abandoned during the coming months (by the end of year 2013), the following description aims at describing the roles and responsibilities in the new business model. The aim of the description is to give a simplified overview of who does what in the various stages of the Diamond Mill's supply chain and order handling processes. The party/parties responsible for each part of the process are presented in bold and italics.

The target of the fine paper mills' new business model is to offer a one-face approach to the customers and to set a clear governance structure for the customer relationship management. The corporation also aims at finding synergies and improved efficiency through a joint, centralized organization for both sales desk and logistics related tasks.

#### ***4.1.6.1 Contacts to Customers, Forecasting and Monitoring Customer Behavior***

Pearl Group's globally dispersed, *international field sales staff* is in charge of building and maintaining the direct customer relationships in each geographically divided market area. Some of the salesmen operate individually, whereas in some overseas market areas the sales operations are organized under a larger field sales office. Moreover, some of the salesmen are specialized in selling only certain products (e.g. fine paper, magazine paper, newsprint), whereas some of the salesmen are in charge of selling different types of products within their market areas.

Considering the Diamond Mill's sales, the *international field sales staff* is the main contact channel to the customers; the field sales representatives are in charge of handling the business negotiations and agreeing the deals with the customers. The work of the international sales staff is directed, supported and monitored by a *Senior Vice President, Office Paper Sales* located in Belgium and a *Director, Product Segment, Wood Free Uncoated Reels* located at the Diamond Mill. Both the SVP and Product Segment Director are employed by the Pearl Group's Printing Division and work within its Sales Organization. They are thus responsible for the sales operations of all the three sister mills and consequently guide the sales efforts of the Diamond Mill from the perspective of the three mills.

In addition to managing the customer relationships, the international field sales staff is in charge of giving sales forecasts of the expected demand of their market area or individual customers. This forecast is sent regularly to a *Senior Manager, Master Planning* who is in charge of the high-level capacity usage and production planning and sales quota management of the reel orders of the three sister mills. The Senior Manager is located at the Diamond Mill, but operates again from the perspective of the three mills and is employed by the Office Paper Sales Organization.

Based on the sales forecasts received, the Senior Manager assigns a sales and production quota for each market per month. The quota expresses the amount each salesman is allowed to sell to his/her customers, to be produced within a certain month. The operations of the international field sales staff are thus also guided by the Senior Manager, Master Planning. In addition, the sales forecasts received from the international sales organization are also used to give guidance for the need of extra overseas, spot orders to fill the production capacity. Should the need for extra tonnage exist, this need is communicated to a *Sales Manager, Overseas Sales*, whose task is to find the potential customers and to sell them needed tonnage. The Sales Manager is located at the Sapphire Mill, but operates again on behalf of the three mills.

The international field sales staff is also in charge of technical customer service, i.e., for example, helping the customers if they have problems with the products, and following the credit and payment behavior of the customers. The overall responsibility of the credit management, however, lies in the hands of the Director, Product Segment. The Director also has the overall final responsibility of the few key account customers, though the daily work and regular contacts to the customers are mainly handled by the international field sales.

#### **4.1.6.2 Order Handling**

Once the sales forecasts have been received and the sales quotas are consequently set, the actual customer orders can be confirmed. Each confirmed order eats the assigned sales quota; once the quota is used, no new orders can be confirmed.

In the new business model, all Diamond Mill's customer order related matters are handled either by the *international sales offices* or *customer service centers (CSCs)*. In those overseas markets where Pearl Group still has actual sales offices, the customer orders are fed to and confirmed in the global sales system by the sales office market supervisors. On the other hand, in Europe, where the former sales office network has been disassembled, the customer orders are handled by five customer service centers located in Sweden, Finland, Germany, Belgium, and United Kingdom. The responsibility of the different European countries is divided between these five CSCs and thus they consequently take care of feeding and confirming all European orders. Moreover, in addition to handling North-European orders, the *CSC Sweden* is also in charge of feeding and confirming all Diamond Mill's overseas orders that are received directly from the external, overseas agents.

Considering the European orders, in addition to feeding and confirming the orders, the employees of the five CSCs are also in charge of checking the prices on the orders, choosing the correct delivery modes and routes, adjusting the orders according to the customers' wishes, invoicing the goods when they have been dispatched/delivered from the terminals, creating the needed (export) documentation, monitoring the payment behavior, handling customer complaints, and managing potential compensations and rebates. Briefly said, the CSC employees are in overall charge of the order handling process and communication concerning the orders with the customers.

The Diamond Mill's overseas orders, on the other hand, are mainly processed at *CSC Sweden*. Although some of the orders are fed and confirmed at the overseas sales offices, as mentioned above, *CSC Sweden*, however, is in charge of the shipping, invoicing, and needed export documentation of all overseas orders.

As a summary of the previous description, in the future the *Diamond Mill* will have virtually no responsibility over its order handling process. The mill's interference is only needed in special occasions and if, for example, the delivery time must be adjusted due to production related reasons. In the future the mill will thus operate more clearly as a pure production unit, whereas order handling and similar responsibilities are managed from elsewhere.

#### **4.1.6.3 Capacity and Production Planning, Production**

In the new business model, the *Diamond Mill*'s main task is to handle rough and fine planning of its production and to produce the goods in an agreed timetable to meet the promised EX MILL and consequent RFL –dates.

As mentioned earlier, the high-level capacity and production planning of the *Diamond Mill*, in addition to the two sister mills, is executed by the *Senior Manager, Master Planning*. In addition to evaluating the situation from the point of view of the three mills' fine paper *reel* orders, the Senior Manager needs to work in close co-operation with *another Senior Manager, Master Planning* located at Ruby Mill in Sweden, responsible for the capacity planning of the *sheet* orders of the Ruby and Sapphire Mills. The overall capacity planning of the three mills thus takes into account both reel and sheet orders, and tries to optimize the usage of all three mill's production capacity. As has been mentioned earlier, some reel orders may be swapped between the *Diamond* and *Sapphire Mills*, whereas similar swapping is also possible between some *Ruby* and *Sapphire sheet* orders. Moreover, if there is a lack of sheet orders, more reel orders need to be obtained and vice versa. Thus, it is the responsibility of the Senior Managers to decide what is produced and where, and whether some extra orders should be strived for. In low demand conditions the two Senior Managers also need to consider, which mill(s) will run and which mill(s) need to have production standstill. The high-level capacity and production planning of the *Diamond Mill* is thus heavily dependent on the demand and production situation of its two sister mills.

As discussed earlier, before any orders can be confirmed to be produced, the sales quotas must be decided and defined for each market area and be fed into the common sales system. Therefore, as the Senior Managers have considered and evaluated the overall situation at the three mills based on the sales forecasts received, they define the sales quotas for each mill and market area, which the *Diamond Mill's Order Planning Team (MOP)* feeds into the common sales system on behalf of the *Diamond Mill*. The MOP also follows the usage of the sales quotas as orders are being confirmed and informs the sales offices and customer service centers if, for example, some changes are needed. Some market may, for example, be underusing its share and consequently new orders would be needed

to cover the free capacity. Or alternatively the excess quota should be freed for others to use.

In addition to feeding, monitoring and adjusting the sales quotas, the MOP is also responsible for the actual rough and fine planning of the mill's orders; fixing production cycles, their timing, and length, in addition to forming the actual production runs. Once the production plans are fixed, it is the duty of the mill's *production organization* to produce the goods in the given amount, quality, and timetable. As has been mentioned above, in the new business model the mill's core task is to produce the goods in time for the other members of the supply chain to perform their part to match the needs of the customers. Should the mill fail in this task, it needs to inform the particular customer service center in question of the changes, whose representatives will contact the customer in turn, through the field sales office if needed and applicable, and organize the needed changes in transportation.

The input of the MOP team is also needed in abnormal situations, if, for example, some customer service center cannot confirm an order due to some restrictive parameters in the sales system. The MOP team is also in charge of making Intrastat customs statistics notifications. It is also the mill representatives' right and duty to monitor, for example, the actualized transportation costs and other key performance indicators, and to analyze the need for possible changes in the operations of the sales offices and customer service centers. The new business model will considerably change the responsibilities and persons in charge within the Diamond Mill's supply chain and therefore extra education and monitoring is required, at least in the early stages of the change.

The Diamond Mill's production planning related matters are described in more detail in Section 4.2.

#### **4.1.6.4 Deliveries**

As the *CSC and sales office representatives* confirm the Diamond Mill's orders, they simultaneously confirm the delivery mode (rail, truck, sea, multimodal) and the route to the customer. Consequently the mode of delivery and delivery time set the EX MILL date for the production planning and production operations of the Diamond Mill, which the mill must obey. The possible, usable routes available in the sales system and the contracts that are needed behind them, are organized and negotiated by Pearl Group's logistics organization, *Pearl Logistics* (PL). In the new business model, PL is in charge of all logistics contracts: pre-carriage from the Diamond Mill to the Finnish harbors (railway, truck), harbor operations, maritime transport, international road transport, international rail transport, etc.

In the new model, the *Diamond Mill* itself is in charge of the maritime pre-carriage, delivering the finished goods to the Finnish harbors either by using domestic trucks or railway. As mentioned above, the deals with the railway and trucking companies are managed by PL; therefore the mill's task is to merely book the needed amount of trailers and railway wagons per day and to take care of the loading. The ordering of the railway wagons and trailers is managed by the foremen of the Diamond Mill's finished goods warehouse. In addition to the pre-carriage, the Diamond Mill's personnel is also in charge of moving the goods from one terminal to another within Finland. The responsibility of organizing and using the return deliveries of empty import containers to deliver goods to Central Europe (short sea containers) also remains in the hands of the mill representatives.

On the other hand, if the finished goods are delivered from the Diamond Mill to the end customer(s) or to foreign inland terminals by using direct trucks, the trailers needed are booked and organized by *CSC Finland*. CSC Finland is also in charge of organizing the Diamond Mill's international railway transports to, for example, Russia.

When maritime deliveries are used, the booking of the needed vessel space for the European liner maritime deliveries is handled by the representatives of PL's South Finnish office. The overseas maritime transports of the Diamond Mill, on the other hand, are organized in Sweden. The booking request, i.e. a request for booking vessel space on a certain ship, is created when the overseas orders are confirmed. As has been discussed earlier in Section 4.1.6.2, although CSC Sweden is in overall charge of handling the overseas orders when they have been fed and confirmed, the actual booking itself, however, is done in Gothenburg, Sweden by PL's *Global Ocean Centre*.

Should any damage occur to/on the Diamond Mill's reels in any part of the delivery chain, the complaints are handled centralized in Belgium, at *CSC Belgium*. CSC Belgium handles all transport damage claims on behalf of the whole Pearl Group.

Depending on the delivery address and mode of the Diamond Mill's orders, its delivery chain thus includes several alternative parties and operators.

#### ***4.1.6.5 Terminal Call-Offs & Inventory Management***

If the Diamond Mill's orders are delivered to foreign harbor or inland terminals before final delivery to the customers (Europe and USA), the customer call-offs, deliveries from the terminals to the customers and their invoicing, are handled by the *customer service centers* responsible for the area in question (Europe) or the local *field sales office* (USA). As has been mentioned earlier, Pearl Group has

CSCs in Germany, Belgium, and UK that take care of the Diamond Mill's European call-offs. The deliveries to Northern Europe are handled by direct trucks and thus no warehousing is needed.

The *international field sales* staff and *CSCs* should follow the customer inventory levels and aim at cutting the stocked tonnage by agreeing deliveries with the customers and adjusting the new orders according to the inventory levels. The final responsibility of the inventory levels, however, lies in the hands of the *Senior Manager, Master Planning and Director, Product Segment*. If the situation demands, the Senior Manager and Director remind the international field sales staff of the inventory targets and follow that the needed actions are taken. In ultimate cases the Director and Senior Manager also need to consider production standstill in order to cut the inventory tonnage.

The responsibility of the physical stock taking of the various inventories is decided based on location. The *Diamond Mill* is in charge of the physical stock taking of the inventory located at the mill, whereas the *CSCs* handle the physical stock taking in Europe and the *American field sales office* in the USA.

To summarize the topics discussed in Section 4.1.6, Figure 7 describes the different parties of the Diamond Mill's future sales process and their reciprocal duties as a simplified flow chart. The black arrows describe the actual actions, whereas the dark grey dotted arrows describe the monitoring and background activities. The solid, light grey arrows, on the other hand, describe the actions of the external logistics service providers, whose tasks and duties are not listed in the flow chart. As mentioned above, it should be noted that Figure 7 is simplified and may not be self-explanatory; therefore the whole Section 4.1.6 should be read in order to receive the full overview.

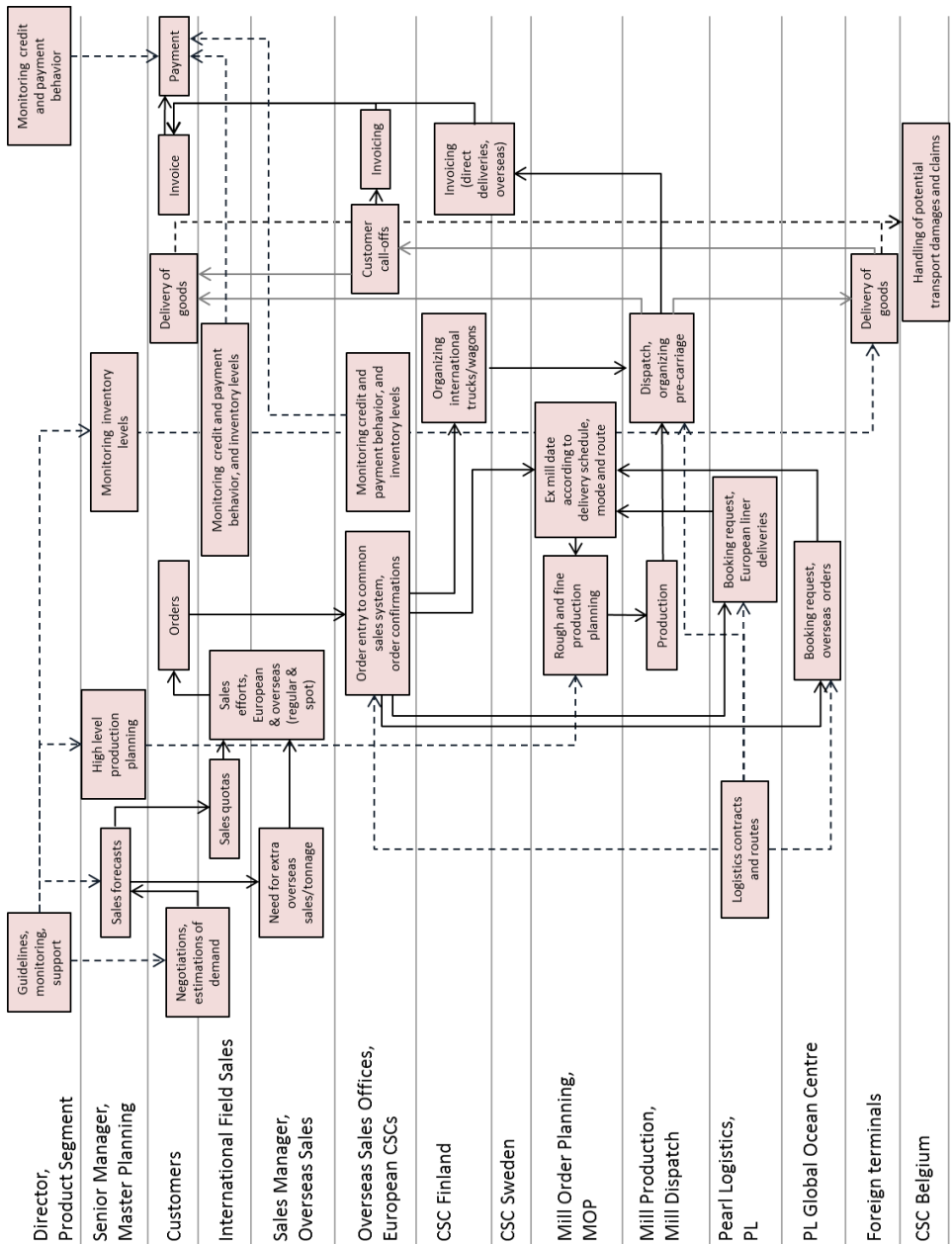


Figure 7 Diamond Mill's Future Sales Process (to be Adopted by the End of Year 2013), Parties and Duties

## **4.2 Diamond Mill's Production Planning**

As has been discussed in the previous section, in the future the Diamond Mill will operate more clearly as a pure production unit, whereas the other duties related to its sales process are executed from elsewhere. Therefore, in the future the mill's main responsibility is to plan and produce the ordered goods accurately and responsibly according to the specifications and delivery schedules promised to the customers.

The section 4.1.6.3 has briefly described the tasks of the future Mill Order Planning Team (MOP) that will be responsible for the mill's future production planning duties. In addition, the current section will concentrate on providing a more detailed overview of the mill's current and future production planning activities. The section is based on discussions had with Diamond Mill's Production Planner and Senior Manager, Master Planning on 26.6.2013, 27.6.2013, and 6.8.2015, in addition to unpublished production planning material (received on 26.6.2013).

### **4.2.1 Organization**

The mill's current production planning organization includes two production planners. Today, in addition to the actual production planning activities, the duties of the production planners also include various logistics activities, for example, planning and organizing international transportation. In the near future these tasks, however, will be moved to the Customer Service Centers (CSCs; see Section 4.1.6) and therefore they will not be discussed in the following description.

The future MOP team starts its operations during the fourth quarter of the year 2013; it includes four members. The MOP team has a rotating team leader chosen amongst the team members and in the organization structure it operates under the direct supervision of the Senior Manager, Master Planning (see Section 4.1.6). Although the Senior Manager is employed by the Office Paper Sales Organization, the members of the MOP team form a part of the Diamond Mill's organization.

The future MOP team will concentrate more purely on the actual production planning activities of the mill. However, it is worth noticing that the actual production planning tasks of the Diamond Mill will not change notably together with the organizational change. Therefore the tasks and duties described below represent both the current and future production planning activities of the Diamond Mill. In addition, in the following description the term "production planner" is used to refer to both the current production planners and the future MOP team members.

## 4.2.2 Duties

The duties and responsibilities of the production planners include both long-term and short-term production planning activities. The long-term and short-term duties are discussed separately below.

### 4.2.2.1 Long-Term Duties

***Setting Available Production Tonnage and Sales Quotas.*** The production planners (PPs) start the long-term production planning of the mill by feeding the basic information of the coming month's or months' estimated production and sales tonnages into the corporate sales system. The PPs are able to do this elementary platform setting based on the production forecasts and sales quotas they receive regularly from the Production Manager and the Senior Manager, Master Planning (see Section 4.1.6).

The Production Manager gives the PPs his forecast of the coming month's/months' available production tonnage based on the already confirmed orders in the sales system in addition to considering the planned maintenance standstills. The more there are orders with higher grammages per square meter confirmed to be produced during the coming month and the less there are planned standstills, the higher is the available production capacity/produced tonnage during that month and vice versa. The usual production tonnage of the mill varies approximately between 22,000 – 23,000 tons per month.

The information of the reachable total production tonnage for each month is also forwarded to the Senior Manager, Master Planning, who checks the earlier made estimations of the possible sales tonnages per market area against the available total production tonnage. Based on this double checking she consequently assigns the final sales quotas for each market area and product segment, and gives them to the PPs to be fed into the common sales system. In addition to the various market based quotas, the quotas usually also include a so called pool, which includes unassigned, free capacity that can be used by any market or customer should the need for extra tonnage arise. The pool may also be used as a buffer, should some unplanned production problems or standstills occur.

As the sales system is corporate wide, once fed into the system, the total production tonnage per month and the consequent sales quotas per market area and product quality are visible worldwide. The mill thus aims at providing the international field sales staff and customer service center representatives a transparent view of both its production possibilities and current, up-dated production situation. More of deciding and setting the sales quotas can be read from Sections 4.1.6.1 & 4.1.6.3.

***Setting and Altering Production Cycles.*** Based on the information received from the Senior Manager, the PPs also create a plan of the coming production cycles into the sales system. The production cycles specify which products, qualities, and grammages are produced at specified points of time, and how long each production cycle will approximately last.

The target of the mill is to plan the production cycles and their duration as accurately as possible, using the available information of the confirmed orders and the existing customer inventories, in order not to increase the overall inventory levels. The Senior Manager also tries to plan the production cycles in a manner that would satisfy – or compromise between – the needs of the customers, the production, and the corporation/investors. She thus aims at planning such cycles with which the customers would receive good service and flexibility, the production would receive longer runs without a need for a change of settings and consequent better efficiency, and the mill would receive high monthly invoiced tonnage figures. During rush periods, the needs of the customers overrun the other needs and this consequently results in shorter production cycles and lower production efficiency. The already created cycles may also be altered to offer needed flexibility either for the customers or the production. Thus, although the cycles are aimed to be planned very carefully from the beginning, fast changes are also possible in order to accommodate changing conditions and needs.

As the production cycles are created in the sales system, they are also consequently automatically transferred to the mill's production system Alpha, utilizing automatic data transfer built between the two, separate systems. Also the possible changes made to the cycles in the sales system are immediately transferred to Alpha. The sales system and the production system Alpha are produced by different software companies and therefore separate, external data converters are needed to move and convert the information.

Once the cycles have been created or altered, both the already confirmed orders and the new orders to-be-confirmed place automatically to such cycles, which are set to produce the particular ordered product/quality and which end before the promised EX MILL date. As has been mentioned several times earlier, the mill's task is to make sure that the goods are produced in the promised timetable for the other members of the supply chain to be able to fulfill their part of the process of satisfying the customers' needs. Should the best possible cycle be full or should the orders exceed the set sales quotas, extra actions are needed from the PPs.

As the orders are confirmed in the sales system, they also appear simultaneously in the Diamond Mill's production system Alpha. Also the possible changes made to the orders are automatically transferred to Alpha.

#### **4.2.2.2 Short-Term Duties**

Once the sales quotas and production cycles have been set and the orders have arrived, the production planners move to execute their short-term production planning duties.

**Closing and Locking of Cycles.** The earlier created production cycles are normally closed seven working days before the commencement of the actual production. In practice this means that no new orders can be confirmed to the cycle in question after that moment. However, with low demand conditions, the cycles may be kept open until two working days prior to the production in order to be able to receive, confirm, and produce as many orders as possible. Alternatively, the excess capacity may also be moved further in the production schedule and the cycle-to-be-locked may consequently be shortened. The closing and locking of the production cycles is done in the sales system.

The two working days' minimum deadline for closing and locking the cycles has been set due to the needs of the production; the production needs to know in advance what will be produced in the near future. In some special cases the production even needs to receive an estimation of the coming production tonnage as early as two weeks prior to the production. This is due to the fact that, for example, the thin print products need special chemicals and certain orders need special cores that need to be separately purchased for each production run.

Once a certain production cycle has been locked, the PPs execute a double check in the sales system to be sure whether all relevant orders can be found in the cycle and whether some orders that have been directed into the following, future cycles would be missing their EX MILL date. If such orders exist, the PPs consider whether the orders should be advanced to the cycle under scrutiny and be produced earlier, if possible. Once this extra checking is done, the production planners may start the actual production planning of the cycle in question. The actual production planning is begun in the production system Alpha.

**Clustering the Orders, Deciding the Running Order of Clusters.** As the automatic data transfer functions between the sales system and the production system Alpha, all the same orders that can be seen in a certain production cycle in the sales system, can be found in the corresponding production cycle in Alpha. The cycles are identifiable through an identical cycle number visible in both systems.

When a certain cycle is fetched in Alpha, it brings forward all orders in the cycle in question, together with their specific data (order number, ordered product, grammage, tonnage, reel diameter, reel width, reel core, reel length, EX MILL date, etc.). Once fetched, the orders within a cycle are clustered according to their similarities; the criteria the Diamond Mill is using for the clustering include the diameter, core, and length of the reel. The target of the clustering is to take ad-

vantage of the similarities between the different orders and to consequently increase the production efficiency. The mill's aim of receiving high production efficiency through efficient production planning and clustering of orders within cycles, is challenged by the multitude of options the mill offers to its customers. It offers several different products for different end uses, produced in different grammages and whiteness, utilizing five different diameters, four different cores, and a multitude of possible reel widths ranging from approximately 150 mm to 2,600 mm. The clustering of the mill's orders, and the production planning of the mill in its entirety, is thus not an easy task.

When the clustering is done, the PPs check the ending specifications of the previous production run/cycle in order to make the new run to start from the best possible match. In the best possible match the last cluster of the previous run and the first cluster of the following run have as similar quality, cores, diameters, and grammages as possible. The Diamond PM3 is able to slide small grammage changes from one grammage to the other, without losing production tonnage. In some cases larger grammage jumps, and consequent production of production waste, are, however, unavoidable. The overall target of both clustering the orders within the separate cycles and matching and fitting the different cycles to one another, is to ensure as smooth and efficient production as possible.

Before the PPs move to plan the actual, precise contents of the individual production cycles, called trimming in the paper industry, they first still decide the running order of the clusters within the cycle. Again the target is to ensure as smooth production as possible, but still keeping the promised EX MILL dates. The running order is stated in the production system Alpha.

***Forming of Actual Production Runs/Trimming.*** The target of trimming is to use and utilize the paper machine width as completely as possible, while simultaneously ensuring that the ordered quantities are produced to the full, in the promised timetable. In trimming the PPs thus aim at combining the individual orders and their ordered reel widths to fill and utilize the full paper machine width.

The width of the Diamond PM3 is 7,700 mm; consequently the PPs aim at utilizing it to the full in order to reach as high production tonnage and efficiency as possible. In some special cases the PPs may be forced to plan trim widths falling below earlier agreed trim-width targets. Such cases, however, result in lower production efficiency.

The trimming of the mill's orders is challenging. As mentioned earlier, this is partly due to the fact that the mill offers a multitude of variations to its customers; different grammages, diameters, cores, whiteness etc. for the same products. In addition, the minimum ordered tonnage the mill accepts is very low, 5 tons. By and large, the mill's average order size is 25 tons, while an order of 100 tons is already considered as a large order. Some overseas orders may, however, be significantly larger, e.g. 500 tons. Comparing the mill's average order size to its

yearly production capacity of 300,000 tons, it adds up to a considerable amount of individual orders and specifications per year. In addition, considering all the factors mentioned above, the mill's PPs thus face a muddle of different orders and specifications while calculating and planning the trims. Their duty is to try to combine the orders to their best knowledge and ability, in order to make the best possible trim combinations and to achieve the consequent good production efficiency. The current product offering seems to try to maximize the service and flexibility to the customers while it simultaneously sets its challenges for the mill's production efficiency.

The trimming itself is done in the production system Beta. While the orders have been clustered and the running order has been set in the production system Alpha, the cycle is moved to the Beta system utilizing automatic data transfer possibilities built between the two separate systems. The Alpha and Beta systems are produced by different software companies and therefore separate, external data converters are utilized.

The Beta system operates relatively automatically; manual interference by the PPs is only needed, if/when the PPs have a reason to alter the trimming suggestions offered by the Beta system. The Beta system can be programmed to calculate the trim suggestions by optimizing either the production efficiency or fulfillment of the ordered tonnages, or both. In some cases manual calculations may bring better end results than the program offers. In many cases there also exists more than one possible trim solution; there is no right or wrong trim, only different choices that compromise between the needs of the customers, production, and stocks. Moreover, in addition to optimizing the mill's actual paper production, the PPs also aim at optimizing the usage of the mill's reel cutting and packing facilities.

While considering the trims, the PPs also check whether the mill would have some suitable surplus stock that could be utilized to fulfill the new orders to be produced. If suitable, earlier produced material exists, the new orders may be fulfilled by converting the old paper reels to match the needed, new specifications. Utilizing the old surplus stock benefits the mill; it both decreases the overall inventory levels and eases the production pressure. As has been mentioned in Section 4.1.4, the mill aims at minimizing its inventory levels. Some redundant surplus stock, however, usually exists at the mill. This tonnage is due to e.g. overproducing the orders, not being able to fit all the produced reels into transport vehicles, and being forced to run so called sidetrack orders. Sidetrack orders are such orders that are not nominated to any customer and that are created and run to fulfill the minimum trim requirements of the paper machine. As the un-nominated sidetrack orders are not ordered by any customer, they remain at the mill's warehouse having been produced. In some cases, if the customers are ordering some specialty products or specifications, they are also asked to provide

the trim help orders to the mill. The target of such behavior is to prevent the mill from being forced to run excessive amounts of unnecessary sidetrack to the stock.

When the actual, final trims have been decided, the processed production cycle is saved in the Beta system. As the cycle is saved, the Beta system sends the information of the confirmed trims to the Alpha system, in which the trims are formed into a final production run. The formed production run is still once more checked by the PPs, and if everything is in order, activated in the production system Alpha.

The activation, on the other hand, sends the information of the confirmed production run to the sales system and to three other Diamond Mill's production systems: Gamma, Delta, and Upsilon. Gamma is a system that double checks the formed trims; Delta shows the current, constantly updated status of the machine line (including the actual paper machine, reel cutter, packing line, etc.); Upsilon, on the other hand, shows the order of the production – what is run now and which production cycles/runs will follow. The Delta and Upsilon programs are designed by the same producer as the Alpha system and they are followed by the production employees. The Gamma system, on the other hand, is designed by a third supplier and it operates behind the other programs involved in the trimming. Its part in the trimming process is less visible than the parts of the other programs.

As the Diamond Mill utilizes actively the automatic data transfer possibilities built between its different operating systems, no information of the formed production runs is delivered manually on paper from the PPs to the production employees. Instead, the production employees follow constantly the information available in the different systems, and produce the orders accordingly. If some last minute changes are needed to the run currently in production, information of the needed changes must, however, be shared in person. The permission to make the needed changes must be asked from the production; it must be confirmed whether the paper machine settings can be adjusted to accommodate the new needs or not.

***Other Short Term Duties – Daily & Weekly Tasks.*** The actual production run planning duties of the PPs end when the orders have been clustered, organized, and trimmed, and when the information of the trimmed production run has been sent to the production employees through the different systems. After that, the PPs interference is only needed in possible change situations. If no changes are needed, the production produces the orders according to the original, trimmed specifications.

The PPs, however, also have other daily duties. The PPs start their workday by checking the previous day's production; this checking is started in the production system Delta by reviewing the previous day's figures:

- Have the orders been produced to the full? If yes, the orders are marked totally produced both in the production system Alpha and the sales system. The double work is needed as the automatic data transfer between the two systems is not fully working. If some orders are left incomplete, the PPs plan how to fulfill the missing tonnage.
- Which production runs have been completely run? The completed runs are marked totally produced in the production system Alpha. Alpha sends the information automatically to the sales system.
- What is the current status of the production; what is currently being produced? The PPs check the current production situation and estimated ending time of the production run currently in production from the production system Alpha. This information is used to update the production view in the sales system in order to guarantee that the international field sales staff and the customer service center employees would have accurate information of the mill's current production status.

In addition to checking the status of the production, the PPs also take part in daily morning meetings of the production department. The PPs task in the meeting is to inform the production employees of the mill's overall order backlog (free orders, unconfirmed orders, orders in stop –status; 4 weeks' and 3 months' period; information from the sales system), and coming production runs. Reciprocally the PPs receive production related information from the production department employees. The meeting is also used to discuss special cases, e.g. test runs, and problem situations.

In addition to the daily tasks, the PPs also constantly follow the overall and surplus stocks at the mill. The overall inventory status is followed in an inventory management system which is separate from the production systems and which is mainly built for the needs of the mill dispatch. It shows the total amount of customer reels waiting to be dispatched, production waste, and surplus/un-nominated prime quality reels. More accurate information concerning the surplus inventory is available in the sales system. As has been mentioned earlier, the mill's target is to have as small un-nominated surplus tonnage as possible. The surplus stocks increase the mill's tied-up capital and thus are not strived for. The surplus reels can either be sold forward as such, moved to similar orders, converted to fulfill specifications of differing orders, or be reused as raw material in the coming production runs.

#### ***4.2.2.3 Summary of Duties - Connections and Systems Used***

Figure 8 presents the actual production planning related duties of the production planners, in addition to the different programs utilized, as a simplified flowchart.

Figure 9, on the other hand, presents the other daily and continuous duties of the production planners. In order to receive a complete overview of the various duties, the whole Section 4.2.2 should be read.

In Figure 8 and Figure 9, the solid lined black arrows and boxes describe actual actions needed in the mill's production planning operations. The dotted black lines and boxes, on the other hand, describe actions and information sharing that happen automatically, without interference of the mill's production planners.

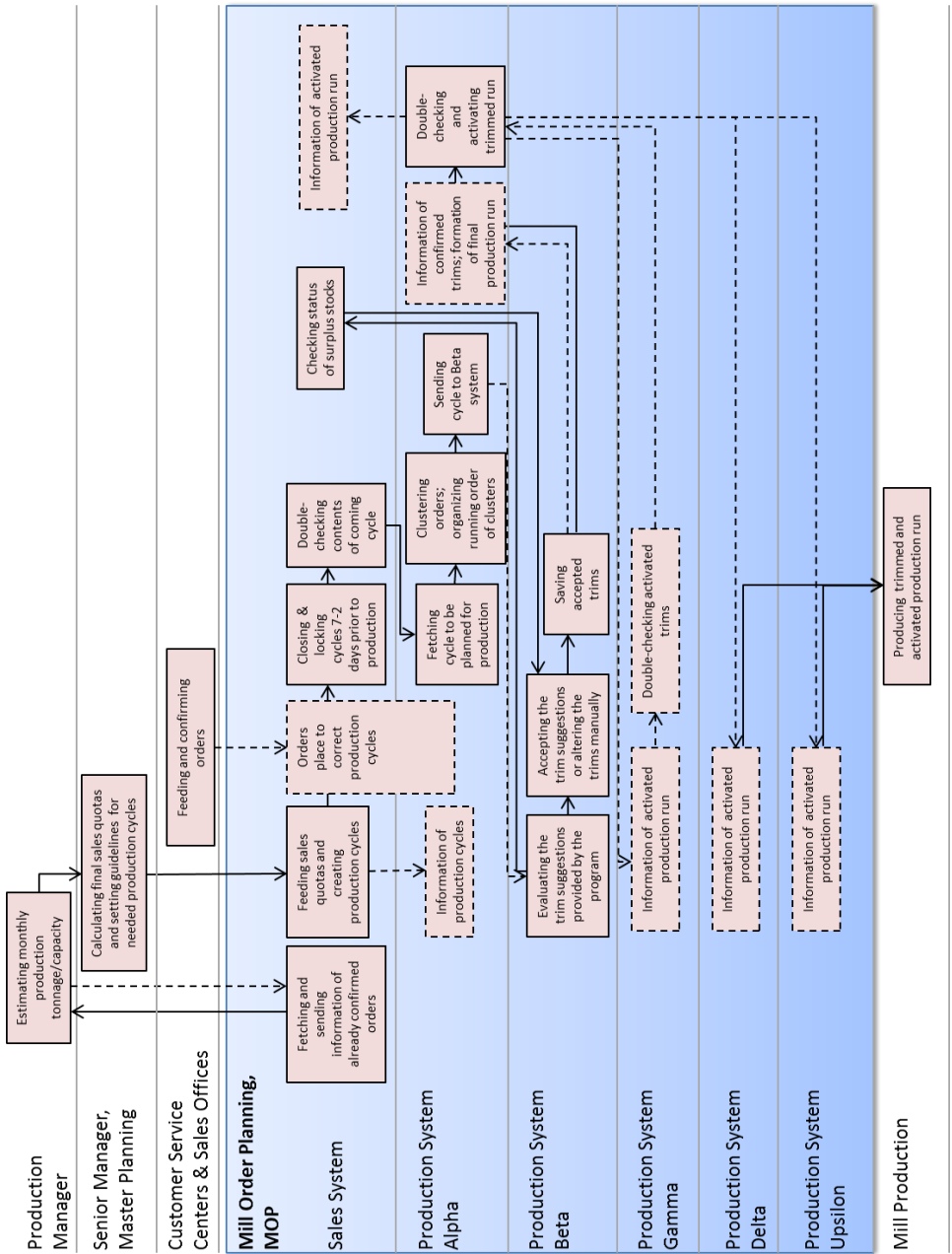


Figure 8 Long-Term and Short-Term Production Planning Duties of the Diamond Mill's Production Planners and Programs Used

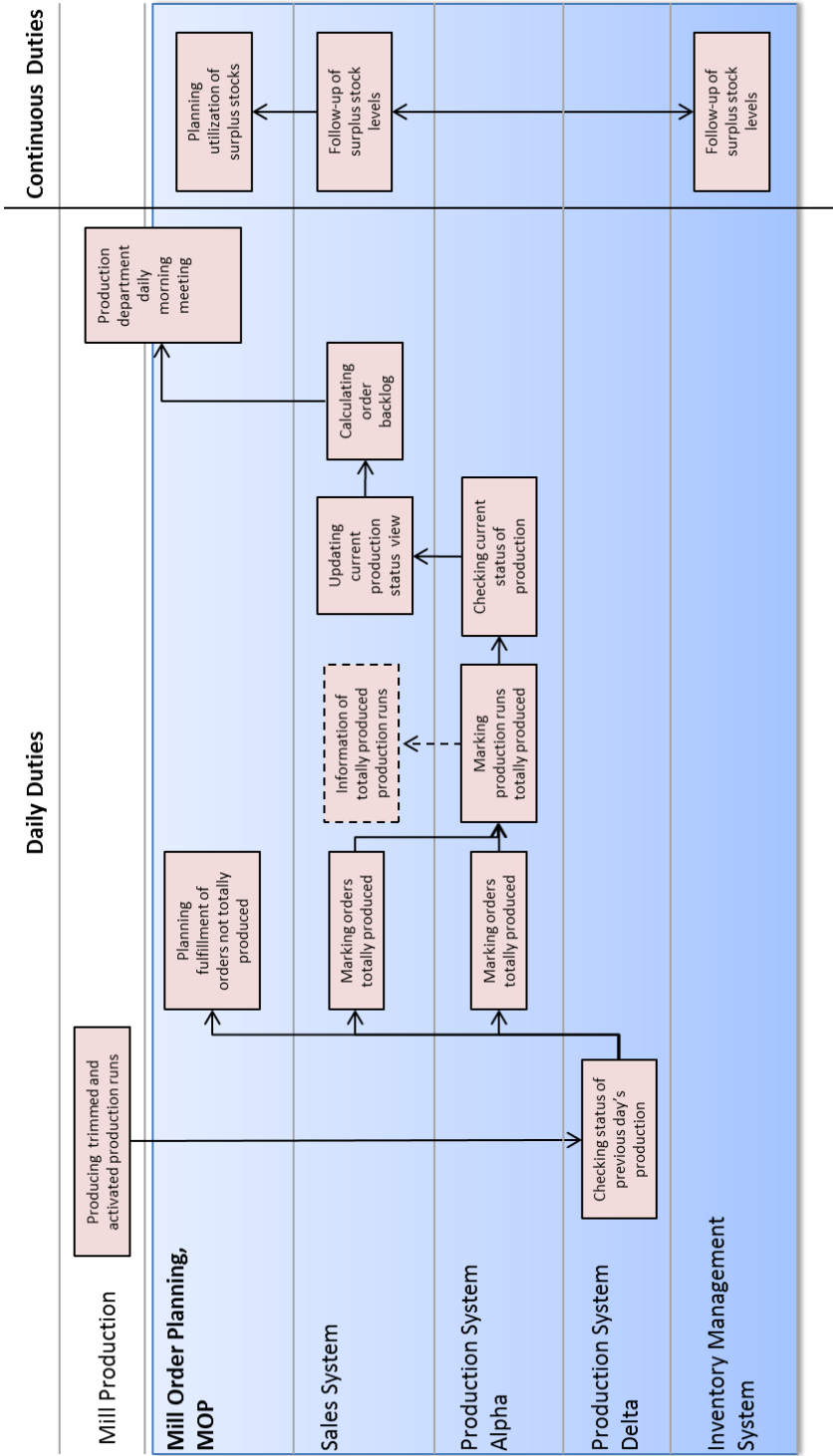


Figure 9 Other Daily and Continuous Duties of the Diamond Mill's Production Planners and Programs Used

### ***4.2.3 Effect of Three Sister Mills on Diamond Mill's Production Planning***

As has been discussed in Sections 4.1.2 and 4.1.6.3, the Diamond Mill does not operate as a totally independent production unit but is run in combination with its two sister mills, Sapphire Mill in North Finland and Ruby Mill in South Sweden. In several previous sections it has also been discussed that the Diamond Mill and Sapphire Mill are able to swap some of their orders from one mill to the other, if the need arises.

The order swapping, however, does not affect the production planning operations at the Diamond Mill to a significant extent. The swapping is only executed in special occasions if, for example, either one of the mills is having problems with its production. The target of such order swapping is thus to guarantee customer service in problem situations. The swapping may also be utilized to balance differing demand conditions at the two mills; in very low demand conditions the Senior Manager, Master Planning also needs to decide which mill will stay in operation and which mill needs to have temporary production standstills.

As the order swapping operations are only executed in special occasions and are not a regular activity, the order swapping operations are not specifically described in the current description. The Diamond Mill's production planners treat the swapped orders like any other orders and fast change situations like any other special occasion.

### ***4.2.4 Collaboration and Information Sharing with Other Internal (and External) Supply Chain Parties***

While executing their long-term and short-term duties, the Diamond Mill's production planners work in collaboration and share information with several internal and external supply chain parties. The means and regularity of the collaboration and information sharing varies from one party to the other. Tables 14, 15, & 16 present the different parties with whom the Diamond Mill's production planners work in collaboration and share information, in addition to presenting the occasions, means, regularity, and formality of the co-operation. Tables 14-16 are created from the point of view of the production planners, based on their opinions. As the target of the doctoral research is to concentrate on the internal supply chain, the emphasis is consequently put on presenting the internal collaboration and information sharing executed within the mill. Two connections to the external supply chain parties, the customer service center representatives and the suppliers of the mill's production systems, are, however, briefly included in the table, as these connections also affect the operability of the mill's internal supply chain.

In order to wholly understand the roles of the different parties involved in the internal supply chain of the Diamond Mill discussed in Tables 14-16, in addition to the current section, the Section 4.1.6 Division of Duties – Roles of Different Parties in Diamond Mill’s Sales Process should be read in advance.

Table 14 Collaboration and Information Sharing Parties of Diamond Mill's Production Planners - Director, Product Segment & Senior Manager, Master Planning

Collaboration and Information Sharing Party	Occasion/Reason for Collaboration and Information Sharing	Activities	Means	Regularity	Formality
<b>Director, Product Segment</b>	Sales department weekly meeting	Director: Participating sales department weekly meetings; listening to the overall order and production status provided by the other participants, providing additional comments	Personal participation	Regular, weekly (director participating more irregularly, when time allows)	Formal
	Providing order backlog reports	PPs: Calculating and creating order backlog reports, sending them to the director	E-mail	Regular, frequent (minimum 2 times/week, sometimes daily)	Formal
	Checking overall status of production and orders	Director: Inquiring overall status of production and orders	Personal visit	Irregular, occasional	Informal
<b>Senior Manager, Master Planning</b>	Providing and producing specialty products for the customers	Director: Inquiring the timing of the next run, inquiring the quality of the produced orders	Personal visit	Irregular, occasional	Formal
	Sales department weekly meeting	Senior Manager: Participating sales department weekly meetings; listening to the overall order and production status provided by the other participants, providing additional comments	Personal participation	Regular, weekly	Formal
	Providing order backlog reports	PPs: Calculating and creating order backlog reports, sending them to the senior manager	E-mail	Regular, frequent (minimum 2 times/week, sometimes daily)	Formal
	Setting monthly quotas to sales system	PPs: Providing information of order backlog; Prod. Manager: Providing estimation of monthly production tonnage; Senior Manager: Naming the monthly quotas	E-mail	Regular, monthly	Formal
	Receiving and responding to new, large enquiries from the customers	Senior Manager: Inquiring the trimming possibilities of new large orders; PPs: Calculating the possible trims & responding to the Senior Manager	E-mail	Irregular, occasional	Formal
	Checking overall status of production and orders	Senior Manager: Inquiring overall status of production and orders	E-mail	Irregular, occasional	Formal
	Swapping orders between Diamond and Sapphire Mills	Senior Manager: Informing details of the swapping	E-mail/personal visit	Irregular, occasional	Formal
	Updating information in the sales system	Senior Manager: Informing details of the needed changes	E-mail	Irregular, occasional	Formal
	Overall status check	Senior Manager: Inquiring overall status of all things	Personal visit/call/e-mail	Irregular, occasional	Informal

Table 15 Collaboration and Information Sharing Parties of Diamond Mill’s Production Planners – Production Manager & Production Employees

Collaboration and Information Sharing Party	Occasion/Reason for Collaboration and Information Sharing	Activities	Means	Regularity	Formality
Production Manager	Estimating a viable monthly production tonnage/capacity	PPs: Providing information of order backlog; Prod. Manager: Providing estimation of monthly production tonnage	E-mail	Regular, monthly	Formal
	Providing order backlog reports	PPs: Calculating and creating order backlog reports, sending them to the production manager	E-mail	Regular, frequent (minimum 2 times/week, sometimes daily)	Formal
Production Employees	Production department daily meetings	PPs: Providing information of order backlog and coming production runs; explaining reasons for some needed/done changes; listening to the other production related matters; solving jointly order & production related problems/dilemmas	Personal participation	Regular, daily	Formal
	Quality meetings	PPs: Listening to the quality related matters of the production	Personal participation	Irregular, occasional	Formal
	Testrun meetings	PPs: Listening to the other members; providing comments for the point of view of the mill’s production planning	Personal participation	Irregular, occasional	Formal
	Creating and activating new production runs	PPs: Clustering, organizing, and trimming of production runs; providing the information of the runs to the production department	Automatic data transfer	Regular, daily	Formal
	Changing activated production runs	PPs: Asking for approval of making alterations to the earlier activated production runs; making the approved changes	Call/personal visit (approval); automatic data transfer	Regular, occasional	Formal/informal
	Problems in production (e.g. orders cannot be produced to the full, surplus reels to be altered in the production cannot be found in the warehouse, grammage jumps cause problems etc.)	Production employees: Asking for comments/instructions/help from the PPs	Call	Regular, occasional	Formal/informal
	Providing earlier unplanned, urgent test reels to the customers	Director, Product Segment: Asking the PPs to organize the test reels; PPs: contacting the production, giving instructions for creating the reels	E-mail/personal visit (director); call (PPs)	Irregular, occasional	Formal/informal
	Different production related enquires e.g. max reel width, weight, etc.)	PPs/production employees: Asking for advice concerning various matters	Call/E-mail (depending on the urgency)	Irregular, occasional	Formal/informal

Table 16 Collaboration and Information Sharing Parties of Diamond Mill's Production Planners – Mill Warehouse and Dispatch Employees, Mill Quality Personnel, Customer Service Center Representatives, & Production System Suppliers

Collaboration and Information Sharing Party	Occasion/Reason for Collaboration and Information Sharing	Activities	Means	Regularity	Formality
Mill Warehouse and Dispatch Employees	Various production, warehouse, loading, and dispatch related matters (duration of standstill, current status of production, timing of fulfilling unfinished orders, shipment schedules, problems with trucks/wagons, marking of reels, etc.)	PPs/warehouse/dispatch employees: Asking for advice and information concerning various matters	Call/personal visit	Regular, several times daily	Informal
	Handling of poor quality reels already located at finished goods warehouse	Warehouse/dispatch employees: Asking for advice which reels should be rejected and what should be done otherwise; PPs: naming the reels to be rejected, giving advice for further actions	Call/personal visit (warehouse/dispatch employees); e-mail (PPs)	Irregular, occasional	Formal
Mill Technical Customer Service Personnel	Providing test reels to customers (acceptability of quality, availability of suitable reels in surplus stock)	PPs: Enquiring suitability of available surplus reels; Quality Personnel: confirming the suitability of the quality of the surplus reels to be used for test reels	E-mail	Irregular, occasional	Formal
Customer Service Center Representatives (external)	Making decisions on rejecting some produced lot based on quality; assessing the adequacy of quality	PPs: Enquiring adequacy of quality of certain reels; Quality Personnel: confirming adequacy and acceptability of the quality of the reels	E-mail/production department morning meeting/personal visit	Irregular, occasional	Formal
Production System Suppliers (external)	Various/all individual order and production related matters (changes, timing of production, production problems, etc.)	PPs: Informing the CSC representatives of any changes to the original plan (e.g. under/overrun orders, delays and/or problems in production, quality, etc.)	E-mail, call	Irregular, frequent	Formal/informal
	Fixing malfunctions in the systems; developing the systems	PPs: Informing the suppliers of possible problems and wishes for improvements; System suppliers: Responding to the claims and development wishes	E-mail, call (claims); personal meeting (development of programs)	Irregular, occasional	Formal/informal

As can be seen in Tables 14-16, the Diamond Mill's production planners work in close co-operation with several other internal supply chain parties. The pro-

duction planners operate in an interface between many different parties and therefore hold an important role and position of both receivers and sharers of information.

### **4.3 Diamond Mill's Production Operations**

As the mill's Production Planners have fulfilled their duties and sent the trimmed production runs to the production department utilizing the different systems, it is the responsibility of the mill's production department to produce the goods in the planned specifications and timetable. The following section concentrates on providing an overview of the mill's production operations in addition to discussing the duties and information sharing parties of those production department employees directly involved in managing the daily operations of the mill's internal supply chain. Sections 4.3.1-4.3.3 are based on discussions had with Diamond Mill's Production Manager on 12.8.2013 and 19.8.2013, in addition to unpublished production operations related material (received 12.8.2013). The sources of Section 4.3.4, on the other hand, are presented separately in each subsection.

#### ***4.3.1 Organization and Working Schedules***

The mill's current production department includes three separate functions: actual paper production (PM3), transports, and management and maintenance of real estates. The following description concentrates solely on the actual paper production and paper machine 3. The mill's transporting, finished goods warehousing, and dispatch activities are presented subsequently in Section 4.4. As the real estate maintenance operations do not form an actual part of the mill's internal supply chain, they are left out of the discussion. Consequently, in the following description the terms production, production operations, and production department are used to refer to *only to the actual paper making operations and employees of the PM3*.

The mill's production department has three white collar employees working in day shift: Production Manager, Superintendent, and Assistant Superintendent. The Production Manager acts as a head of the whole department and as a direct supervisor of the Superintendent and the Assistant Superintendent; who, on the other hand, are in charge of managing and running the daily operations of the PM3. In addition to managing the daily actions, the Superintendent is also in administrative charge of managing the lower organization levels of the production department, Shift Supervisors (white collar shift workers, 5 employees) and paper

machine operators (blue collar shift workers, 53 employees). The Assistant Superintendent operates in an expert role and has no direct, administrative subordinates. He, however, possesses a superior status towards the Shift Supervisors and paper machine operators and therefore also has authoritative power over their work and actions.

The overall manpower of the production department is thus altogether 61 persons, 8 white collars and 53 blue collars. Out of these 61 employees, two are women (one shift supervisor, one operator); the largest age group is formed of employees aged between 45-49 years. Only one of the employees is less than 35 years and one more than 60 years old. The mill's paper machine operators are trained to possess several, distinct production operations related skills. Thus the operators do not only continuously execute specified, limited responsibilities but are able to carry out various different duties and change positions if needed.

The paper machine operators work in five shifts around the clock; in morning, evening, and night shifts. Their normal work day is 8 hours and they have rest days between the changes of shifts (four mornings + one rest day, four evenings + one rest day, four nights + six rest days). Each of the five shifts is managed by a named Shift Supervisor. It is, however, worth noticing that the Shift Supervisors operate in a different shift schedule than the paper machine operators. The supervisors work in an experimental schedule of four 12 –hour shifts (two days, two nights) and six rest days in a row. This results in a situation in which the operator shifts actually have several supervisors instead of only one. The named supervisor is, however, in overall charge of managing and developing his/her own shift/team.

#### ***4.3.2 Produced Products and Brief Description of Production Process***

As has been discussed several times earlier, the mill offers and produces several different products for its customers – business forms, envelope, offset, notebook, and specialty papers. Examining the different alternatives from the perspective of the production, the production treats these different products as different *end uses*. The various, final paper qualities are thus tailor made and optimized to be suitable for different end uses. Production wise the biggest differences in the products and qualities produced exist in the different whiteness and grammages of the various papers. As has been mentioned earlier, the mill offers its products in higher and lower whiteness; the grammage range, on the other hand, varies between 40-60 grams per square meter for the thin print products and 60-120 grams per square meter for the other products.

The production process itself follows standard paper production principles and utilizes birch or pine fiber and fillers as its basic raw materials. In the ready-made

paper approximately 75 % of the raw material structure consists of either birch or pine pulp and 25 % of a filler, either PCC (Precipitated Calcium Carbonate) or chalk. The fillers are used to give the paper better quality characteristics, for example, better opacity, higher thickness, and higher whiteness. The usage of fillers is also rational in monetary terms; the price of the fillers is considerably lower than the price of pulp. However, the amount/share of fillers cannot be increased excessively. The target of the filler usage is to optimize both paper quality and costs, and consequently to be able to produce sufficient and acceptable quality with competitive costs. In addition to the fillers, different starches are also added to the pulp in order to give the paper higher surface and bond strength and to minimize its dusting.

Once the paper has been produced at the paper machine, it is moved to the reel cutting and packing facilities of the mill. The target of the post-processing is to cut the individual customer reels to the exact specifications the customers have ordered (reel width, diameter, length, etc.) and to use such cores the customers have ordered, to wind the paper on. The function of packing and packaging, on the other hand, is to individualize each separate reel and to protect the reels during the transportation. The reel and core cutting and packing facilities of the mill are highly automatized. Operator intervention is only needed in adding packing materials and in special circumstances, such as machine failures.

As the target of the dissertation is to concentrate on the functionality of the internal supply chain, the production process is not discussed in more detail.

### ***4.3.3 Characteristics of Diamond Mill's Production***

As has been discussed earlier in Section 4.2.2.2, the mill's wide product, width, diameter, core, tonnage etc. offering sets its challenges both for the production planning and actual production operations of the mill. Due to the multitude of variations offered, the mill's production is facing constant changes of settings. Organizing of longer, stable – and consequently more efficient – production runs is usually practically impossible. Albeit, exceptions may also occur; for example, some overseas orders may contain 500 tons and thus they consequently offer the production operations a possibility for longer lasting, more efficient production runs. The large orders, however, are a clear minority amongst the stack of smaller, differing orders.

As has also been discussed earlier (see Section 4.2.2.2), when planning the actual production runs, the mill's Production Planners aim at optimizing both the actual paper production and the usage and functionality of the post-processing facilities (reel cutting, packing). In order to receive the best possible end result, the production department has given the Production Planners guidelines, which

they should follow when planning the runs and with the help of which the production could be run to a tolerable extent and efficiency. In rush periods, these guidelines may, however, be impossible to be followed, in order to keep the promises given to the customers. In rush times the production efficiency thus suffers as the mill tries to maintain good customer service.

From the production point of view, some minor changes to quality settings are relatively easy to make at the paper machine. Generalizing it can be said, that the smaller the change, the easier it is to make and vice versa. For example, the paper machine operators may quite easily make minor changes to the moisture contents of the paper, in addition to sliding from one grammage to the other, if the grammage difference is very small. Larger grammage differences between different orders, however, cause the production more difficulties. The more there are large grammage jumps, the more there is loss of effective production time and production of production waste. The paper machine may be able to quickly slide maximum five grams from one grammage to the other, without being forced to produce grammage wise unacceptable paper. Larger jumps, however, always result in production of waste paper, unsuitable to be sent to the customers.

In addition to quality and grammage changes, the mill's production is challenged by the production of the new thin print products in addition to problem and malfunction situations in which the cause of the problem is unclear and diversified. The thin print products are a result of the mill's research and development actions and demand new skills from the paper machine operators. The new products, however, are not unwanted amongst the paper machine employees, though may be most feared. Due to the novelty and more demanding production conditions of these products, the mill aims at producing them during the week, during office hours in order to maximize the learning potential and to have as high backup resources available as possible, should some problems occur. The multi-cause problems, on the other hand, are luckily rare in nature. If such problems occur, their resolution may be very demanding as the final cause of the problem may be a sum of smaller, separate factors acting together. One additional, special challenge of the production department is also the ever decreasing resources of manpower. The machine needs to be constantly run with less employees and this is consequently inevitably visible in the actions and development of the production department.

As the mill's order base is highly diversified, it is inevitable that the paper machine efficiency cannot be exploited to the full. The most optimal production efficiency is reached with grammages between 80-90 grams. With these grammages the machine reaches its highest speed and largest production tonnage. With higher grammages the capacity of the paper machine's drying section limits the speed of the possible production and consequently the production capacity per hour. The lower grammages, on the other hand, are more difficult to run at the

paper machine and therefore result in lower production amounts per hour, even with maximum speed.

In optimal situations, the paper machine would thus constantly run grammages between 80-90 grams, without larger changes of quality settings. This, however, is impossible in real life; the mill's production department needs to be open and willing – though not happy – to make the constant changes, needed to serve the customers and markets. The production department, on the other hand, cannot be too fast in its actions, either; too fast quality and grammage changes result in disturbances and breakdowns at the paper machine. The Diamond Mill's production department employees thus try to run the paper machine to their best knowledge and ability, in order to reach as high efficiency as possible with the prevailing conditions.

#### ***4.3.4 Duties and Collaboration and Information Sharing Parties of Production Employees Involved in Mill's Internal Supply Chain***

The Production Manager's role in the daily operations of the mill's internal supply chain is very small; his relevant duties are limited to giving the monthly production capacity/tonnage estimate, as described in Section 4.2.2.1. The Assistant Superintendent, Shift Supervisors, and Superintendent, however, are in a more active role in the mill's internal supply chain and therefore their duties and main collaboration and information sharing parties are presented below in more detail.

As the Assistant Superintendent is in charge of running the mill's actual paper machine and making sure that the paper machine is able to produce the production runs planned by the Production Planners, his duties and collaboration partners are presented first. The Shift Supervisors, on the other hand, act as superiors of the blue collar paper machine operators and are in charge of guaranteeing that the daily paper production actions are executed as accurately and efficiently as possible. Their daily duties and responsibilities, in addition to their collaboration partners, are thus consequently presented second. On the other hand, although being in charge of managing the mill's post processing facilities (reel cutting and packing), the Superintendent's role in the daily operations of the mill's internal supply chain is smaller than the roles of the Assistant Superintendent and the Shift Supervisors. The section is thus finalized by presenting his duties and collaboration partners.

#### **4.3.4.1 Assistant Superintendent – Duties**

The Sub-Sections 4.3.4.1 & 4.3.4.2 are based on discussions had with Diamond Mill's Assistant Superintendent on 21.8.2013 and 28.8.2013.

As has been mentioned above, the Assistant Superintendent's responsibility is to make sure that the paper machine operates accurately and efficiently, and that the various products produced follow the agreed quality standards. In order to guarantee the smooth production and good quality products, the Assistant Superintendent needs to execute various long-term and short term duties, which are presented below.

The Assistant Superintendent's (AS) *long term duties* include planning the timing of the mill's maintenance standstills. The paper machine needs to be regularly cleaned and repaired in order to maintain its operability. Neglecting the regular standstills results in unplanned breakages and standstills, and consequently in higher losses of production time and tonnage.

The preliminary timetable planning of the standstills is done twice a year and the original plan is checked and specified throughout the year. The AS feeds the original plan to the mill's ERP –system, which, on the other hand, automatically sends the information of the standstills to the mill's sales system and different production systems (Alpha, Delta, Upsilon). The actual maintenance operations executed in each standstill are decided later on before each individual standstill.

The original plan includes a planned washing and maintenance standstill every three weeks. However, as mentioned above, the original plan may be and is changed and refined according to the prevalent, up-to-date conditions. Should, for example, some market driven standstill (e.g. standstill due to lack of orders) be visible and inevitable, the planned washing and maintenance standstill is moved to the same time period to utilize the available time. Or alternatively, should some machine failure cause a standstill before the normal, scheduled time, all of the other maintenance tasks are moved ahead to utilize the unplanned standstill. No unnecessary, excessive standstills are thus organized and consequently no extra production time is wasted in vain.

The information of the standstills is utilized throughout the mill and its external supply chain, from the sales management and Production Planners to the dispatch employees, from the purchasing department to the customer service centers and field sales representatives. The information is also utilized by an external maintenance organization that is in charge of e.g. the mechanical, electrical, and automation maintenance of the paper machine. The mill's paper machine operators themselves are only in charge of washing and cleaning the paper machine, in addition to changing certain accessories; the external maintenance company executes the other needed maintenance and repair tasks. The initiative to execute a specific maintenance task may come either from the service provider (e.g. certain

parts are changed or maintained in a fixed schedule) or the mill's paper machine operators and Shift Supervisors (e.g. actualized or foreseeable breakages).

The AS's *short-term* task is to schedule and collate the various tasks executed in each washing and maintenance standstill, carried out both by the own employees and the external service organization, and to make sure that all of the planned tasks get done. All of the individual, planned maintenance operations must be done during the specific standstill, even if the standstill would exceed the planned duration. Although the excessive usage of time results in lost production tonnage, the paper machine's overall, long-term effectiveness, however, still remains positive. As mentioned above, neglecting the needed maintenance operations inevitably results in higher losses of production efficiency in the form of unplanned standstills.

The AS's other *short-term, internal supply chain operability related daily duties*, on the other hand, can be summarized as being monitoring and supporting the runnability and efficiency of the paper machine. This part of his daily work can be defined to be very hands-on and pragmatic and it is executed in personal interaction with the other production department employees. The AS thus carries out his duties and improves the operability of the mill's paper machine with the help of and together with the mill's paper machine operators and Shift Supervisors.

The AS's daily duties follow a settled path; he starts his every workday by executing the following tasks:

- *Checking the previous day's production diary entries from the mill system Delta.* The production diary is used and maintained by the paper machine Shift Supervisors and operators. The target of the diary is to log comments of, for example, some disruption or malfunction situations that have occurred in the production, together with their detailed descriptions.
- *Discussing the current production status, possible disruptions, and any other matters with the paper machine operators and Shift Supervisors.* As discussed earlier, the AS's work is closely connected to the practical functionality of the paper machine and he executes it in very close connection with the paper machine operators and Shift Supervisors. He regards it to be very important that he is personally present in the production and available for any questions or help the other production department employees might need. He encourages all production employees to have an active role in developing both the paper machine and its runnability and their own working abilities.
- *Walking through the whole production process.* The target of the tour is to pay attention to any possible problem areas in the production, in addition to alternatively creating an overview/picture of a perfectly working

paper machine. This created image can be used later on to help to fix the paper machine should some malfunctions occur.

- *Fixing potential problems either personally or together with the paper machine operators/Shift Supervisors.* He also informs the mill's Production Planners if some changes are needed to the current or future production runs.
- *Attending the production department daily morning meeting.* If the machine operates normally or the AS has already been able to fix the potential problems either personally or together with the other production department employees, he attends the daily morning meeting. In the daily meeting, the following topics are discussed: 1) work safety matters, 2) previous day's production events, 3) previous day's production tonnage (customer reels, waste), 4) maintenance needs, 5) coming production runs and order backlog (free for production, stop –orders), & 6) quality matters. If the potential production problems demand the AS's presence in the actual production, he may skip the daily morning meeting.

In addition to these tasks, the AS also follows the quality measurements of the paper/orders produced several times per day from the mill system Upsilon. He also monitors visually the operations of the paper machine, in addition to the quality of the paper being produced, every time he visits the paper machine. Should something not be in order, he takes corrective actions.

In addition to the duties presented above, the AS is also in charge of, for example, maintaining several supplier relations (for example, ordering raw materials & spare parts, fixing potential problems), solving various quality issues, and taking part in several development and other projects. As these duties, however, are not directly linked to the topic field of the dissertation, they will not be discussed further in the description.

Figure 10 describes the internal supply chain related duties of the Assistant Superintendent as a simplified flowchart. The target of Figure 10 is to complement Figure 8 (Long-Term and Short-Term Production Planning Duties of the Diamond Mill's Production Planners and Programs Used) and Figure 9 (Other Daily and Continuous Duties of the Diamond Mill's Production Planners and Programs Used), and consequently to complement the overall picture of the various duties and tasks occurring in the Diamond Mill's internal supply chain. The solid lined black arrows and boxes in Figure 10 describe actual actions executed by the Assistant Superintendent and other members in the mill's internal supply chain. The dotted black lines and boxes, on the other hand, describe actions and information sharing that happen automatically, without interference of the Assistant Superintendent. The dotted light grey arrows and box, on the other hand, describe actions that occur outside the mill's internal supply chain, but form an integral part of the mill's operations.

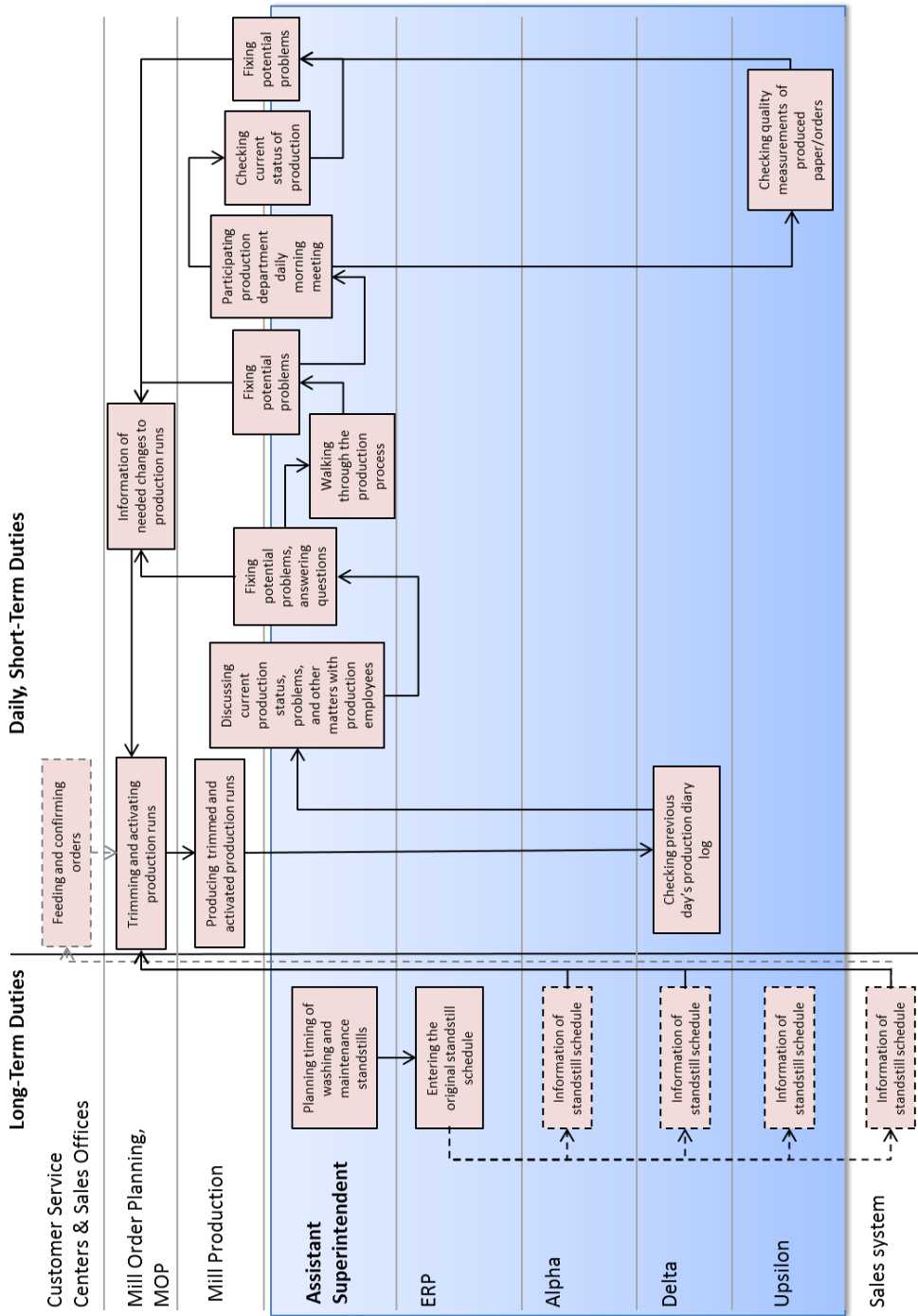


Figure 10 Long-Term and Short-Term Duties of the Diamond Mill's Assistant Superintendent and Programs Used

#### ***4.3.4.2 Assistant Superintendent – Collaboration and Information Sharing Parties***

The Assistant Superintendent works in collaboration and shares information with several internal and external supply chain parties while executing his duties. Tables 17-19 present the main co-operation parties of the Assistant Superintendent. As was the case with the mill's Production Planners, the emphasis is put on collaboration and information sharing within the internal supply chain of the mill. One external connection, collaboration and information sharing with the external maintenance organization, is included in the table, due to the importance of the external service provider for the functionality of the mill's paper machine and consequently for the operations of the whole internal supply chain.

Table 17 Collaboration and Information Sharing Parties of Diamond Mill’s Assistant Superintendent – Production Employees & Production Planners

Collaboration and Information Sharing Party	Occasion/Reason for Collaboration and Information Sharing	Activities	Means	Regularity	Formality
Other Production Department Employees (Shift Supervisors, Paper Machine Operators)	Guiding and teaching the other personnel; developing the functionality of the paper machine/process; committing the other persons to the joint actions/responsibilities/targets	AS: Visiting frequently the paper machine and discussing continuously with the shift supervisors and paper machine operators concerning all matters; being available for the other production department employees, both in the production facilities and at the office	Personal visit/discussions	Regular, several times daily	Informal
Production Planners (PPs)	Production department daily meetings	AS: Acting as a chairman of the meeting (may be replaced by Superintendent or Production Manager) listening to the production, quality, and production planning related matters; solving jointly order & production related problems/dilemmas	Personal participation	Regular, daily (unless tied in fixing production problems)	Formal
	Changing activated production runs (initiative from the PPs)	PPs: Asking for approval of making alterations to the earlier activated production runs; AS: giving the permission or giving alternative solutions; PPs: making the agreed changes	Call (PPs); personal visit (AS); automatic data transfer (information of executed changes)	Regular, occasional	Informal
	Problems in production (e.g. problems with quality of the paper), consequently changing activated production runs (initiative from the production department)	AS: Discussing with the PPs, how the production run/production order should be altered; PPs: making the agreed changes	Personal visit; automatic data transfer (information of executed changes)	Regular, occasional	Informal
	Enquiring the possibility of fulfilling special needs/wishes received from the customers	PPs: Contacting the AS and asking for advice	Personal visit/call	Irregular, occasional	Formal/informal
	Production of speciality products	PPs: Enquiring the best production timing from the AS	Personal visit/call	Regular, occasional	Formal/informal
	Special instruction received from the customers (e.g. need of production samples etc.)	PPs: Informing the AS/production department of the special needs/instructions; adding the special instructions on the actual orders in the systems	Personal visit/call; automatic data transfer (information on orders)	Irregular, occasional	Formal/informal

Table 18 Collaboration and Information Sharing Parties of Diamond Mill’s Assistant Superintendent – Mill Technical Customer Service Personnel, Mill Research and Development Personnel, Mill Warehouse & Dispatch Employees, & Senior Manager, Master Planning

Collaboration and Information Sharing Party	Occasion/Reason for Collaboration and Information Sharing	Activities	Means	Regularity	Formality
Mill Technical Customer Service Personnel (TCS)	Answering customer enquiries and quality complaints	TCS: Contacting AS for comments concerning e.g. some quality complaint, delivering samples received from the customer; AS: Investigating & analysing the matter, providing comments/explanations; TSC: Contacting the customer	E-mail (customer complaint/enquiry, quality reports); personal visit (samples, discussions on the matter); e-mail (reply to the customer)	Regular, weekly	Formal
	Fulfilling sample requests from the customers; delivering special samples to the customers	TCS: Discussing with the PPs and AS concerning the samples; PPs: marking the special sample request on orders; AS: Making a note on the production diary concerning the sample to be taken; Production employees: taking the sample	Personal visit (discussion, TSC, PPs, AS); automatic data transfer (sample request, PPs); system based written diary (instructions for taking the samples, AS)	Irregular, occasional	Formal
Mill Research and Development Personnel (R&D)	Organizing different test runs	R&D: Asking the AS/production employees to run various test runs; AS: agreeing on the matter, checking the best possible time for the test runs	Personal visit	Irregular, often	Informal
Mill Warehouse and Dispatch Employees (WDEs)	Informing timing of different standstills	AS: Informing the warehousing and dispatch employees of the coming standstills (long-term, short-term)	ERP & e-mail calendar (long-term); e-mail & production system diary (short-term)	Regular (twice a year/long-term, approximately every third week/short-term)	Formal
	Storage problems at the warehouse	WDEs: Contacting the AS/production employees/PPs concerning space problems at the warehouse; AS/production employees/PPs: considering and agreeing on needed changes to the production runs; PPs executing the needed changes	Call/personal visit (WDEs); automatic data transfer (information of executed changes)	Irregular, occasional	Formal/ informal
Senior Manager, Master Planning	Setting/updating the timing of the washing and maintenance standstills	AS & Senior Manager: Discussing the market situation, agreeing on consequent consequences on timing of the washing and maintenance standstills	Personal visit	Irregular, occasional	Formal

Table 19 Collaboration and Information Sharing Parties of Diamond Mill’s Assistant Superintendent – External Maintenance Organization

Collaboration and Information Sharing Party	Occasion/Reason for Collaboration and Information Sharing	Activities	Means	Regularity	Formality
External Maintenance Organization (external)	Agreeing on long-term and short-term maintenance needs and actions	Discussing and agreeing on needed investments, yearly maintenance standstills and needs, needed maintenance actions in each standstill, needed daily maintenance actions	Different meetings, personal discussions	Regular (both long-term, short term)	Formal

#### 4.3.4.3 Shift Supervisors – Duties

The Sub-Sections 4.3.4.3 & 4.3.4.4 are based on discussions had with Diamond Mill's Shift Supervisor on 29.8.2013 and 18.9.2013.

As has been mentioned earlier, the paper machine Shift Supervisors act as superiors of the paper machine operators and are thus in charge of managing and guaranteeing the daily paper production operations. The duties of the Shift Supervisors can be regarded to be mainly short-term; the needed actions are executed according to the changing, up-to-date production conditions. However, managing the ample operator team also demands long-term view and orientation from the Shift Supervisors. The Shift Supervisors, in fact, regard that one of the most important asset they need in their work is the personal knowledge of each, individual member within their team. The personal characteristics and ways of operating need to be known in order to be able to manage the team efficiently and to encourage it towards good performance.

Although the short-term, daily duties of the Shift Supervisors are guided and dictated by the up-to-date production conditions, a certain, quite settled path of Shift Supervisors' (SS) daily duties can be portrayed. While working in day shift (7.00-19.00), the SSs' execute their daily duties in the following order:

- *Changing the shift; discussing all relevant matters with the night shift Shift Supervisor.* The two SSs go through all relevant matters of the previous shift – production events/problems, quality issues, personnel issues, etc. The target of the discussion is to give the SS starting his/her shift an up-dated view of the current production and personnel status, in order to help him/her to execute his/her duties in the best possible manner. The discussion is executed face to face, with the help of the production diary discussed earlier in Section 4.3.4.1.
- *Checking the personal and SSs' common e-mail.* Checking whether the e-mails contain messages that should be taken into account during the shift and/or demand some actions from the SS. For example, if some suppliers have informed of chemical trucks coming to the mill, the SS marks the coming loads to the production system Alpha, for the gate personnel to utilize the information. The SS also takes other needed actions, based on the messages received.
- *Walking through the production process.* The target of the tour is to personally discuss with the various employees throughout the production process concerning all production related and any other matters. The SS's tour includes all parts of the production process, from the paper machine's wet end to the packing facilities. During the weekend and night shifts the SS also visits the finished goods' warehouse, as the warehouse foremen only work during office hours. The tour is very important as the

SS needs to be personally present in the production and to be easily approachable for his/her subordinates. As mentioned above, a large deal of the SS's responsibilities consists of managing people. The SS's special target during the tour is to remind the employees of work safety issues.

- *Discussing with the Assistant Superintendent concerning all relevant matters.* The SS and Assistant Superintendent change ideas, solve problems, and up-date each other concerning the current status of the production. The discussion is skipped in the night shift as the Assistant Superintendent only works during office hours.
- *Attending the production department daily morning meeting.* In the meeting the SS is in charge of presenting the previous day's matters/markings on the production diary and discussing them further with the other attendees. The SS also participates in solving any production related problems and/or issues. While working in the night shift, this part of the daily duties is naturally lacking.

In addition to these tasks, the SS also constantly follows, throughout the shift, the functionality of the production, quality change processes when moving from one quality to the other, in addition to the quality of the paper being produced. Should the situation demand, the SS takes corrective actions together with his/her subordinates. If some changes are needed to the production runs, the SS contacts the Production Planners. The SS also contacts the external maintenance organization, if something breaks or is expected to break in the production. The target of such action is to fix the situation as fast as possible and to prevent any excessive, extra damage from happening.

The SS also proactively follows the order and contents of the coming production runs from the production system Delta. The same program/view is also used by the paper machine operators. The SS also uses the mill's ERP system to regularly follow the work safety notifications inserted in the system, in addition to giving guidance to his/her subordinates how to use the system and to insert the notifications. The ERP system is also used in marking and reporting production related malfunction notifications, abnormal emissions, and different maintenance needs and duties given to the external maintenance organization. The daily maintenance markings may either be inserted by the SS or representatives of the maintenance organization; both organizations follow the maintenance needs and operations from the same system.

The SS is also actively involved in executing the mill's washing and maintenance standstills. As has been discussed in Section 4.3.4.1, the Assistant Superintendent is in charge of scheduling and organizing the mill's planned standstills. The actual implementation of the standstills, on the other hand, is executed in cooperation with the Assistant Superintendent and the paper machine operators, guided and managed by the SS. The SS is in charge of guaranteeing that the

agreed washing and maintenance operations get done in the planned timetable and e.g. that all tasks have enough manpower. Should the standstill be prolonged for some reason, the SS needs to be prepared to give comprehensive explanations and to inform all pertinent parties of the delay. In order to guarantee the smooth motion of the standstills, both the SS and his/her subordinates prepare for the actions in advance.

In addition to the tasks mentioned above, as has been mentioned several times earlier, a very important and large part of the SS's both short-term and long-term duties consists of various people management issues. The SSs are in charge of developing the skills of their own, named shift, in addition to e.g. following the absences of the employees, guaranteeing the needed manpower in each shift, having development discussions, solving any personnel related problems, briefing new employees, and so forward. Considering all the duties of the Shift Supervisors, it can thus be summarized that managing the position well demands both technical, paper production related skills and people management abilities from the holders of the position.

Comparing the daily and continuous internal supply chain management related duties of the Shift Supervisor and the Assistant Superintendent, it can be seen that the duties are partly overlapping. The difference between these two positions can be described by classifying the duties of the Assistant Superintendent as being more strategic, development, and long-term oriented, in addition to the short-term orientation, whereas the duties of the Shift Supervisors are mainly operative and short-term oriented. The Assistant Superintendent also operates in a specialist role, whereas the role of the Shift Supervisors is mainly to execute the operative, daily production related actions, together with the help of their subordinates.

Figures 11 and 12 present the various daily and other short-term duties of the Diamond Mill's Shift Supervisors as simplified flowcharts. The target of Figures 11 & 12 is to complement the Figures 7-10, and consequently to create a more comprehensive overview of the various actors, along with their duties, involved in the Diamond Mill's internal supply chain.

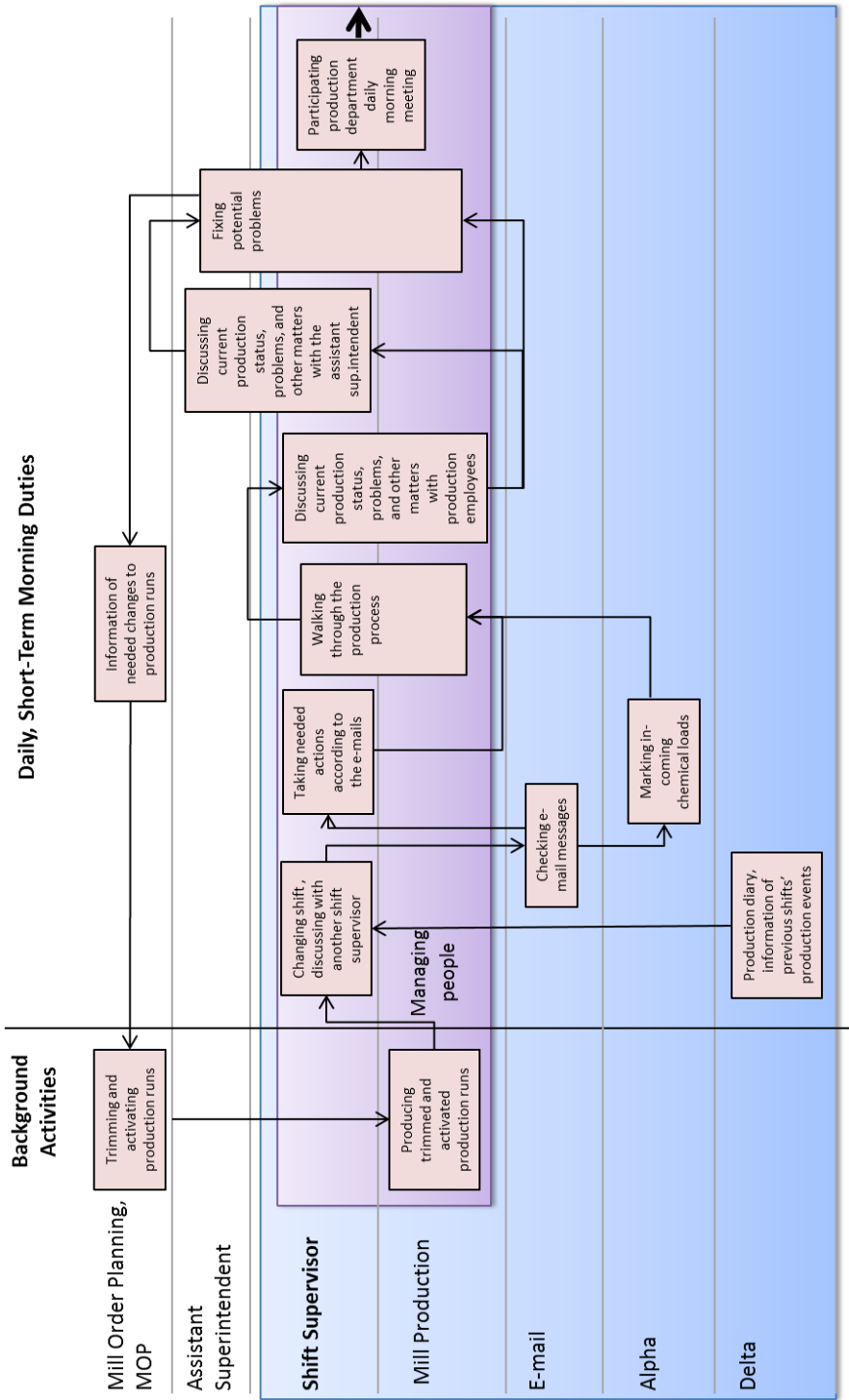


Figure 11 Daily, Short-Term Morning Duties of the Diamond Mill's Shift Supervisors and Programs Used

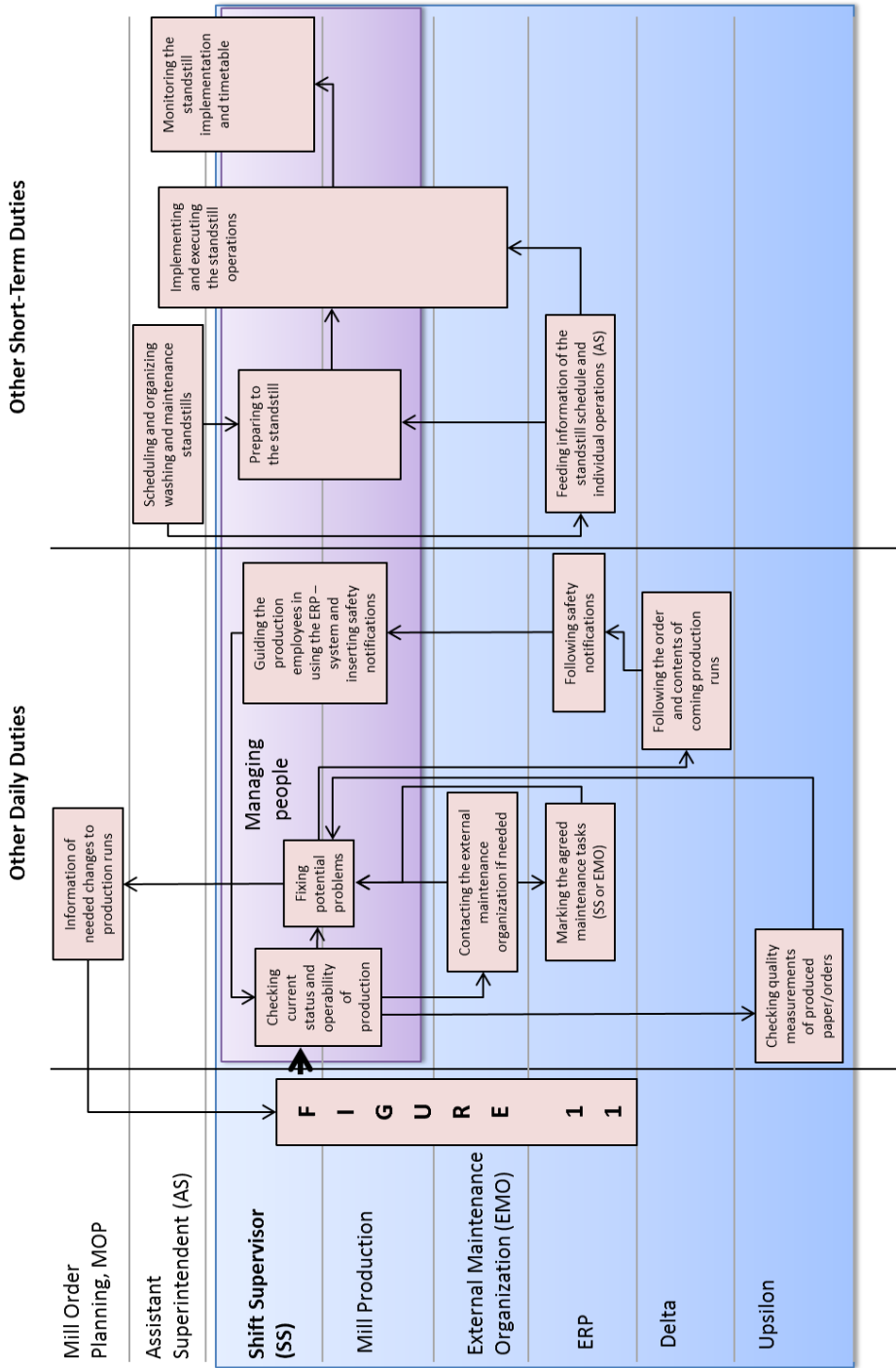


Figure 12 Other Daily and Short-Term Duties of the Diamond Mill's Shift Supervisors and Programs Used

#### ***4.3.4.4 Shift Supervisors – Collaboration and Information Sharing Parties***

As was the case with the Production Planners and the Assistant Superintendent, the Shift Supervisors work in collaboration and share information with several internal and external supply chain parties while executing their duties. Tables 20-22 present the main co-operation parties of the Shift Supervisors. The emphasis is again put on collaboration and information sharing occurring within the internal supply chain of the mill. However, as the Shift Supervisor interviewed mentioned his/her main collaboration & information sharing party to be the external maintenance organization, it is included in the table and presented as the Shift Supervisors' first contact partner.

Comparing the collaboration and information sharing parties of the Assistant Superintendent and the Shift Supervisors (Tables 17-22), it can again be seen that the duties of these two actors are partly overlapping and therefore the contact parties and collaboration and information sharing occasions also show similarities. However, comparing the Tables 17-22, it is also evident that to some extent the duties of the Assistant Superintendent are more strategic and demand special expertise and knowledge; this is consequently visible in the occasions in which the collaboration occurs.

Table 20 Collaboration and Information Sharing Parties of Diamond Mill's Shift Supervisors – External Maintenance Organization & Other Production Department Employees

Collaboration and Information Sharing Party	Occasion/Reason for Collaboration and Information Sharing	Activities	Means	Regularity	Formality
<b>External Maintenance Organization (EMO) (external)</b>	Short-term, sudden maintenance needs at the production facilities	SS & EMO: Discussing and agreeing on needed short-term/sudden daily maintenance operations; SS: Giving permission for fire operations (if needed), securing the workplace/maintenance target; EMO: executing the agreed maintenance operation	Call (SS); ERP (marking/listing each agreed maintenance operation (SS or EMO); personal visit to secure the maintenance site (SS & EMO)	Regular, occasional	Formal
	Implementing and executing washing and maintenance standstills	EMO: Providing a list of maintenance tasks agreed with the AS to the SS; SS: Distributing the list amongst the paper machine operators; securing the maintenance work sites, if/when needed	Personal participation (standstill)	Regular, every three weeks	Formal
<b>Other Production Department Employees (Paper Machine Operators)</b>	Guiding and committing the other persons to the joint actions/responsibilities/targets	SS: Being available for the other production department employees, discussing continuously with the paper machine operators concerning all matters, setting guidelines, acting as a superior, discussing potential customer complaints	Personal discussions	Regular, continuous	Informal/formal (managerial duties, customer complaints)
<b>Other Production Department Employees (Assistant Superintendent (AS); Superintendent (SI))</b>	Fixing problem/situations at the paper machine (wet end - drying section; AS; additives facility, post processing; SI)	SS, AS, SI: Discussing the situation and prevalent circumstances; generating alternative solutions to fix the problem	Personal discussions	Regular, daily/occasional	Informal
	Implementing and executing washing and maintenance standstills	AS: Scheduling and organizing the standstills, printing copies of the standstill tasks and timetable for the SS to distribute amongst the paper machine operators; SS: Distributing the lists of standstill tasks, being responsible for the standstill execution and for keeping the agreed timetable, asking guidance from the AS, if needed	ERP (scheduling, AS); Personal participation (SS & AS)	Regular, every three weeks	Formal/informal
	Informing of changes of shifts of SSs and longer sick leaves of SSs and paper machine operators	SS: Contacting (AS & SI) (administrative superior) and informing of changes in original shift schedule and of longer sick leaves of SSs and paper machine operators	Call	Irregular, occasional	Informal (changes of shifts)/formal (sick leaves)

Table 21 Collaboration and Information Sharing Parties of Diamond Mill's Shift Supervisors – Other Production Related Departments' Employees & Production Planners

Collaboration and Information Sharing Party	Occasion/Reason for Collaboration and Information Sharing	Activities	Means	Regularity	Formality
Mill's Pulp/Mill Employees (PMEs)	Unplanned standstill either at the pulp mill or paper machine	SS/Pulp mill employees: Contacting the other department and informing of an unplanned standstill affecting the operations of the other department SS: Contacting the affected department(s) and informing of an unplanned standstill	Call (SS or PMEs)	Irregular, occasional	Informal
Employees at Different Production Related Parts of the Mill (e.g. Power Plant, etc.)	Unplanned standstill at the paper machine	SS: Contacting the affected department(s) and informing of an unplanned standstill	Call	Irregular, occasional	Informal
Pre-production Planners (PPs)	Production department daily meetings	SS: Presenting the production diary log, listening to other production, quality, and production planning related matters; solving jointly order & production related problems/dilemmas	Personal participation	Regular, daily	Formal
	Changing activated production runs (initiative from the PPs)	PPs: Asking for approval of making alterations to the earlier activated production runs; AS: giving the permission or giving alternative solutions; PPs: making the agreed changes; PPs: Informing the SS and consequently paper machine operators of the changes & updated production run order/status (print new versions of production instructions)	Call (PP); personal visit (AS); automatic data transfer (information of executed changes); Call to the SS (PP)	Regular, occasional	Informal
	Problems in production, consequently changing activated production runs (initiative from the production department)	SS & AS: Discussing with the PPs, how the production run/production order should be altered; PPs: making the agreed changes. During evenings and night time: SS: Making a decision to run the runs in a different order without contacting the PPs, informing the PPs of the changes by making a note of the changes on the production diary log; PPs: Making the alterations/ rearranging the runs in the systems afterwards	Personal visit/call (AS/SS); automatic data transfer (information of executed changes); Call to the SS (PP) (if not otherwise aware of the changes); Evenings & night time: Production diary (SS); automatic data transfer (information of executed changes done afterwards)	Regular, occasional	Informal

Table 22 Collaboration and Information Sharing Parties of Diamond Mill's Shift Supervisors – Mill Warehouse and Dispatch Employees, Mill Technical Customer Service Personnel, & Mill Research and Development Personnel

Collaboration and Information Sharing Party	Occasion/Reason for Collaboration and Information Sharing	Activities	Means	Regularity	Formality
Mill Warehouse and Dispatch Employees (WDEs)	Withdrawal of poor quality reels already located at the finished goods warehouse Storage problems at the warehouse	SS: Contacting the warehouse employees concerning the withdrawal; WDE returning the bad quality reels to the production, to be re-used as raw material WDEs: Contacting the AS/SS/PPs concerning space problems at the warehouse; AS/SS/PPs: considering and agreeing on needed changes to the production runs; PPs executing the needed changes	Call (SS) Call/personal visit (WDEs); automatic data transfer (information of executed changes)	Irregular, occasional Irregular, occasional	Formal Informal
	Delivering incomplete orders to the warehouse	SS: Contacting the WDEs and PPs concerning the matter; SS/WDEs/PPs: agreeing on whether/how/when to fulfill the missing tonnage; PPs: making the needed changes to the production runs; Production: producing the missing tonnage; WDEs: dispatching the order either in two lots or when the whole order is totally produced	Call/personal visit (SS); automatic data transfer (information of executed changes; information of totally produced orders)	Irregular, occasional	Informal/ formal (if customer contact needed)
Mill Technical Customer Service Personnel (TCS)	Borrowing manpower from one department to the other (production <> warehouse) Production department daily meetings	SS/warehouse foreman Contacting the other department and asking for help in lack of manpower SS: Listening to quality related matters (e.g. potential customer complaints) presented by the TCS employees; solving jointly production/quality related problems/dilemmas	Call/personal visit Personal participation	Irregular, occasional Regular, daily	Formal/ informal Formal
Mill Research and Development Personnel (R&D)	Organizing different test runs	R&D: Asking the production to run various test runs; AS/ST: agreeing on the matter, checking the best possible time for the test runs, giving technical guidance, supervising the run; SS: supervising the run if organized outside the office hours	Personal visit/e-mail (R&D); personal visit (AS/ST); personal participation during the test run (AS/ST/SS)	Irregular, often	Informal

#### 4.3.4.5 Superintendent – Duties

In order to fulfill the overall view of the various production department actors involved in the mill's internal supply chain, the duties and collaboration partners of the mill's Superintendent are presented below. The Sub-Sections 4.3.4.5 & 4.3.4.6 are based on discussions had with Diamond Mill's Superintendent on 3.9.2013 and 16.9.2013.

As has been mentioned in Section 4.3.1, the Diamond Mill's Superintendent (SI) operates as an *administrative superior of the mill's Shift Supervisors* but is not otherwise as actively involved in the mill's daily internal supply chain operations as the Assistant Superintendent and the Shift Supervisors. Most of his duties can be regarded to be more strategic, long-term, and development oriented; though many of the duties also directly or indirectly affect the functionality and efficiency of the daily internal supply chain operations.

The SI's main responsibility is the *technical development the mill's paper machine and production process*. He operates as a project manager in various both long-term and short-term development projects aiming at improving the operability of the paper machine and also acts as the mill's spokesman towards the external parties involved in the projects. The different projects managed vary from smaller, short-term, diverse, and continuous development projects executed together with the external maintenance organization to very large, more time and money consuming investment projects.

One of the duties of the SI, that directly affects the daily operations of the mill's internal supply chain, is his responsibility to *purchase the mill's paper reel cores*, around which the ready-made paper is wound, and *packing materials*. He is thus in charge that the mill has continuously enough, but not excessively, suitable cores and needed packing materials (plastic wrapping, board wrapping, inner and outer end caps, and glues) available. As the mill is continuously aiming at minimizing its tied-up capital, the SI is consequently in charge of guaranteeing that the size of the core and packing material inventories is as accurate and planned as possible – not too large, but not too small, either.

The inventory levels of the plastic wrapping and the glues are monitored by the mill's purchase department. Consequently a new load/batch of each substance is ordered to the mill by the purchase department employees when a certain limit is reached. The SI, thus, mainly needs to concentrate on guaranteeing the availability and deliveries of the cores, board wrapping, and end caps.

The SI begins the purchase process of these materials by giving a long-term, yearly need estimate to the different suppliers, based on previous years' consumption. The estimate is later on refined along the year in order to reach as accurate deliveries as possible. The cores are currently delivered to the mill once or twice a week, based on the contents of the coming production runs. The board

wrapping and end caps, on the other hand, are delivered approximately once a week or fortnight.

In addition to being in charge of guaranteeing the sufficiency of the mill's cores and packing materials, the SI is *in direct charge of the mill's additives facility and post-processing facilities (reel cutting, packing)*. The additives facility's part of the production process is to prepare the needed chemicals and additives for the different parts of the production process. Due to the direct responsibility, if something unexpected happens either at the additives facility or in post-processing, for example, some malfunction occurs, the SI participates in finding a solution to the problem. The SI also aims at discussing with both the additives facility and post-processing personnel on a daily basis. The normal, daily actions, however, are managed independently by the additives facility and paper machine operators and the Shift Supervisors, without a need of interference of the SI.

In addition to discussing with the personnel, the SI's daily routines include attending the production department morning meeting. Otherwise his duties and tasks vary from day to day. Moreover, in addition to the internal supply chain related duties mentioned above, the SI has several other duties and responsibilities. However, as these duties are out of the topic area of the dissertation, they will not be further discussed in the description.

Figure 13 summarizes the short-term and long-term, internal supply chain related duties of the Superintendent. The target of Figure 13 is to complement and finalize the overall picture of the various internal supply chain related duties executed at the mill's production department. The Figures 10-13 should thus be studied together in order to receive a comprehensive view of the various tasks and duties.

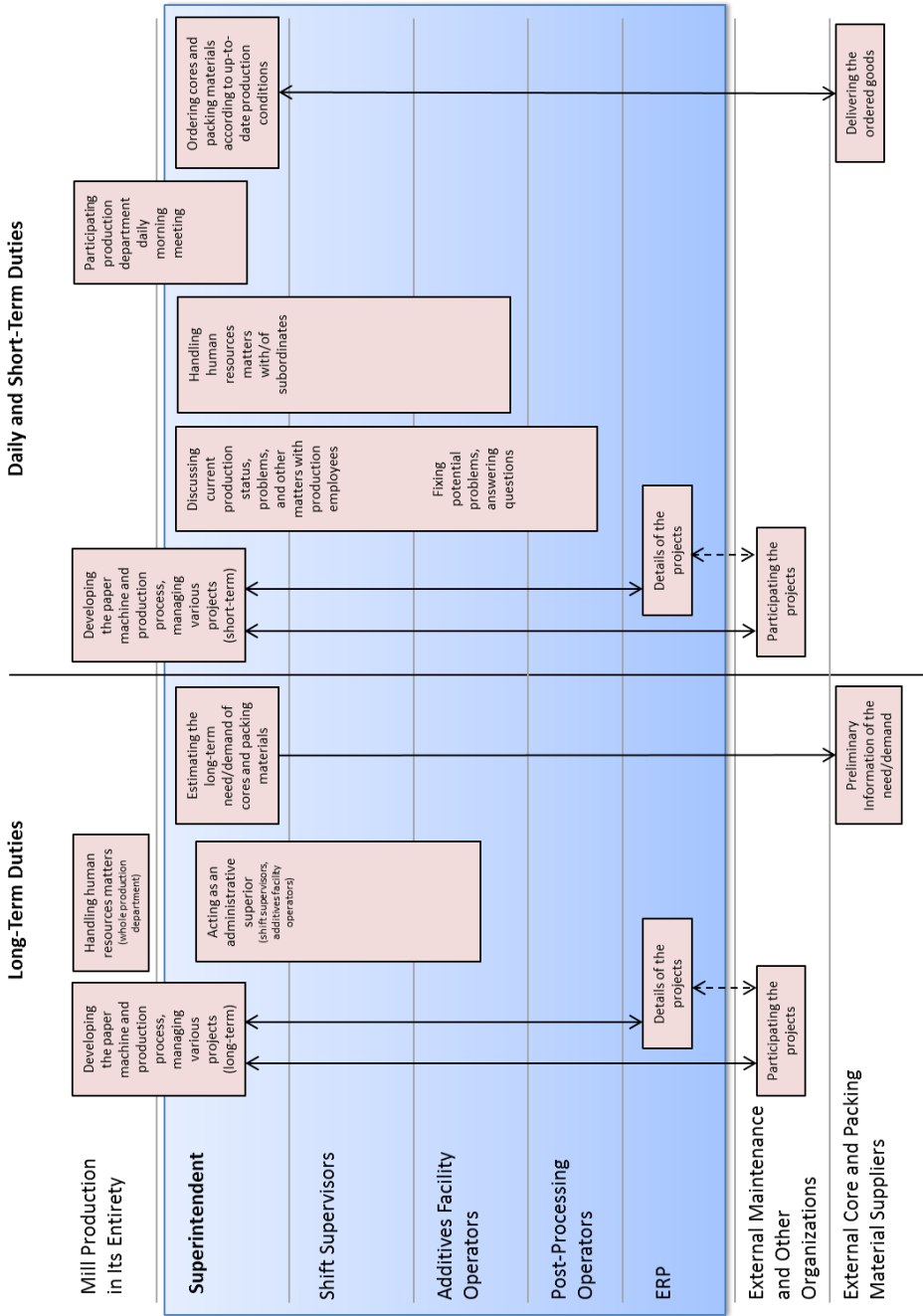


Figure 13 Long-Term and Daily and Short-Term Duties of the Diamond Mill’s Superintendent and Programs Used

#### ***4.3.4.6 Superintendent – Collaboration and Information Sharing Parties***

As was the case with the other members of the mill's internal supply chain, the Superintendent works in collaboration and shares information with several internal and external supply chain parties while executing his duties. Tables 23 & 24 present the main collaboration and information sharing parties of the Superintendent.

The emphasis is continuously on collaboration and information sharing occurring within the internal supply chain of the mill. However, as was the case with the Shift Supervisors, the Superintendent mentioned his main collaboration & information sharing party to be the external maintenance organization. The maintenance organization is thus included in the Table 23 and presented as the Superintendent's first contact partner.

Moreover, as the Superintendent works in close co-operation with the several packing material and core suppliers having an impact on the mill's internal supply chain, they are included in the Table 24.

Table 23 Collaboration and Information Sharing Parties of Diamond Mill’s Superintendent – External Maintenance Organization, Production Department Employees, Production Planners, & Senior Manager, Master Planning

Collaboration and Information Sharing Party	Occasion/Reason for Collaboration and Information Sharing	Activities	Means	Regularity	Formality
<b>External Maintenance Organization (external, EMO)</b>	Technical development of the production process and facilities; overall management of the maintenance and development operations	SI & EMO: Discussing and agreeing on long-term and short-term development projects (investments, faster and smaller development projects, & other maintenance related issues)	Different meetings, personal discussions; ERP (agreed maintenance and development operations)	Regular, daily (both long-term, short-term)	Formal
<b>Production Department Employees</b>	Subordinates (Shift Supervisors, Additives Facility Operators): Guiding and committing the other persons to the joint actions/responsibilities/targets; developing the functionality of the processes  All employees: Being in charge of human resources matters of the production department	SI: Discussing with the subordinates concerning all matters, setting guidelines, acting as a superior  SI: Searching for summer workers and other new employees, hiring new personnel, participating potential co-determination processes, giving notices, etc.	Personal visit/discussions	Regular, continuous	Informal/formal (managerial duties)
<b>Production Planners (PPs)</b>	Production department daily meetings  Enquiring the possibility of fulfilling special post processing related needs/wishes received from the customers  Enquiring the possibility of fulfilling special post processing related needs/wishes received from the customers	SI: Acting as a chairman of the meeting (may be replaced by Assistant Superintendent or Production Manager), listening to the production, quality, and production planning related matters; solving jointly production related problems/dilemmas  PPs: Contacting the SI and asking for advice	Different meetings (hiring new personnel, co-determination process); personal discussions (co-determination process, giving notices, interviewing new personnel); various systems (searching for new employees)  Personal participation	Irregular, often  Regular, daily	Formal  Formal
<b>Senior Manager, Master Planning</b>		Senior manager: Contacting the SI and asking for advice	Personal visit/call  E-mail	Irregular, occasional  Irregular, occasional	Formal  Formal

Table 24 Collaboration and Information Sharing Parties of Diamond Mill's Superintendent – Mill Technical Customer Service Personnel, Mill Research and Development Personnel, Mill Warehouse and Dispatch Employees, Mill Post-Processing Operators, External Packing Material Suppliers, & External Core Supplier

Collaboration and Information Sharing Party	Occasion/Reason for Collaboration and Information Sharing	Activities	Means	Regularity	Formality
Mill Technical Customer Service Personnel (TCS)	Answering post-processing related customer enquiries and quality complaints	TCS: Contacting SI for comments concerning e.g. some quality complaint , delivering samples received from the customer; SI: Investigating & analysing the matter, providing comments/explanations; TSC: Contacting the customer	E-mail (customer complaint/enquiry, quality reports); personal visit (samples, discussions on the matter); e-mail (reply to the customer)	Irregular, monthly	Formal
Mill Research and Development Personnel (R&D)	Organizing additives facility and/or post-processing related different test runs	R&D: Contacting SI for comments concerning the matter; SI: Agreeing on making the test run, giving guidance in technical matters	Personal visit	Irregular, often	Informal
Mill Warehouse and Dispatch Employees (WDEs)	Receiving packing material loads (board wrapping, end caps)	SI: Ordering packing materials from different suppliers; Suppliers: contacting the WDEs directly concerning the coming loads; WDEs: unloading the arriving loads	E-mail (SI to suppliers); call (suppliers to WDEs)	Regular, weekly	Formal/informal
Mill Post-Processing Operators (PPOs)	Delivering special samples to the customers demanding extra/special attention from the WDEs Receiving reel core loads	SI: Informing the WDEs of the special needs; WDE: Acting according to the special needs	Call/E-mail	Irregular, occasional	Formal
Packing Material Suppliers (external, PMSs)	Ordering packing materials	IS: Ordering cores from the core supplier, informing the PPOs of the coming loads; PPOs: receiving and unloading the loads	Call (SI to supplier); marking on production diary log (SI to PPOs)	Regular, weekly	Formal
Core Supplier (external, CS)	Ordering reel cores	SI: Ordering packing materials; PMSs: delivering the ordered goods in an agreed schedule	E-mail	Regular, weekly	Formal
		SI: Ordering cores; CS: delivering the ordered cores in an agreed schedule	Call	Regular, weekly	Formal

## **4.4 Diamond Mill's Warehousing and Dispatch Operations**

As has been discussed in Section 4.3, the warehousing and dispatch operations of the Diamond Mill work administratively under the production department and PM3 machine line. However, in practice the warehousing and dispatch operations function as a relatively separate and independent unit under the command of the Transport Manager. The characteristics of the Diamond Mill's warehousing and dispatch operations are described below. Sections 4.4.1-4.4.2 are based on discussions had with Diamond Mill's Transport Manager on 18.9.2013 & 14.10.2013. The sources of Section 4.4.3, on the other hand, are presented separately in each sub-section.

### **4.4.1 Organization and Working Schedules**

As has been mentioned above, the mill's warehousing and dispatch operations are supervised and managed by the Transport Manager. In addition to the Transport Manager, the operations employ two white-collar foremen; out of whom one is especially assigned for the warehousing and dispatch duties, in addition to booking the needed domestic truck transports, and the other one for other related duties, such as booking return deliveries of empty short-sea import containers and supervising railway wagon booking and change operations. The two foremen replace each other and execute each other's duties, if and when needed. The Transport Manager and the two foremen work in day shift, during normal office hours.

In addition to the white-collar workers, the actual warehousing and dispatch operations employ 15 blue-collar workers, in addition to three blue-collar workers operating in related duties at the mill's locomotive garage. The locomotive garage employees are in charge of operating the mill's locomotive, ordering the needed railway wagons, and executing the needed change operations. Out of the 15 employees operating at the mill's warehouse and dispatch, 10 work as pure forklift operators, specializing in the various tasks occurring at the warehouse and dispatch. The remaining five employees, on the other hand, are multi-skilled and may consequently operate in several different parts and duties within the mill. The salaries of the warehouse and dispatch and locomotive garage blue-collar employees are based on their skills; the more they are multi-skilled, the higher is consequently their salary.

The total warehouse and dispatch workforce (white- and blue-collar, warehouse and dispatch and locomotive garage) is highly male-dominated; only one of the forklift operators is a woman. Most of the employees are aged between 40 to 50 years; youngest being 35-40 years and the oldest approximately 60 years

old. The actual warehouse and dispatch blue-collar employees work 24 hours per day, seven days a week (3/7 shift). They operate in a long rotating shift, having four mornings + one rest day, four evenings + one rest day, and four nights + six rest days. Each shift contains three workers. As the foremen only work during office hours from Monday to Friday, the paper machine Shift Supervisors also supervise the work of the warehouse and dispatch employees, as has been discussed in Section 4.3.4.3. The locomotive garage employees, on the other hand, work in two shifts (morning, evening) from Monday till Sunday (2/7 shift). The rotation of the shift lasts 84 days and due to its complexity, will not be described in more detail. Each shift usually contains only one operator.

#### ***4.4.2 Characteristics of Diamond Mill's Warehousing and Dispatch***

##### ***4.4.2.1 Various Operations Executed***

The duties of the warehouse employees range from receiving the finished paper reels from the packing facilities to loading them in a proper condition to the different modes of transport. The separate duties within this process include, for example: receiving the reels, placing them to the proper warehousing location or bringing them directly to the awaiting vehicle or wagon, moving the reels to the appropriate warehousing location or vehicle with the forklift data terminal, fetching the goods from their location to the named vehicle (if not dispatched directly from production line), loading the goods, securing the cargo (in case of short-sea containers), and printing the waybills both for the vehicle drivers and the mill. Before the actual loading operations can be done, the different transport vehicles must be ordered to the mill. As has been discussed in Section 4.1.6.4, in the new sales process, the mill is in charge of ordering and arranging the pre-transport vehicles (trucks, wagons), i.e. delivering the goods from the mill to the Finnish harbors and domestic terminals, in addition to organizing the utilization of the return deliveries of the empty import short-sea containers. These vehicles and containers are organized and ordered by the warehouse and dispatch foremen, in addition to the locomotive garage employees. The foreign direct trucks, on the other hand, are organized and booked by Pearl Logistics and Customer Service Center Finland. The duties of the foremen, in addition to the actions executed by the other warehouse and dispatch and locomotive garage employees, are described in more detail in Section 4.4.3.

In addition to the duties mentioned above, the warehouse and dispatch employees also execute various other tasks, such as, relabeling of reels, moving reels from one order to the other (based on instructions received from the Produc-

tion Planners), making inventory calculations, moving rejected reels back to the production facilities to be reused as raw material, receiving and unloading packing materials, opening wagon doors, moving and placing loading ramps, and so forward.

On the other hand, as has been mentioned above in Section 4.4.1, the mill's locomotive garage employees are in charge of different duties linked to operating the mill's own locomotive and managing the railway wagons needed at the mill's loading and dispatch operations. In addition to these duties, they also have other duties that are not related to the scope of the dissertation. Due to their irrelevance, these duties will not be further discussed in the description.

#### ***4.4.2.2 Warehousing Capacity and Loading Places***

The maximum capacity of the Diamond Mill's warehouse is approximately 5,500 tons; corresponding to approximately one fourth of the monthly, average production tonnage. The total fullness, however, makes the normal warehousing and dispatch operations very difficult due to the lack of free space for handling the reels. A manageable size of the stored tonnage lies at approximately 4,000 tons; in such case the warehouse still has some free space and aisles for moving and handling the goods. In an optimal situation the stored tonnage would remain under 3,000 tons. Currently the size of the mill's stored tonnage is more than 4,000 tons. The situation thus starts to be challenging and consequently sets its challenges for the daily warehousing operations.

If the warehouse has space and the chosen modes of transport are known early enough in advance, the reels are aimed to be stored as close to the actual loading place as possible. The mill has five places for loading the trucks and one, long loading bridge for loading the railway wagons. Each completed, individual order is aimed at being stored in the same slot; separate reels should not be dispersed around the warehouse. Additionally, one slot may contain several orders. However, when the warehouse is reaching its capacity limits, the reels are stored on random, free spots anywhere in the warehouse. The high stored total tonnage thus makes both the warehousing and loading operations of the mill more demanding and time and effort consuming. Also more mistakes and human errors may occur, for example, in the form of damaging or dislocating the reels, or mixing the warehouse bookkeeping.

#### ***4.4.2.3 Different Modes of Transport Utilized***

The mill aims at using more truck transports than rail transports in its carriages; the yearly target ratio is 70 % for trucks (for ALL deliveries, including direct trucks to the Finnish and foreign customers), 30 % for wagons. The current ratio is approximately 60/40. The yearly target is due to the price difference between the different modes of transport, in addition to the lower service level offered by the railway transport provider.

The mill has received lower prices and less handling and transport damages through the use of direct trucks to the European customers. Instead of utilizing pre-transport to the Finnish harbors and delivering the goods as, for example, normally unitized maritime cargo to Europe, the mill thus prefers to use direct truck transports from the mill to the customer. This is consequently visible in the lesser use of pre-transport railway deliveries. The prices of the pre-transport railway deliveries from the mill to the Finnish harbors are also higher than the prices offered by the different road transporting companies for the same legs. This price difference evidently also favors the usage of pre-carriage truck deliveries.

In addition, the mill has currently three railway departures per week (Tuesday, Thursday, Sunday), delivering the goods from the mill to the Finnish harbors, whereas the truck transports can be organized for every day and night. The truck deliveries to the harbors are thus consequently considerably faster than the rail deliveries. The mill, however, also tries to have full train loads for the three departures, in order to maintain the current service level and not to be forced to accept even higher railway transport prices in the future. In case of real shortage of wagon loads, a certain departure may be cancelled totally, rather than dispatching only a few wagons.

#### ***4.4.2.4 Challenges***

In addition to the problems caused due to the too full storage, as discussed above, the mill's warehousing and dispatch operations have been challenged by, for example, some occasional system based problems. There have, for example, been some problems in the automatic data transfer between the different programs utilized; all needed information has not moved from one system to the other. The mill's warehouse and dispatch employees have also faced communication problems with the foreign truck drivers speaking only their own native language. Due to the incoming vessel schedules, the foreign trucks-to-be-loaded also seem to accumulate to certain loading hours and consequently cause rush periods at the mill.

The continuous stock bookkeeping and the yearly stock taking of the finished goods inventory, however, are regarded to be managed well. The yearly stock taking usually only shows minor discrepancies; the differences in books and real life situation are usually caused due to, for example, not withdrawing the waste reels from the stock bookkeeping as they are returned to the production to be re-used as raw material. Also some “lost reels” may be found.

#### ***4.4.3 Duties and Collaboration and Information Sharing Parties of Warehouse and Dispatch Employees Involved in Mill’s Internal Supply Chain***

As was the case with the Production Manager, the Transport Manager is not actively involved in the internal supply chain related, daily warehouse and dispatch operations of the mill. His duty is rather to set the basic boundaries for and to guarantee, for example, the safety of the operations, whereas the actual daily duties are managed very independently by the Warehouse and Dispatch Foremen (WDF) and their subordinate employees. The following section thus concentrates on describing the duties and collaboration and information sharing parties of the WDF, while also simultaneously discussing the duties of the warehouse and dispatch and locomotive garage blue-collar employees. As the different duties occurring at the mill’s overall warehouse and dispatch operations are largely divided between the two foremen, the duties of each foreman are presented separately, as duties of WDF1 and WDF2.

##### ***4.4.3.1 Warehouse and Dispatch Foreman 1 – Duties***

The sub-section is based on discussions had with Diamond Mill’s Warehouse and Dispatch Foreman 1 on 24.9.2013, 3.10.2013 and 4.10.2013, in addition to unpublished warehousing and dispatch related material (received 24.9.2013).

The duties of the WDF1 mainly include short-term, daily or weekly internal supply chain related responsibilities. The only actual long-term responsibility of the WDF1 is to manage and lead the *yearly stock taking* of the mill’s finished goods’ inventory and to fix the potential discrepancies. Otherwise the duties concentrate largely on various short-term operations.

The WDF1 follows *the order and contents of the coming production runs* from the mill system Alpha. Based on this information received, the WDF1 is able to form an overall view of orders entering the warehouse during the next few days, their destinations, in addition to their dispatch and shipping schedules. Consequently the information assists the WDF1 in creating an overview of, for exam-

ple, the coming amount of international direct truck transports/loads and the need of near future domestic pre-carriage and terminal deliveries.

Once the finished products enter the warehouse on a conveyor belt from the mill's packing facilities, they are scanned and automatically moved to the warehouse bookkeeping in the mill's Inventory Management System. Consequently they appear as finished stock to be dispatched to the customers. The forklift drivers fetch the finished reels from the belt and move them to appropriate storage locations, if not dispatched immediately. Once the reels are positioned on a certain location, they are locked to that specific location with the forklift data terminals. Consequently, the information of the storage location moves automatically to the mill's Inventory Management System; the Inventory Management System therefore shows up-to-date information of the whereabouts of each separate, produced and warehoused, reel.

As has been discussed in Section 4.1.6.4, the direct foreign truck deliveries of the mill are organized and instructed by Pearl Logistics and Customer Service Center Finland. The mill, on the other hand, is in charge of organizing and instructing pre-carriage of deliveries delivered through the Finnish harbors. Based on the shipping schedules promised to the customers and consequent closing times of the outbound sailing vessels, the WDF1 gives *loading instructions* for the other warehouse and distribution employees, i.e. the forklift drivers: what has to be dispatched, to where, how, and when. If the orders are to be shipped later, the creation of the loading instructions is postponed to the appropriate point in time. All orders, the ones to be dispatched immediately and the ones to be shipped later, however, remain on the shipping lists (loading instruction given, loading instruction not given) in the Inventory Management System; it is the duty of the WDF1 to make sure that all orders get shipped as promised and that no order is accidentally left in the warehouse. The loading instructions are also created and given in the Inventory Management System.

When the loading instructions are created for orders-to-be-dispatched, all orders are marked to be dispatched by using railway. The reason for this behavior is to have one, single list that contains all orders that are to be dispatched in the near future. However, this instruction does not tie the warehouse and dispatch employees; the Inventory Management System and forklift data terminals also allow the orders to be loaded into road transport vehicles. As has been mentioned above, the mill favors road transports over rail transports in all its deliveries. Consequently the mill wishes to guarantee that orders planned for railway deliveries may also be sent by road, if possible and feasible.

Although the mill prefers road transport over rail transport in its pre-carriages, both modes of transport are used. The final decision what is loaded into railway wagons and road transport trailers, is decided by the mill's forklift drivers, based on the urgency and closing times of the orders, in addition to the location of the

orders in the warehouse. In some special cases the WDF1 may give clear and univocal instructions that some order has to be loaded into a certain mode of transport and/or vehicle but in a normal situation the decision power over such matters lies in the hands of the forklift drivers.

The *trucks* used in the mill's pre-carriages are *booked and organized* by the WDF1. The mill has two regular trucks visiting the mill every day; other trucks are booked according to the demand and availability. The mill's forklift drivers load approximately 20 trucks per day, out of which approximately three to four loads are pre-carriage deliveries to the Finnish harbors. The amount of the mill's pre-carriage loads, however, varies considerably from day to day. Depending on the contents of the production runs, destinations of the orders, and the availability of trucks, the amount of pre-carriage loads may vary from two to ten per day. If only two loads are to be delivered to the Southern Finnish harbors, the deliveries are handled by the regular service providers/trucks. No other trucks are booked or otherwise accepted to come and fetch the loads.

The WDF1 checks *the need and availability of pre-carriage trucks* on a daily basis; the loads are agreed with the trucking companies on a short notice, for the same or the following day. The regular trucks visit the mill automatically, without a need for a separate agreement. When the WDF1 has agreed the amount of loads with the trucking companies, he adds the incoming trucks on a *truck list* in the Inventory Management System. The list contains all trucks coming to the mill on a certain day and updates in real time as trucks are being loaded and leave the mill. Moreover, if some unforeseen, sudden new truck loads are agreed with the trucking companies, the trucks are added on the list during the day. The truck list thus shows an up-dated, real time view of the trucks about to enter the mill site to fetch a load.

The needed *railway wagons*, on the other hand, are *booked* by the blue-collar employees working at the mill's *locomotive garage*, under the supervision of the WDF2. If the availability of trucks is good – the trucking companies, for example, call the mill and offer extra loads – the opportunity of utilizing more trucks is used and more loads are moved from the railway to road transport. The three train departures per week are thus not filled on the expense of truck loads. On the contrary, as discussed earlier, a whole departure may be cancelled due to the lack of wagon loads. The division of loads between road and rail pre-transport may thus alter as the situation develops. Consequently the locomotive garage employees must make their best estimation of the prevailing situation, while ordering the wagons. The actual amount of needed wagons, however, always remains an educated guess.

When the WDF1 adds the trucks on the truck list in the Inventory Management System, he does not assign which order should be loaded into which truck. He may – or may not – add a destination for some of the trucks, e.g. a certain

harbor, but the *decision of what is loaded into each pre-carriage vehicle is made by the forklift drivers*. This decision is based on the urgency of the orders; the orders with the nearest closing time are loaded first and vice versa. As the Southern Finnish harbors, which are used by the mill, are located very near to each other, a truck may also be loaded to contain orders that are to be delivered to different harbors. The named truck destination thus does not strictly dictate the loading operations of the forklift drivers. Only in special occasions the WDF1 may order his subordinates to dispatch some certain order with a certain truck, to a certain destination. The same procedure also applies to loading the railway wagons. The forklift drivers are given the freedom and responsibility to decide what is loaded into each wagon. The WDF1 does not actively instruct the wagon loading operations, except in special, exceptional occasions.

The *loading* itself is begun by choosing a certain order to be loaded into a certain arrived vehicle (truck, wagon, container) by using the forklift data terminal. The data terminal consequently shows the location of the reels in the warehouse. The forklift drivers fetch the correct reels and bring them to the awaiting vehicle. As the forklift driver lifts the reels, the reels are system-wise attached to the forklift – or more specifically to the *forklift driver* as they log on to the forklifts by their personal usernames – with the forklift data terminal. Once the reels are positioned into the vehicle, they are, on the other hand, detached from the forklift and moved to the specific vehicle with the data terminal. During the loading operations the reels thus move from the warehouse, to being carried with the forklift, to being positioned into the specific, awaiting vehicle. Should some supporting, protecting, or tying material be needed, they are utilized according the characteristics of each individual case.

The *movements done with the forklift data terminal are automatically transferred to the mill's Inventory Management System*. The Inventory Management System thus constantly shows up-to-date information of the location of each order and reel; whether they are still in the warehouse, currently being loaded, or whether they have already been totally loaded and dispatched. When a whole truck has been marked loaded and dispatched, the *information of the dispatched reels/orders also moves to the mill's Sales System*; until then the location of the reels is shown to be the mill's warehouse. On the other hand, in case of railway deliveries, the information of the dispatched reels/orders moves to the Sales System as the whole train leaves the mill; not when a single wagon is acknowledged as being fully loaded.

Although the loading operations can be regarded to be quite clear cut, also mistakes may happen. As has been discussed earlier, a very full warehouse, for example, sets its challenges for the loading operations. Generalizing it can be said that the fuller the warehouse, the more there are possibilities for mistakes. An example of such mistakes is dispatching incorrect, wrong numbered reels; the

mill does not have barcode readers that would prevent such mistakes from happening. If mistakes actually do happen, it is the responsibility of the WDF1 to fix the situation both in the systems and on the documentation. The information in the systems and on documents, for example, waybills, must match the reality.

Some mistakes in the loading operations have also taken place due to the lack of sharing of relevant information, either through the systems or in person. Some orders may have originally been ordered to be dispatched by using a certain type of vehicle (e.g. wagon); this order may have come, for example, from the mill's sales department. If the situation has changed and the WDF1 and the forklift drivers have not received information of the change, the orders may have been loaded to and dispatched with the wrong type of vehicle. Such mistakes indicate that either the automatic data transfer between the various programs used at the mill does not work properly – if the connection between the programs is built in the first place – or that there is potential for improvement in the information sharing occurring in other forms between the different departments. Similar problems in the automatic data transfer between the different programs have also become evident when following the orders on the shipment lists. Some orders may appear on the list, although they would have been cancelled from the mill's Sales System. If some orders thus constantly seem to appear on the list, without any change, the WDF1 needs to check the correct situation from the Sales System and consequently to update the correct information to the Inventory Management System.

All in all, it can be said that the WDF1's main duty is to *ensure the operability and efficiency of the mill's dispatch function*. Although he is not usually obliged to intervene the daily loading operations, he, however, constantly *monitors and supervises the progression of the daily actions*. As the WDF1 also *operates as a superior* of the warehouse and dispatch blue-collar employees, he also visits the warehouse and loading operations on a regular basis. In addition, he also periodically holds development discussions with his subordinates.

In addition to the tasks and duties mentioned above, the WDF1 is also in charge of guaranteeing the *availability of the different protective materials*, e.g. corner protections and protective bars, needed and utilized at the mill's loading operations. These materials are ordered together with and through the mill's purchasing department. The availability of the needed tying materials and locks, on the other hand, is monitored and secured by an external supplier; these materials are managed utilizing the consignment stock principles. The WDF1 also has other duties and responsibilities. However, as these duties are out of the scope of the dissertation, they will not be further discussed in the description.

Figures 14 & 15 summarize and present the duties of the WDF1 as simplified flowcharts. In the figures, the solid lined black arrows and boxes describe actual, physical actions occurring at the mill's warehousing and dispatch operations. The

dotted black lines and boxes, on the other hand, describe automatic data transfer happening within the process.

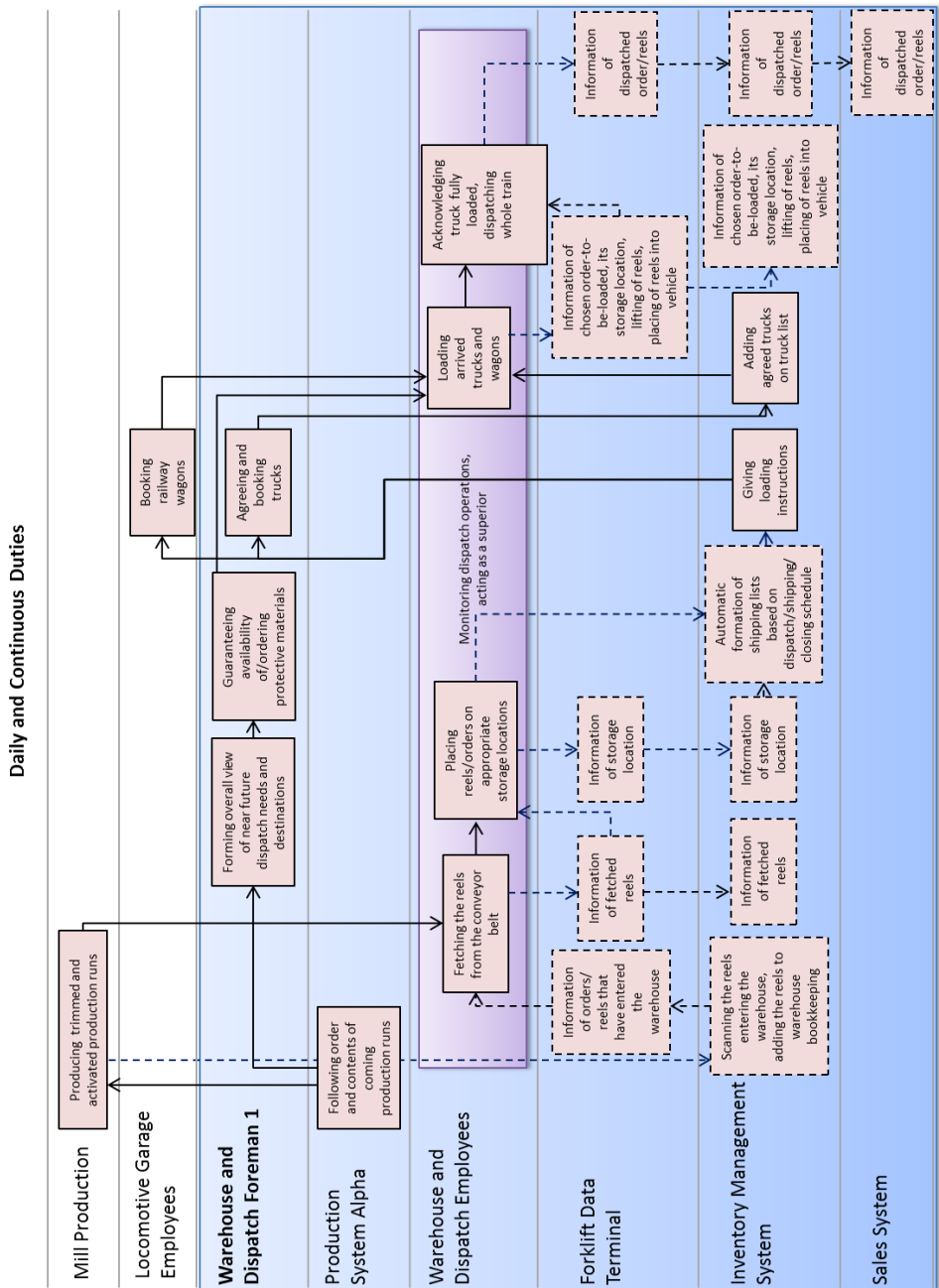


Figure 14 Daily and Continuous Duties of the Diamond Mill’s Warehouse and Dispatch Foreman 1 and Programs Used

Long-Term and Short-Term Occasional Duties

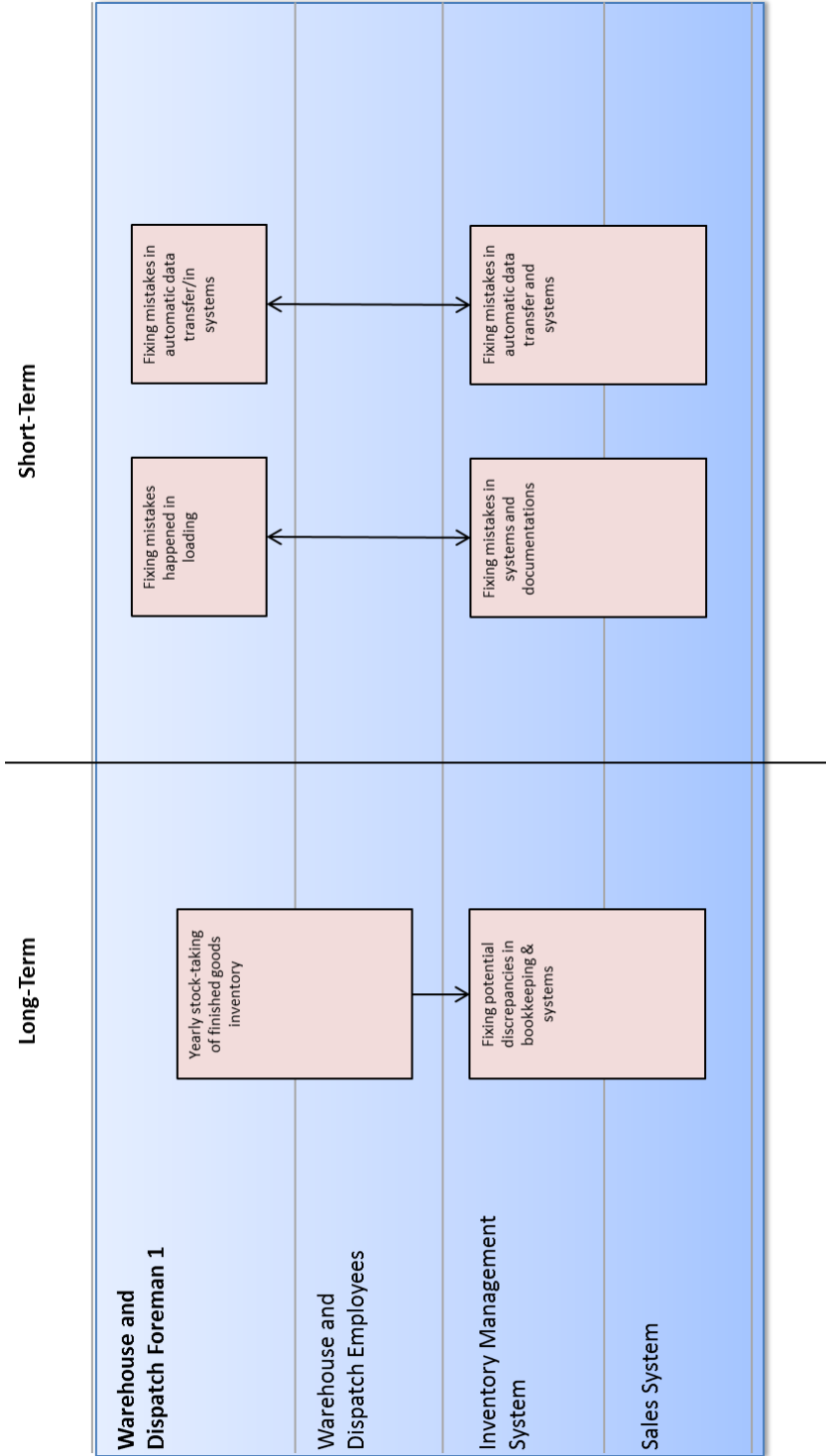


Figure 15 Long-Term and Short-Term Occasional Duties of the Diamond Mill’s Warehouse and Dispatch Foreman 1 and Programs Used

#### 4.4.3.2 Warehouse and Dispatch Foreman 2 – Duties

The sub-section is based on discussions had with Diamond Mill's Warehouse and Dispatch Foreman 2 on 3.10.2013, 4.10.2013, and 15.10.2013.

As was the case with the Warehouse and Dispatch Foreman 1 (WDF1), the internal supply chain related duties of the Foreman 2 (WDF2) are mainly short-term and operational. In addition to these duties, the WDF2 also has several other responsibilities that are out of the scope of the dissertation, and therefore his role in the mill's dispatch functions is not as extensive and visible as the role of the WDF1 – except when he is replacing the WDF1.

As has been mentioned earlier in Section 4.4.3.1, the WDF2 operates as a *superior of the mill's locomotive garage employees*. His duty is thus to *monitor* that all actions related to *ordering and managing the railway wagons* at the mill are executed properly and efficiently. As has also been discussed earlier, the locomotive garage employees handle the ordering of the wagons very independently; only in special occasions the WDF2 may give clear instructions of, for example, the needed amount of wagons to be booked.

The WDF2 should also give *weekly pre-notifications to the railway operator concerning the expected future need of the wagons*. However, as the needed amount of wagons is continually more or less a guess, due to the emphasis the mill puts on road transport in its deliveries, this notification is not always sent, as it is not seen to give the railway operator any predictive, valuable information. On the other hand, should the mill be wishing to cancel or add a railway departure or should the mill be facing any other *special situation demanding unusual service from the railway operator*, the WDF2 *contacts the operator* and agrees on the coming actions.

As has also been mentioned earlier, the WDF2 is also *in charge of ordering the needed empty short-sea import containers* to the mill. The mill utilizes these containers to deliver goods to Central Europe; for example, to Belgium, France, and the Netherlands. The container delivery is chosen when the orders are being confirmed. The WDF2 consequently *follows the coming container deliveries and needed amount of containers* from the mill's Sales System on a daily basis and orders the containers accordingly. He usually *orders the containers* two weeks in advance and *updates the information of the actual need* as the situation progresses.

The containers are delivered to the mill on trucks and the target is to load and dispatch them as soon as possible after their arrival; the containers are not lifted off the trucks for loading. In order to have the containers at the mill at the exactly right time – not too early, not too late –, the WDF2 *follows the already produced and warehoused container tonnage* from the mill's Inventory Management System, in addition to following *the order and timing of the coming production runs*

from the mill system Alpha. Should, for example, the production timing of some container order be delayed, the WDF2 contacts the container supplier and informs their representatives of the delay. The WDF2 monitors the up-to-date production status of the container orders on a daily basis and contacts the container supplier accordingly.

When the containers arrive at the mill, the WDF2 also *supervises and guides the loading* of the containers. As was the case with the pre-carriage trucks and wagons, the loading instructions for the container orders are given in the mill's Inventory Management System; the WDF2 is *in charge of giving the loading instructions* for the short-sea container deliveries. As the container deliveries are invoiced on a container basis, instead of a tonnage basis, the mill aims at utilizing the container payloads to the full. It is thus the WDF2's duty to make sure that the container payloads are exploited as efficiently as possible, while simultaneously respecting the minimum and maximum delivery tonnages of each separate order, promised to the customers. The WDF2 thus consequently *follows* both the *actualizing and actualized container payloads* from the Inventory Management System and takes corrective actions if needed. The aim is not to send the containers half full to Europe. Should some container-to-be-dispatched have room for extra reels, it is filled with coming weeks' already produced container delivery tonnage. This tonnage thus arrives at the foreign terminal earlier than originally planned.

Moreover, in addition to dealing with the railway operator and the short-sea container supplier, the WDF2 is also *in charge of informing the Southern Finnish harbors of the coming pre-carriage deliveries* (trucks and wagons). The needed information for these pre-notifications is gathered from the Inventory Management System and the notifications should be sent to the harbor operators every day.

In addition to the different duties mentioned above, the WDF2 also operates in a *managerial role towards the actual warehouse and dispatch employees* – although their named administrative superior is the WDF1. The WDF2 is in charge of, for example, accepting the working hours and monitoring and organizing the needed training of the warehouse and dispatch employees. The warehouse and dispatch employees thus, in fact, have two operative superiors. According to the WDF1 & 2, this division of managerial duties has not caused operative or other problems.

As the WDF2's other responsibilities are not directly linked to the mill's internal supply chain, they will not be further discussed in the description.

Figures 16 & 17 summarize the internal supply chain related duties of the Warehouse and Dispatch Foreman 2.

**Internal Supply Chain Related Duties**  
**Short-Term and Continuous**

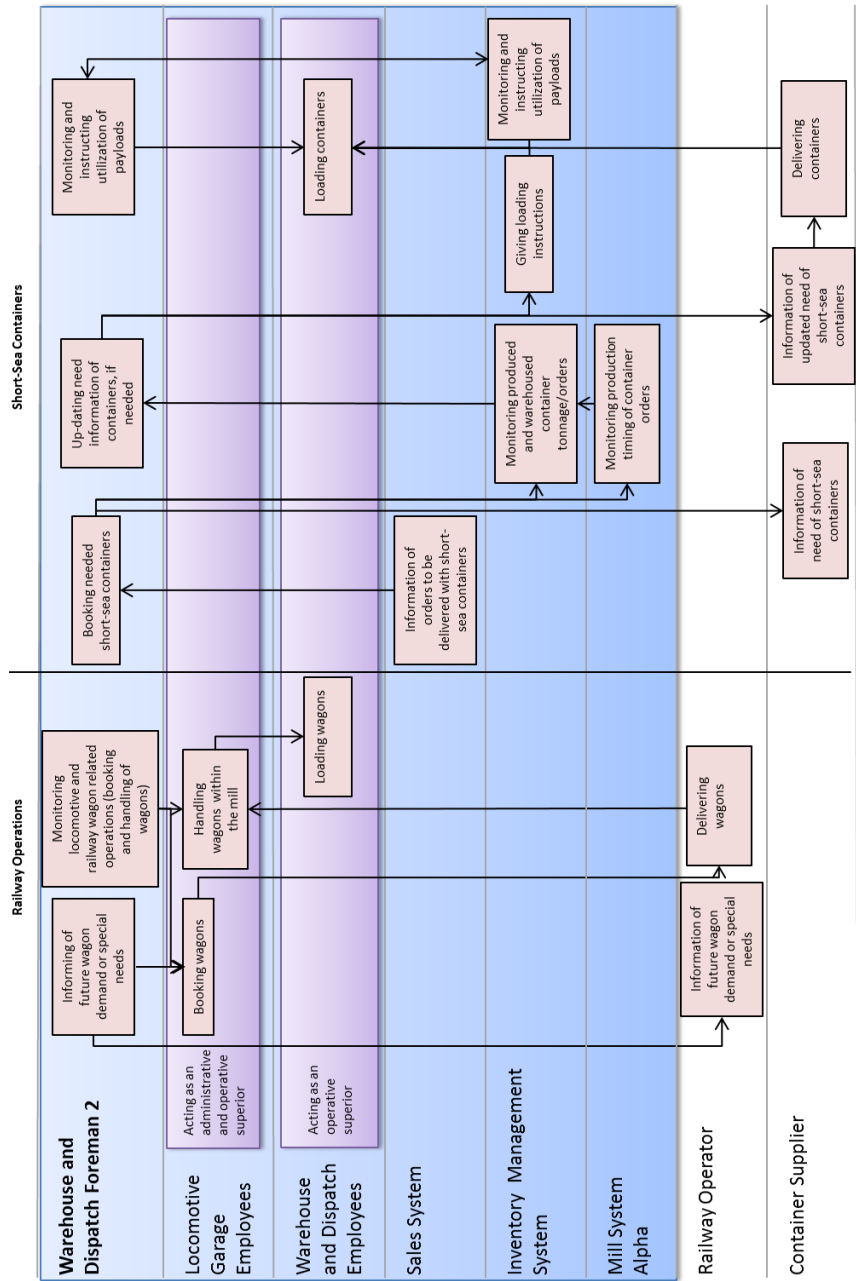


Figure 16 Short-Term and Continuous Internal Supply Chain Related Duties of the Diamond Mill’s Warehouse and Dispatch Foreman 2 and Programs Used

### Internal Supply Chain Related Duties Short-Term and Continuous

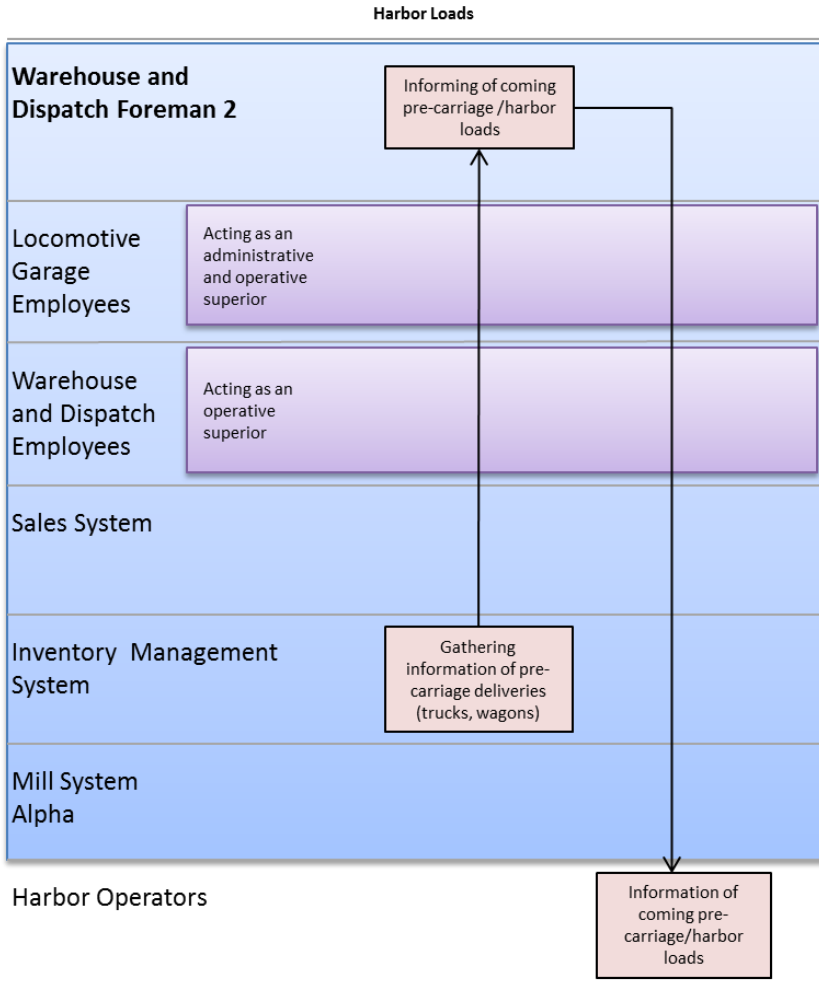


Figure 17 Other Short-Term and Continuous Internal Supply Chain Related Duties of the Diamond Mill’s Warehouse and Dispatch Foreman 2 and Programs Used

#### ***4.4.3.3 Warehouse and Dispatch Foremen – Collaboration and Information Sharing Parties***

As the duties of the WDF1 and WDF2 are at least partly overlapping and in many senses interrelated, in addition to the fact that the WDF1 and WDF2 substitute one another, the collaboration and information sharing parties of both foremen are presented simultaneously. Tables 25-27 thus present the main collaboration and information sharing parties of the Diamond Mill's Warehouse and Dispatch Foremen. The information presented in Tables 25-27 is based on discussions had with Diamond Mill's Warehouse and Dispatch Foreman 1 and 2 on 24.9.2013, 3.10.2013, 4.10.2013, and 15.10.2013.

The emphasis is again put on the internal collaboration and information sharing parties. However, as the nature of the duties of the WDF dictate that they need to be in contact with several external supply chain parties in order to make the internal supply chain to operate efficiently, also several external collaboration and information sharing parties are presented in Tables 26 & 27. However, in the remaining part of the research the concentration is kept on collaboration and information sharing occurring within the mill's internal supply chain from the production planning to the warehouse and dispatch operations.

Table 25 Collaboration and Information Sharing Parties of Diamond Mill's Warehouse and Dispatch Foremen – Other Foreman, Warehouse and Dispatch and Locomotive Garage Employees, Production Planners, & Senior Manager, Master Planning

Collaboration and Information Sharing Party	Occasion/Reason for Collaboration and Information Sharing	Activities	Means	Regularity	Formality
The Other Warehouse and Dispatch Foreman (1/2) (WDF)	All warehouse and dispatch related matters; substituting one another; sharing superior status	Various activities depending on the matter	Personal discussions	Regular, daily	Informal
Warehouse and Dispatch and Locomotive Garage Employees (WDEs, LGEs)	Guiding and committing the other persons to the joint actions/responsibilities/targets; developing the functionality of the processes and the skills of the employees	WDF: Discussing/handling all matters with the subordinates, setting guidelines, acting as a superior, organizing needed training for the subordinates	Personal discussions/E-mail/Call/ Marking on production diary log (depending on the matter)	Regular, continuous	Informal/formal (managerial duties)
Production Planners (PPs)	Various production run related matters (e.g. inquiring whether some order can be produced earlier to meet the needed dispatch date; inquiring the status of an order-to-be-dispatched that seems to be missing totally from the coming production runs; inquiring a production point/date of remaining tonnage of some unfinished order; inquiring availability of a new, suitable raw material reel to substitute another, missing raw material reel, to be rewinded to new specifications, etc.)	WDF: Contacting the PPs concerning the matter under scrutiny	Personal visit/Call/E-mail	Irregular, frequent	Informal
Senior Manager, Master Planning	Clarifying warehousing and dispatch process related matters in order to solve open/problematic matters with other external supply chain parties (e.g. investigating the own process in order to guarantee that e.g. some reels have been dispatched in proper condition; guaranteeing the obeying of minimum and maximum weight/dispatch limits on orders)	Senior manager: Contacting the WDF and asking for comments/clarification or giving instructions; WDF: providing the comments or forwarding the instructions to the subordinates	E-mail/Meeting	Irregular, occasional	Formal
	Checking current status of warehouse (tonnage, available actual/physical space for handling the reels and orders)	Senior manager: Contacting the WDF and inquiring the current status	E-mail/Meeting	Irregular, occasional	Formal

Table 26 Collaboration and Information Sharing Parties of Diamond Mill's Warehouse and Dispatch Foremen – Production Department Employees, Mill Technical Customer Service Personnel, Mill Purchase Department, & Various External Parties

Collaboration and Information Sharing Party	Occasion/Reason for Collaboration and Information Sharing	Activities	Means	Regularity	Formality
Production Department Employees (Superintendent (SD), Assistant Superintendent (AS), Shift Supervisors (SS))	Offering waste reels from the warehouse back to the production process Inquiring/rushing production timing of some order/reel-to-be-dispatched coming from the mill's rewinder	WDF: Contacting the SS concerning the matter; WDF & SS: Agreeing on bringing the waste reels back to production to be used as raw material WDF: Contacting the SS and informing of the needed production timing to match the planned dispatch date; asking for a change in the production order, if needed; WDF & SS: Agreeing on the matter	Call Call	Irregular, occasional Irregular, occasional	Informal Informal
Mill Technical Customer Service Personnel (TCS)	Borrowing manpower from one department to the other (warehouse <> production) Answering warehouse and dispatch related customer enquiries and quality complaints	WDF: Contacting the SI/AS and asking for help in lack of manpower (and vice versa) TCS: Contacting WDF for comments concerning e.g. some quality complaint; WDF: Investigating & analysing the matter, providing comments/explanations; TSC: Contacting the customer	Call E-mail (customer complaint/enquiry, quality reports; discussions on the matter; reply to the customer)	Irregular, occasional	Formal
Mill's Purchase Department (PD) Customer Service Center Representatives (external, CSCR)	Ordering protective materials needed in loading Various dispatch and transporting related matters (changes, mistakes in waybills, etc.)	WDF: Informing of the need of the protective materials; PD: Ordering the needed materials WDF/CSCR: Contacting the other party in any dispatch or transporting related matter demanding comments or actions from the other party	E-mail/Call E-mail/Call	Regular, monthly Irregular, frequent	Formal Formal/informal
Road Transporting Companies (external, RTCs)	Booking road transport vehicles	WDF: Asking for availability of trucks/booking trucks; RTCs: Offering available trucks, sending, agreed trucks to the mill	Call	Regular, daily	Informal
Railway Operator (external, RO)	Special needs/situations in railway deliveries (need of an additional train, cancellation of a departure, an unusually large consignment, etc.)	WDF: Contacting RO in order to agree on the matter	E-mail/Call	Irregular, occasional	Formal/informal
Short-Sea Container Supplier (external, SSCS)	Ordering needed short-sea containers	WDF: Informing the SSCS of the need of containers/booking the containers; up-dating the need information if needed; SSCS: delivering the booked containers	E-mail	Regular, daily	Formal/informal

Table 27 Collaboration and Information Sharing Parties of Diamond Mill’s Warehouse and Dispatch Foremen – Various External Parties

Collaboration and Information Sharing Party	Occasion/Reason for Collaboration and Information Sharing	Activities	Means	Regularity	Formality
Harbor Operators (external, HOs)	Informing of discrepancies in arrived and documented (waybill) reels	HOs: Contacting the WDF and informing of discrepancies	E-mail	Irregular, occasional	Formal
Pearl Logistics (external, PL)	Informing of coming loads to be sent to the harbors	WDF: Sending information of coming loads (trucks, wagons) to HOs	E-mail	Regular, daily (target)	Formal
	Various logistics, dispatch, and transporting related matters: new transporting concepts, invoicing matters, contract matters, transport damage matters, new instructions in product safety matters, training needs, need for extra storage space, permission for early deliveries to harbors etc.	WDF/PL: Contacting the other party in any logistics, dispatch, or transporting related matter demanding comments or actions from the other party	E-mail/Call/Meeting	Irregular, occasional	Formal/informal
External Maintenance Organization (external, EMO)	Maintaining forklifts and the warehouse facility	WDF: Informing EMO of the needed maintenance actions; EMO: Executing the agreed maintenance actions	Call/E-mail; a marking of the maintenance need in ERP	Irregular, occasional	Formal

## **5 DIAMOND MILL, PM3 – DURING TRANSITION (2014-2015)**

Pearl Group announced in June 2013 to conduct a feasibility study which target is to evaluate the potential and possibilities of converting the Diamond PM3 from fine paper production to produce virgin-fiber-based carton board, more specifically brown and white top kraftliners. The motivation behind the commencement of the feasibility study was the continually decreasing global market demand for paper and simultaneously increasing global demand for carton board. (Pearl Group Website, 2013.)

The actual, positive investment decision was received in April 2014. Based on the findings of the feasibility study, Pearl Group decided to invest EUR 110 million into converting the Diamond PM3 to produce carton board. As stated in Pearl Group's press release: "Renewable-fibre-based packaging has good growth potential in Europe and globally, and [Pearl Group] sees an opportunity to benefit from that growth by investing in competitive kraftliner capacity at [Diamond Mill Integrate]. Through the machine conversion, [Pearl Group] is taking advantage of the combination of two market forces: the decreasing global market for paper but increasing global market for renewable packaging board." (Pearl Group Website, 2014.)

The actual machine conversion actions were announced to be executed in the autumn of 2015 and the production of carton board was/is expected to start during the last quarter of 2015. The fine paper products will be produced until the end of August, after which the fine paper orders will be produced and delivered by the Diamond Mill's two sister mills, Sapphire in Finland and Ruby in Sweden. (Ibid.)

The investment decision gave a new direction for the mill. A converting project, responsible for the preparation and actual conversion of the paper machine, was established at the mill; some mill employees moved to work for the project and new know-how and personnel were recruited, as needed. Eyes were turned to the future, whereas it was also emphasized that all daily operations were to be executed as usual, until the actual ceasing of the fine paper production.

Chapter 4 has described the operations at the mill during 2013-2014. The current chapter, on the other hand, concentrates on discussing the changes happened during 2014-2015 compared to the situation of 2013-2014. In addition, the current chapter also presents the results of an internal integration survey executed at the mill in May 2015, in addition to results of consequent specifying interviews

executed at the mill in September-October 2015. Chapter 6, on the other hand, aims at describing the future operating environment of the mill, while starting and executing the carton board production.

## **5.1 Changes Happened in Diamond Mill's Internal Supply Chain during 2014-2015**

The operational changes happened in the mill's internal supply chain from production planning to warehousing and dispatch operations during 2014-2015 were researched by going through the earlier written description of the mill (2013-2014, see Chapter 4) together with the representatives of each department. The investigation proved that the occurred changes were minor and that more extensive changes were only about to come in the near future, when changing the mode of production and consequently position in the Pearl Group.

The *production planning operations* are currently (spring 2015) mainly executed as earlier (see Section 4.2.). The MOP team works under the supervision of the Senior Manager, Master Planning and fulfils the mill's production planning duties using the same systems as earlier. Due to the investment decision, the order swapping operations between Diamond and Ruby and Sapphire Mills have, however, increased. In the past orders could only be swapped between Diamond and Sapphire Mills. However, as in the future all office paper orders will be delivered from either Ruby or Sapphire, the swapping has also started with the Ruby Mill. The production of some products has also already been permanently and completely moved from Diamond to the two sister mills. (Senior Manager, Master Planning & Production Planner, 29.4.2015.)

The mill has also adopted new procedures with so called sidetrack orders (see Section 4.2.2.2). The mill has harmonized the widths of the un-nominated sidetrack orders brought to the stock. The target of the harmonization has been to find such widths that could be best utilized in the future, either by rewinding the reels to widths required by the customers or selling them forward as such. The mill has also made a decision that very small sidetrack orders will be directly reused as raw material in the mill's production; they will not be brought to the stock. The target of such operation is to minimize the amount of redundant stock standing both physically in the warehouse and in stock bookkeeping. All in all, currently (spring/summer 2015) the mill aims at clearing its warehouse as effectively as possible; the old fine paper reels cannot be used as raw material in the new carton board production and, on the hand, have expiry/obsolescence dates. (Ibid.)

Otherwise the production planning operations are executed as during years 2013-2014. The information sharing and collaboration parties, occasions, and

means also remain the same (see Section 4.2.4). One, current information sharing challenge was, however, brought up by the Production Planner: Necessary information of production breaks (reason, length) is not proactively received from the production; information of the occasions must be actively enquired. (Ibid.)

The changes occurred in the mill's *production operations*, compared to the description written in year 2013, are also sporadic. One change that has happened irrespective of the investment decision is the change of shift schedule of the paper machine operators. As they in year 2013 worked in a so called long shift (four mornings + one rest day, four evenings + one rest day, four nights + six rest days), in February 2014 they moved to work in 12 –hour shifts (two days, two nights + six rest days). The Shift Supervisors were already working in the 12 -hour shifts in year 2013. Thus currently all production operation employees (excluding the upper level white collars) work in 12 –hour shift schedule. This has cleared the operations, as currently all paper machine operators clearly only have one Shift Supervisor as their superior. (Production Manager, 29.4.2015.)

Another change, brought by the investment decision, is that the Assistant Superintendent has temporarily moved to the project organization and his normal duties are consequently divided between the Superintendent and Shift Supervisors. However, if the project allows, the Assistant Superintendent also tries to be involved in the operations of the paper machine as much as possible. Due to the Assistant Superintendent's project duties, the role of the Shift Supervisors has increased. The Shift Supervisors are currently in charge of managing all daily duties, responsibilities, and collaboration and information sharing towards, for example, production planning and warehouse and dispatch operations. The Shift Supervisors also need to be able to manage and fix special cases occurring in the production process individually with the help of their subordinates, due to the Assistant Superintendent's absence. (Ibid.)

In addition, due to the investment decision and coming process change, the research and development actions of the fine paper grades have also been suspended. The mill aims at running good, acceptable quality paper for the customers until the ceasing of the fine paper production. No new experiments or development actions will be initiated and executed. (Ibid.)

Otherwise the production operations are executed as described in Section 4.3. The information sharing and collaboration parties and occasions also remain the same, apart from the increasing role of the Shift Supervisors caused due to the Assistant Superintendent's temporary position in the project organization (see above).

The *warehouse and dispatch operations* are also currently mainly executed as during year 2013. As was the case with the paper machine operators, the warehouse and dispatch employees also moved to the 12 –hour shift schedule. For the warehouse and dispatch employees the change, however, happened later, in De-

ember 2014. The usage of the same shift schedule in production and warehouse supports the possibility of moving resources/employees from one department to another, if needed. In addition to the duties of their own department, the warehouse and dispatch employees are also trained to assist in duties at the paper machine. The movement of manpower, however, is not executed daily between the departments, but only during special occasions. (Transport Manager, 12.5.2015; Production Manager, 17.6.2015.)

The division and division target of truck and rail transports has also changed from year 2013. The mill would still prefer truck transports in its domestic and foreign deliveries. However, due to the lack of utilizable trucks, more deliveries have been forced to be moved to rail/ship deliveries. The lack of foreign trucks, for example, has been caused due to the overall economic situation. As the Finnish imports have decreased, also the amount of usable export trucks/return loads has decreased. The same story applies to export containers. The lack of containers, however, does not affect the mill's actual loading operations that notably. What it, however, does affect, is the amount of goods standing in the stock. The longer the shipments are delayed due to the lack of containers, the longer the finished reels will stand in and burden the warehouse. Currently the mill aims at delivering 60 % with trucks and 40 % by rail (in 2013 target was 70/30). (Senior Manager, Master Planning & Production Planner, 29.4.2015; Transport Manager, 12.5.2015.)

A third change that has happened in the warehouse and dispatch operations is the increased emphasis put on safety matters. The Warehouse and Dispatch Foreman 1 discusses regularly with his subordinates concerning safety matters and performs a safety check of the whole warehouse facility once a month. The target of the safety check is to guarantee that all places are clean and that no visible risks can be identified. The overall purpose of the safety measures is to make the warehouse as safe as possible for both the employees and the finished products. (Transport Manager, 12.5.2015.)

Otherwise the warehouse and dispatch operations are executed as described in Section 4.4.

## **5.2 Diamond Mill's Manufacturing Execution System Renewal Project**

Following the positive investment decision, Diamond Mill's production system was decided to be renewed as part of the converting project. The new manufacturing execution system (MES) will replace the old manufacturing system Alpha totally; fine paper production will still be managed in the old system until the end, whereas the new carton board production will begin with the new system,

currently (spring 2015) still under development. The new MES is currently in testing phase, and should be in operation before the commencement of carton board production. (Production Manager, 4.5.2015.)

Representatives from different departments (production, production planning, warehouse) have been involved in planning the contents and operability of the MES. The target has been to construct the system with an ideology of “one common mill for all”. The screens of the system, for example, have been tried to be planned in a manner in which the different users of the system would see how their own actions in some part of the process affect the others. For example, the screens used by the production planners will also show production, raw material, and warehousing data and/or diagrams. As the production planners make some action, they will immediately see the results/consequences of their action on other parts of the process in real-time (for example, sufficiency of pulp used as raw material); the screens update constantly. The ideology behind the system is also that all needed information for different parties – also from linked departments – should be readily available, without a need for massive search within the system. The same ideology is planned to be adopted in other systems used at the mill as well. The role of the MES is to support the achievement of common, mill-wide goals. (Ibid.)

### **5.3 Diamond Mill’s Internal Integration in Spring 2015 – Survey Results**

In order to explore the current status of the internal integration of the Diamond Mill’s production planning, production, and warehousing and dispatch operations, a www-survey amongst the employees of the respective departments was conducted in May 2015. The survey design and process are explained in detail in Chapter 3.

The survey included 50 statements discussing the formal and informal information sharing and collaboration activities occurring/executed between the different departments, and related coordination activities. The target of the survey was not to make generalizations, but to receive opinions of the different departments and organization levels.

The overall response rate, with 25 incoming responses, was 75.8 %. Out of the white-collars, 16 out of 17 answered the survey, representing a response rate of 94.1 %. In the blue-collars, on the other hand, the respective figures were 9 out of 16, forming a response rate of 56.3 %. One white-collar response remained lacking from the production department, whereas 6 out of 10 (60 %) responses were received from the production blue-collars and three out of 6 (50 %) from the warehousing and dispatch blue-collars.

The blue-collar responses received represented three out of five production shifts and two out of five warehousing and dispatch shifts. The representatives of two production shifts and three warehousing and dispatch shift thus could not be reached through the survey. It should, however, be noted that the responses received represent the opinions of the responding individual, not the whole shift.

The results of the survey are presented below, categorized by survey themes and respondent groups. The actual survey questionnaire can be found in Appendix 6 (in English) and Appendix 7 (in Finnish). The findings of the survey are presented in a manner guaranteeing the anonymity of the respondents, though bringing forward the homologous and/or differing opinions received from different departments, organization levels, and/or individuals. Due to clarity, two upper level white-collar were moved from the “overall management” category, chosen by themselves, to the most representative department, matching with their duties and responsibility areas.

### 5.3.1 Formal and Informal Information Sharing (FIIS) – Overall Status of Information Sharing between the Different Departments

The overall information sharing occurring between the different departments divided the opinions of both respondent groups. As can be seen in Table 28, all four statements showed dispersion of opinions (see Appendices 6 and 7 for whole survey questionnaire).

Table 28 Overall Status of Information Sharing – Responses Received

Statement	Respondent group	Fully disagree	Somewhat disagree	Do not agree or disagree	Somewhat agree	Fully agree	Can not state my mind	n, answers received
1 <i>Mill's production planning, production, and warehousing and dispatch departments share their internal information, relevant to the other departments, with one another</i>	White-collar	0	2	1	9	3	0	15
	Blue-collar	1	4	1	3	0	0	9
2 <i>The different departments keep information which is relevant to the other departments consciously to themselves</i>	White-collar	5	4	1	4	0	1	15
	Blue-collar	2	1	4	0	0	1	8
3 <i>The interdepartmental information sharing is effective, information is shared regularly</i>	White-collar	0	5	3	5	1	1	15
	Blue-collar	2	4	2	0	0	0	8
4 <i>The interdepartmental information sharing is adequate in order to manage the mill's operations productively</i>	White-collar	0	4	3	7	1	0	15
	Blue-collar	1	5	2	1	0	0	9

Most of the white-collar responses received to **Statement 1 (S1)** “*Mill's production planning, production, and warehousing and dispatch departments share*

*their internal information, relevant to the other departments, with one another*”, were positive, agreeing somewhat or fully with the statement (12 responses out of 15). However, also two disagreeing opinions were received. One respondent from production planning and one respondent from production operations stated to somewhat disagree with the statement.

The responses received from the blue-collar respondents, on the other hand, were more negative. Five of nine respondents informed to either fully (1) or somewhat (4) disagree with the statement. The most negative response was received from the production department. In addition, all warehouse blue-collar (3) and one production operations blue-collar stated to have a somewhat disagreeing opinion. However, three production operations blue-collar employees, on the other hand, stated to somewhat agree that relevant information is indeed shared between the departments.

Similar opinions were also visible in **Statement 2** (S2), enquiring whether *the different departments keep information which is relevant to the other departments consciously to themselves*. Again, most of the white-collar (9 out of 15) had an opinion that the relevant information is not consciously “concealed” (answering either fully or somewhat disagree). However, four respondents, on the other hand, stated to somewhat agree with the statement. The somewhat agreeing opinions were received from the production (3) and warehousing and dispatch (1) operations.

The opinions received from the blue-collar to S2, on the other hand, were this time more positive. Three respondents informed to either fully (2) or somewhat (1) agree with the statement; all positive statements were received from the production department. No respondent informed to believe that information is consciously “concealed”; five answers were neutral. Thus although part of the blue-collar respondents have an opinion that the information is not shared between the departments (S1), they still do not believe that the information is purposefully kept from the other parties (S2).

The white-collar responses received to **Statement 3** (S3) “*The interdepartmental information sharing is effective, information is shared regularly*” showed again differing opinions. Six respondents informed to either totally agree (1) or somewhat agree (5) with the statement. However, five respondents also informed to somewhat disagree with the sentence. The negative responses were received from the production and warehousing and dispatch departments.

No positive answers, on the other hand, were received from the blue-collar respondents. Six respondents informed to either fully disagree (2) or somewhat disagree (4) with the statement 3. Two respondents had a neutral stand. The opinions of the effectiveness and regularity of the information sharing were negative in both departments.

The answers received to **Statement 4** (S4) “*The interdepartmental information sharing is adequate in order to manage the mill’s operations productively*” finalize the overview of the mill’s overall information sharing occurring between the different departments: It divides the opinions of the different employees. Eight (8 of 15) of the white-collar respondents informed to either fully agree (1, production planning) or somewhat agree (7, all departments) with the statement. Four responses, however, stated to somewhat disagree with the sentence. The somewhat negative responses were received from production planning (1) and production (3) departments. Three respondents had a neutral opinion.

The blue-collar employees, on the other hand, had again more negative opinions. Six respondents (6 out of 9) informed to either totally disagree (1, production) or somewhat disagree (5; 3 production, 2 warehousing and dispatch) with the statement. They thus see that the information sharing activities are inadequate in order to manage the operations productively. On the other hand, one respondent (production), however, informed to somewhat agree with the statement; he/she thus believes the information sharing activities to be more adequate.

To **summarize**, as mentioned above, the status, efficiency, and adequacy of overall information sharing occurring between the different departments shared the opinions of both respondent groups. The answers of the white-collar respondents showed more dispersion from side to side – from positive to negative –, whereas the blue-collar respondents seemed to have to some extent more negative opinion of the overall information sharing. However, it should still be kept in mind that also positive opinions were visible in the blue-collar responses. No blue-collar respondent also seemed to believe in conscious “concealing” of information, whereas some suspicious opinions were given by the white-collar respondents.

The answers received from upper and lower level white-collar to different questions were quite similar; the two levels are not specifically discussed above due to anonymity requirements. On the other hand, comparing the different departments, in the white-collar group some more negative responses seemed to come from representatives of production and warehousing and dispatch departments. The answers received from the two blue-collar departments, on the other hand, seemed to be quite even; representatives of neither department seemed to have distinctively more positive or negative stands.

### 5.3.2 FIIS – Form and Regularity of Information Sharing in Work Duties

Statements 5-7 enquired the regularity of formal and informal information sharing organized/occurring between the different departments. The answers received are presented in Table 29.

Table 29 Form and Regularity of Information Sharing – Responses Received

Statement	Respondent group	Daily	Weekly	Once or twice per month	More sparsely	Never	Can not state my mind	n, answers received
5 <i>How often do you attend <u>organized meetings</u> in which the matters of at least two or all three concerned departments are jointly discussed</i>	White-collar	0	3	3	8	2	0	16
	Blue-collar	0	1	3	3	2	0	9
6 <i>How often do you have <u>formal discussions</u> with the representatives of the concerned departments in which you handle matters of at least two or all three departments (e.g. personal discussions, consultations, e-mails)</i>	White-collar	1	4	4	7	0	0	16
	Blue-collar	0	0	1	5	3	0	9
7 <i>How often do you have <u>informal discussions</u> with the representatives of the concerned departments in which you handle matters of at least two or all three departments</i>	White-collar	3	5	6	2	0	0	16
	Blue-collar	0	0	3	4	2	0	9

The white-collar answers received to **Statement 5** (S5) “*How often do you attend organized meetings in which the matters of at least two or all three concerned departments are jointly discussed?*” show that joint meetings are attended relatively rarely. 13 respondents out of 16 informed to attend such meetings once or twice per month, or more sparsely. Two production department respondents informed to never attend such meetings. Only three respondents answered to attend such meetings weekly (1 production planning, 2 production). No-one was attending the joint meetings daily.

The answers received from the blue-collar respondents show a similar trend. Eight out of nine respondents informed to attend such meetings once or twice per month or more sparsely. Two respondents answered to never attend such a meeting (1 production, 1 warehousing and dispatch) whereas one production department employee, on the other hand, informed to attend such a joint meeting weekly.

**Statement 6** (S6), on the other hand, enquired the regularity of formal discussions executed between the members of different departments, “*How often do you have formal discussions with the representatives of the concerned departments in which you handle matters of at least two or all three departments (e.g. personal discussions, consultations, e-mails)?*” With the white-collars, formal discussions were executed more often than the formal meetings were attended (S5); however, formal discussions were still held relative rarely. 11 out of 16 respondents informed to have such discussions once or twice per month (4) or more sparsely (7). Five respondents answered to have such discussions daily (1 production planning) or weekly (4; 2 production, 2 warehousing and dispatch).

The blue-collar, on the other hand, answered to have such discussions very rarely. Only one respondent informed to have such formal discussions once or twice per month (production), the rest more rarely (5) or never (3).

The white-collar, on the other hand, informed to have much more informal discussions with one another. The white-collar responses received to **Statement 7 (S7)** “*How often do you have informal discussions with the representatives of the concerned departments in which you handle matters of at least two or all three departments*” entailed three “daily” answers (1 production planning, 1 production, 1 warehouse and dispatch) and five “weekly” answers. The rest (8) informed to have such discussions once or twice per month or more rarely.

The regularity of informal interdepartmental discussion, however, seems to be much rarer amongst the blue-collar respondents. All respondents answered to have such informal discussion once or twice per month (3), more sparsely (4), or never (2).

To **summarize**, all in all, organized joint meetings are attended relatively rarely within both respondent groups. The white-collar responses received, on the other hand, showed that they have more interdepartmental formal discussions than the blue-collar respondents. The biggest difference between the two groups, however, is visible in the regularity of informal discussions had. The white-collar seem to have much more informal, interdepartmental discussions than the blue-collar employees.

### **5.3.3 FIIS – Information Sharing Climate, Approachability and Usability of Other Members of the Organization**

In order to guarantee to clarity, the different items within the theme are presented in separate sub-sections.

#### **5.3.3.1 Information Sharing Climate**

Statements 8 & 9 enquired the overall information sharing climate at the mill. The responses received are presented in Table 30

The white-collar answers received to **Statement 8 (S8)**, “*The mill’s climate is open towards information sharing executed between the concerned departments*” were mainly positive; however, some dispersion was also visible. 12 out of 16 respondents informed to either partly agree (5) or fully agree (7) with the statement. Four respondents, however, somewhat disagreed (1, production), were neutral (2, production), or could not state their mind (1, production planning).

Table 30 Information Sharing Climate – Responses Received

Statement	Respondent group	Fully disagree	Somewhat disagree	Do not agree or disagree	Somewhat agree	Fully agree	Can not state my mind	n, answers received
8 <i>The mill's climate is open towards information sharing executed between the concerned departments</i>	White-collar	0	1	2	5	7	1	16
	Blue-collar	0	4	2	1	2	0	9
9 <i>The mill's climate encourages information sharing between the concerned departments</i>	White-collar	0	0	7	3	5	1	16
	Blue-collar	0	3	3	1	2	0	9

The white-collar answers received to **Statement 9 (S9)**, “*The mill’s climate encourages information sharing between the concerned departments*”, on the other hand, were somewhat similar. Half of the respondents either somewhat (3) or fully agreed (5) with the statement, whereas seven respondents stated neither agree or disagree with the statement. One respondent could not state his/her opinion.

The answers received from the blue-collar respondents to **S8 & S9**, on the other hand, were more dispersed. Four of the blue-collar respondents (3 production, 1 warehouse & dispatch) stated to somewhat disagree that the mill’s climate would be open for information sharing. Three respondents, on the other hand, informed to somewhat (1, production) or fully agree with the statement (2; 1 production, 1 warehouse and dispatch). The same dispersion was visible in S9, in which three blue-collar respondents (production) stated to partly disagree that the mill’s climate would encourage information sharing and three to somewhat (1, production) or fully agree (2; 1 production, 1 warehouse and distribution). Reviewing the blue-collar answers received, it thus seems that some blue-collar employees have quite negative stand towards the mill’s information sharing climate, whereas some have very positive. The situation is the same within both departments.

### 5.3.3.2 Approachability of Other Members of the Organization

Discussing the approachability of different people within the mill, the responses received from both white-collar and blue-collar respondents are presented in Table 31.

Table 31 Approachability of Other Members of the Organization – Responses Received

Statement	Respondent group	Fully disagree	Somewhat disagree	Do not agree or disagree	Somewhat agree	Fully agree	Can not state my mind	<i>n</i> , answers received
10 <i>The mill's employees are easy to approach despite their department or organizational status (generally, including top management)</i>	White-collar	0	0	0	8	8	0	16
	Blue-collar	0	1	1	3	3	0	8
11 <i>The mill's director and manager level is easy to approach (generally)</i>	White-collar	0	0	0	7	9	0	16
	Blue-collar	0	1	1	4	3	0	9
12 <i>I feel comfortable contacting the representatives of the other concerned departments when the need arises</i>	White-collar	0	0	0	4	12	0	16
	Blue-collar	0	2	1	3	3	0	9

The answers received from the white-collar respondents were very positive to all of the three **statements, S10-S12**. All of the respondents (16) either somewhat or fully agreed that “*the mill's employees are easy to approach despite their department or organizational status (generally, including top management)*” (S10), “*the mill's director and manager level is easy to approach (generally)*” (S11), and that they “*feel comfortable contacting the representatives of the other concerned departments when the need arises*” (S12). The most positive answers were received to S12, where three quarters (12 out of 16) of the respondents stated to fully agree with the statement.

The answers received from the blue-collar respondents to statements S10-S12 were also mainly quite positive; however, also disagreeing opinions were given. Approximately two thirds of the respondents somewhat or fully agreed with all three statements. Single respondents, however, somewhat disagreed with each statement (all disagreeing statements from the production department).

### 5.3.3.3 Usability of Other Members of the Organization

The final statement within the theme, **Statement 13** (S13), “*If needed, it is easy for me to get time of the representatives of the other concerned departments, to go through joint issues*”, divided the opinions of both respondent groups. The responses received are presented in Table 32.

Table 32 Usability of Other Members of the Organization – Responses Received

Statement	Respondent group	Fully disagree	Somewhat disagree	Do not agree or disagree	Somewhat agree	Fully agree	Can not state my mind	n, answers received
13 <i>If needed, it is easy for me to get time of the representatives of the other concerned departments, to go through joint issues</i>	White-collar	0	2	1	8	4	1	16
	Blue-collar	0	4	1	3	0	1	9

12 out of 16 of the white-collar respondents answered to either somewhat (8) or fully agree (4, all upper level white-collars) with the statement. However, two partly disagreeing opinions were also given (production). On the other hand, the answers given by the blue-collars were somewhat more negative, or at least more “average”; no answers were given to either ends of the scale. Four blue-collars stated to somewhat disagree (2 production, 2 warehouse and dispatch) and three to somewhat agree (2 production, 1 warehouse and dispatch) with the statement.

#### 5.3.3.4 Summary of Responses Received

To **summarize** the findings presented in Sections 5.3.3.1-5.3.3.3 , the white-collar respondents seem to believe that the mill’s climate is more open and encouraging to information sharing than the blue-collars. Deviant answers were, however, given in both respondent groups. Moreover, in the opinion of the white collars, all mill employees are easy to approach despite their department or organizational status. Most of the blue-collars agreed with the white-collars, however, also some disagreeing opinions were given.

The possibility of getting other persons’ time to go through joint issues divided the opinions in both groups. Both positive and negative opinions were presented. Most positive opinions were received from the upper-level white collars.

Reviewing the answers received from both respondent groups, it seems that some more disagreeing answers were received from the representatives of the production department.

### 5.3.4 Collaboration – Membership in Formal and Informal Cross-Departmental Teams, Purpose of Teamwork

Moving on from information sharing to collaboration, the Statements 14 & 15 enquired whether the respondents belong to some formal or informal cross-departmental team(s). The responses received are presented in Table 33.

Table 33 Membership in Cross-Departmental Team(s) – Responses Received

Statement	Respondent group	Yes	No	Can not state my mind	n, answers received
14 <i>Do you belong/are you named to some cross-departmental team which has representatives from production planning, production, and/or warehousing and dispatch (for example, development team of the new manufacturing execution system)?</i>	White-collar	5	11	0	16
	Blue-collar	4	5	0	9
15 <i>Do you work voluntarily in some informal, cross-departmental team that has representatives from production planning, production, and/or warehousing and dispatch?</i>	White-collar	1	15	0	16
	Blue-collar	1	8	0	9

Approximately one third, five out of 16, white-collars answered positively to **Statement 14** (S14), “*Do you belong/are you named to some cross-departmental team which has representatives from production planning, production, and/or warehousing and dispatch (for example, development team of the new manufacturing execution system)?*” The positive answers were received from all departments, one from production planning, two from production, and two from warehousing and dispatch. The teams the respondents mentioned to belong to, included the development team of the new MES (mentioned three times, gathering according to an earlier designed plan and when needed), common safety meeting (gathering once per month), management team safety meeting, and production department daily morning meeting (respondent attending once per week).

The blue-collar answers received to S14, on the other hand, had four positive and five negative answers. Two positive answers were received from both departments; all respondents informed to belong to the development team of the new MES, gathering approximately two or three times per month.

On the other hand, the positive answers received from both respondent groups to **Statement 15** (S15) “*Do you work voluntarily in some informal, cross-departmental team that has representatives from production planning, produc-*

tion, and/or warehousing and dispatch?” were very rare. Only one white-collar (production) and one blue-collar (production) respondent informed to work in such a team. However, the white-collar respondent did not specify the actual team and the blue-collar respondent informed to attend the management team safety meeting once a month. The management team safety meeting, however, can be categorized to rather represent a formal than an informal team and as such belongs under the formal teams discussed in Statement 14.

All in all, mill employees do not seem to form voluntary, informal work-teams exceeding departmental borders. Informal, cross-departmental teams can thus be regarded to be virtually nonexistent. However, it should still be noted that people may indeed work informally cross-departmentally together, but do not regard to work in actual informal teams.

Statements 16-19 enquired the respondents’ opinion on the purpose and target of teamwork. The answers received are presented in Table 34.

Table 34 Purpose and Target of Teamwork – Responses Received

Statement	Respondent group	Fully disagree	Somewhat disagree	Do not agree or disagree	Somewhat agree	Fully agree	Can not state my mind	n, answers received
16 <i>Teamwork is used to solve operative situations and/or problems</i>	White-collar	0	0	3	8	5	0	16
	Blue-collar	0	1	0	5	3	0	9
17 <i>Teamwork is used to solve operational problems proactively</i>	White-collar	0	2	1	6	6	0	15
	Blue-collar	0	1	0	3	4	0	8
18 <i>Teamwork is used to find common means to improve cost effectiveness</i>	White-collar	0	1	2	7	6	0	16
	Blue-collar	0	1	1	3	4	0	9
19 <i>Teamwork is used for some other purpose</i>	White-collar	0	1	4	4	2	5	16
	Blue-collar	0	0	0	2	3	4	9

Most of the white-collar respondents either somewhat (8 out of 16) or fully agreed (5) with **Statement 16** (S16), “*Teamwork is used to solve operative situations and/or problems*”. No white-collar disagreed, though two production and one warehousing and dispatch respondents did not agree or disagree. The answers received to **Statements 17** (S17) “*Teamwork is used to solve operational problems proactively*” and **18** (S18) “*Teamwork is used to find common means to improve cost effectiveness*”, however, showed more dispersion. Although most of the white-collar respondents still somewhat or fully agreed with both of the statements (12 out of 15 with S17 and 13 out of 16 with S18), also somewhat disagreeing opinions were presented. Two respondents somewhat disagreed that teamwork would be used to solve operative problems proactively and one respondent that teamwork would be used to improve cost effectiveness. All disagreeing opinions were received from the representatives of warehousing and dis-

patch department. In addition, three “do not agree or disagree” answers were received from the production department (S17: 1; S18: 2)

The answers received from the blue-collar respondents to S16-18 were quite similar with the answers of the white-collar. Again, most of the respondents either somewhat or fully agreed with all of the statements, whereas one disagreeing opinion was also received for each. As was the case with the white-collar, all of the disagreeing opinions were received from the warehousing and dispatch department.

**Statement 19** (S19), finally, enquired the respondents’ opinions whether the “*teamwork is used for some other purpose*” and if yes, for what. The statement dispersed the opinions of both respondent groups, as can be seen in Table 34. Those white-collar respondents, who regarded teamwork to be used for some other purpose, mentioned such targets as (translated from Finnish):

- improving the teams’ and whole personnel’s effectiveness and interaction (received from production department),
- levelling workload, preventing burnout, improving work satisfaction, improving product quality through increased knowledge (production),
- maximizing the speed of customer service, improving work methods, harmonizing work methods (production planning), and
- reaching balanced workload between different employees (production).

In addition, one production department blue-collar also stated teamwork to be used for improving safety and work wellbeing, and adopting new ideas and modes of operating.

To **summarize** the answers received to S14-S19, approximately one third of the white-collar and half of the blue-collar respondents informed to work in formal cross-departmental team(s). The amount of the white-collar working in named cross-departmental teams seems relatively low, whereas the amount of blue-collar relatively high. Many positively answered white-collar and all positively answered blue-collar were taking part in the development project of the mill’s new manufacturing execution system. On the other hand, the mill’s daily production department morning meeting, for example, was mentioned to be attended by only one of the respondents. Thus, either the meeting is in fact not cross-departmentally attended or though it represents a form of a formal cross-departmental meeting, it is not regarded as such.

On the other hand, informal, cross-departmental teams are nonexistent at the mill. Either informal teams are not formed, or people do not regard them as such although are working across departmental borders.

Most of both white-collar and blue-collar respondents agreed that teamwork is used to solve operational situations and problems both re- and proactively and to find means to improve cost effectiveness. However, also disagreeing opinions

were presented. The negative opinions in both respondent groups were received from the representatives of warehousing and dispatch departments.

In addition, examples of other targets of teamwork were also received. The respondents mentioned teamwork to be used, for example, to balance workload and improve work satisfaction and wellbeing, adopt new and harmonize old working methods, and to fasten customer service.

### 5.3.5 *Collaboration – Overall Supply Chain Understanding, Cross-Departmental Consideration and Consultation, Synchronizing of Activities, Common Vision and Goals*

Due to clarity, the separate items within the theme are presented in separate subsections.

#### 5.3.5.1 *Overall Supply Chain Understanding*

The purpose of Statements 20-22 was to enquire the respondents' overall supply chain knowledge and understanding. Statements 32-38, on the other hand, were asked to find explaining factors for the answers received and to enquire the respondents' interest in job rotation and extra supply chain related training and/or education. Due to technical reasons, the Statements 32-38 had to be presented on a separate page than the Statements 20-22 in the www-survey. Therefore the numbering of the statements does not proceed logically.

The responses received to **Statement 20** (S20) "*I understand what supply chain management means as a general term*", are presented in Table 35.

Table 35 Overall Supply Chain Understanding – Responses Received

Statement	Respondent group	Fully disagree	Somewhat disagree	Do not agree or disagree	Somewhat agree	Fully agree	Can not state my mind	<i>n</i> , answers received
20 <i>I understand what supply chain management means as a general term</i>	White-collar	0	1	0	4	11	0	16
	Blue-collar	0	1	0	4	2	2	9

Almost all of the white-collar respondents either somewhat (4 out of 16) or fully agreed (11) with the statement. The white-collar respondents thus generally had the opinion that the overall ideology of supply chain management is familiar to them. Only one production department white-collar informed to somewhat disagree with the statement; he/she thus believed that his/her knowledge is lacking.

Some more hesitating answers were received from the blue-collar respondents. Again, four respondents out of 9 informed to somewhat agree (all from production) and two to fully agree (1 production, 1 warehousing and dispatch) with the statement. They thus believed to somewhat or fully understand the general meaning of supply chain management. Three respondents, however, informed to either somewhat disagree (1, production) with the statement or could not state their mind (2, warehousing and dispatch). The “cannot state my mind” answers can be interpreted to signal that the knowledge of those respondents is lacking. Thus 2/3 of the blue-collar respondents believed to understand the basic ideology of supply chain management, whereas 1/3 believed to have gaps in their knowledge.

The respondents were also asked to define the term supply chain management. The respondents’ answers received to a specifying question “*What does supply chain management mean to you?*” are presented in Table 36 (translated from Finnish). Five white-collars (1 production planning, 3 production, 1 warehousing and dispatch) and six blue-collars (3 production, 3 warehousing and dispatch) did not provide their definitions. All blue-collar definitions are thus given by the production department employees.

Reviewing the definitions given, some seem to be narrower and seem to concentrate – or at least articulate accordingly – on some part of supply chain management, for example, production and/or outbound logistics. Some definitions, on the other hand, seem to have a broader view and articulate to entail several components of supply chain management. However, it is difficult to interpret the scope of the definitions definitely; the respondents may, for example, have a wider “background” view of the topic than they actually articulate – or alternatively may not. For example, a person defining supply chain management to mean “right time deliveries to customers” may either truly concentrate on the outbound side of logistics or may alternatively think in the background that the product first has to be produced out of purchased raw materials according to the needs of the customer and according to the plans made by the production planners, and only after that has to be delivered to the customer in the right condition and manner, at the right time.

Despite the supposedly varying scope and contents, all of the definitions, however, entail “right” supply chain elements. Such supply chain related issues are several times mentioned as (using varying wordings): customer centricity and satisfaction, cost effectiveness, right timing, delivery reliability, producing right/promised quality, flawless products, sharing information, and working together towards a common goal. On the other hand, the mill-external partners (for example, transporting companies) needed in the supply chain process, were only once specifically mentioned (white-collar respondent). In addition, only one definition clearly discussed the supply/inbound logistics side of supply chain management (blue-collar respondent).

Table 36 Respondents' Definitions of Supply Chain Management – Responses Received

Respondent Group	Department	Definition
White-collar	Production planning	We make sure that the products are produced on time, not too early, not too late.
White-collar	Production planning	The supply chain is as strong as its weakest link. Delivering a good quality product to the right customer at the right time and cost effectively. All members of the chain should have a clear picture why we do what we do, do their best at their own work, and respect the work efforts of the others. Preventing possible problems proactively together, or at least minimizing the damages - in this proactive information sharing is in an important role.
White-collar	Production planning	Customer receives the ordered product in a right place at the right time.
White-collar	Production planning	The different parties have a joint target to make the customer deliveries at the right time cost effectively and with high quality.
White-collar	Production	Understanding how the whole production chain affects the effectiveness of the operations (safety, total costs, quality, customer satisfaction)
White-collar	Production	Order comes, is produced, and goes to the customer cost effectively and without problems.
White-collar	Production	Recognizing efficiency, cost, time-schedule, deficit, safety, environment, etc. criteria.
White-collar	Production	We produce Stora Enso's best uncoated finepaper with the production plans received from the production planners, and which is joyfully loaded to trucks and wagons by the warehousing and dispatch employees. Our part is to make sure that the right amount of paper really gets produced and that the quality is as promised.
White-collar	Warehousing and dispatch	Delivering the ordered product to the customer without faults, at the right time, to the right address, with as low costs as possible.
White-collar	Warehousing and dispatch	Timely deliveries cost effectively.
White-collar	Overall management	Matching the targets and needs of the customers and mills in a manner in which the customer receives the wanted product or service at an agreed time while reaching the mills' cost effectiveness and operational targets. Reaching customer and mill targets with the help of third party delivery partners.
Blue-collar	Production	The chain works as flexibly and openly as possible to make it easier for all to work.
Blue-collar	Production	Knowledge of orders coming to production and leaving the mill and of, for example, availability of subcomponents needed in production. With this knowledge I can best lead both my own work and the work of my team to produce a good quality, cost effective product that satisfies the needs of the customer.
Blue-collar	Production	All parts of the chain from the mill to the customer work without problems.

The answers received to Statements 21-22 enquiring the respondents' understanding of the role of their own department and the roles of the other, concerned departments as a part of the mill's supply chain, on the other hand, are presented in Table 37.

Table 37 Roles and Duties of Own and Other Concerned Departments in Mill's Supply Chain – Responses Received

Statement	Respondent group	Fully disagree	Somewhat disagree	Do not agree or disagree	Somewhat agree	Fully agree	Can not state my mind	n, answers received
21 <i>I understand the role and duties of my own department as a part of the Diamond Mill's supply chain</i>	White-collar	0	0	0	3	13	0	16
	Blue-collar	0	0	0	2	7	0	9
22 <i>I understand the role and duties of the other concerned departments as a part of the Diamond Mill's supply chain</i>	White-collar	0	0	0	3	13	0	16
	Blue-collar	0	1	0	4	4	0	9

The white-collar responses received to **Statement 21** (S21) “*I understand the role and duties of my own department as a part of the Diamond Mill's supply chain*” and **Statement 22** (S22) “*I understand the role and duties of the other concerned departments as a part of the Diamond Mill's supply chain*”, were very positive. All of the white-collar respondents informed to either somewhat (3 out of 16) or fully agree (13) with both of the statements. Very similar responses were also received from the blue-collar. Only one production department blue-collar respondent informed to somewhat disagree with S22. He/she thus believed to have gaps in understanding the roles and duties of the other departments in the mill's supply chain.

As has been mentioned in the beginning of the section, the purpose of the Statements 32-38 (S32-S38) was to find explaining/linked factors for the answers received to S20-S22 and to enquire the respondents' interest in job rotation and extra supply chain training/education. The answers received to S32-S38 are presented in Table 38.

Approximately one third (five out of 16) of the white-collar respondents answered positively to **Statement 32** (S32), “*I have work experience of duties of more than one of the concerned departments (production planning, production, warehousing and dispatch)?*” The positive answers were received from the production department (3; 2 upper-level, 1 lower level white-collar), production planning (1; lower level), and overall management (1; upper level). All of the production department respondents and the production planning respondent had experience of warehousing and dispatch duties. The overall management respondent, on the other hand, had experience of general management of all of the functions.

Two out of nine blue-collar respondents, on the other hand, informed to have experience of the duties of the other concerned departments. One warehousing and dispatch employee had experience of production duties, and vice versa.

Table 38 Cross-Departmental Work Experience, Job Rotation, and Training/Education Received – Responses Received

Statement	Respondent group	Yes	No	<i>n</i> , answers received
32 <i>I have work experience of duties of more than one of the concerned departments (production planning, production, warehousing and dispatch)?</i>	White-collar	5	11	16
	Blue-collar	2	7	9
33 <i>I have taken part in job rotation organized by the employer between the different duties of the concerned departments</i>	White-collar	2	14	16
	Blue-collar	0	9	9
34 <i>I have been offered a possibility to job rotation between the concerned departments and duties</i>	White-collar	1	15	16
	Blue-collar	0	9	9
35 <i>I am interested in taking part in job rotation between the concerned departments and duties, if offered</i>	White-collar	5	11	16
	Blue-collar	2	7	9
36 <i>I have received training and/or education of the operations and basic principles of the other concerned departments and/or overall supply chain management related training/education</i>	White-collar	6	10	16
	Blue-collar	1	8	9
37 <i>I have been offered training and/or education of the operations and basic principles of the other concerned departments and/or overall supply chain management related training/education</i>	White-collar	3	13	16
	Blue-collar	0	8	8
38 <i>I am interested in taking part in such training/education, if offered</i>	White-collar	9	6	15
	Blue-collar	5	4	9

The positive answers received to **Statement 33** (S33), “*I have taken part in job rotation organized by the employer between the different duties of the concerned departments*”, and **Statement 34** (S34), “*I have been offered a possibility to job rotation between the concerned departments and duties*”, were very scarce from both respondent groups. Only two of the white-collar respondents answered to have taken part in job rotation organized by the employer (1 production planning/lower level white-collar, 1 production/upper-level white collar). In addition,

the production department respondent had in fact been *organizing* such rotation for the blue-collar employees between production and warehousing and dispatch duties, and had not taken part in job rotation him/herself. The production planning respondent, on the other hand, had worked in a position that had included duties from both production planning and warehousing and dispatch departments simultaneously. He/she was consequently the only white-collar respondent answering positively to the question enquiring whether the respondents have been offered a possibility to job rotation (S34).

None of the blue-collar respondents, on the other hand, had taken part in job rotation (S33) neither had been offered the possibility to one (S34).

However, more positive answers were received to **Statement 35** (S35) enquiring whether the respondents would be “*interested in taking part in job rotation between the concerned departments and duties, if offered*”. Five (out of 16; all lower level) white-collar and two (out of nine) blue-collar respondents informed to be interested in job rotation between the different departments, if the possibility was offered. The positive white-collar answers were received from production planning (1), production (2), and warehousing and dispatch (2) and the positive blue-collar answers from production (1) and warehousing and dispatch (1). Thus all departments have employees interested in job rotation, if offered, in both respondent groups.

Statements 36-38, on the other hand, enquired whether the respondents had received cross-departmental and/or general supply chain management related training/education, and their interest in receiving it. Approximately one third (6 out of 16) of the white-collar respondents answered positively to **Statement 36** (S36) “*I have received training and/or education of the operations and basic principles of the other concerned departments and/or overall supply chain management related training/education*”. The positive answers were received from production planning (4; all lower level), production (1, upper level), and warehousing and dispatch (lower level). The production planning respondents commented to have learned about production operations while learning the production planning duties (one respondent) and about warehousing and dispatch operations while executing duties of both departments as part of their own work (two respondents). One production planning respondent additionally commented to have received overall supply chain management related education as part of larger educational entities. Finally, the production department respondent stated to have received training/education of the different information systems used at the different departments.

The positive white-collar answers received to **Statement 37** (S37) enquiring whether the respondents “*have been offered training and/or education of the operations and basic principles of the other concerned departments and/or overall supply chain management related training/education*” on the other hand, were

quite sparse. Three out of 16 respondents answered positively to the statement (2 production planning, 1 warehousing and dispatch); the level seems quite low. However, it should be noted that no connection between the Statements 36 & 37 was build and used in the survey questionnaire. The statements, for example, were *not* linked with a specifying statement, that if you have not received training/education (S36), have you still been offered one (37). Thus it, for example, cannot be said whether the respondents answering positively to Statement 37 have actually *taken part in* the training/education offered and thus have answered positively to S36. One respondent has actually answered positively to S36 and negatively to S37. All in all, reviewing the answers received, it seems that the knowledge the different respondents have of, for example, the operations of the other departments is received rather through work experience than formal education and/or training. The amount of formal education received and offered, on the other hand, seems rather low.

However, approximately two thirds of the white collar respondents (9 out of 15) would be “*interested in taking part in such [cross-departmental and/or overall supply chain management related] training/education, if offered*” (**Statement 38**, S38). The interest areas stated by the respondents are presented in Table 39. Four positively answered respondents did not specify their interest areas.

Table 39 White-Collar Training/ Education Interests – Responses Received

Respondent Group	Department	Education/training interests
White-collar	Production planning	Warehousing and dispatch, operations of the new production mode (carton board)
White-collar	Production	Production planning
White-collar	Production	Future flow (carton board)
White-collar	Warehousing and dispatch	Production
White-collar	Overall management	Optimizing supply chain management

Reviewing Table 39, different education and/or training interests thus exist within the mill. What is, on the other hand, worth noticing, 6 white-collar respondents out of 15 informed not to be interest extra training/education. The negative responses were received from production planning (2), production (3), and warehousing and dispatch (1), i.e. from all concerned departments.

The positive answers received from the blue-collar respondents, on the other hand, enquiring whether they have received (S36) or been offered (S37) cross-departmental and/or overall supply chain management training/education were really scarce. Only one (out of 9) production department blue-collar informed to have received internal cross-departmental training and knowledge due to/through workplace steward duties and consequent management board membership. No

other respondent had received cross-departmental or/or SCM related training/education (S36). Moreover, none of the respondents informed to have been offered one (S37).

On the other hand, more than half of the blue-collar respondents (five out of 9; 4 production, 1 warehousing and dispatch) informed to be interested in extra training, if it is offered (S38). The positively answered warehousing and dispatch employee informed to be interested in learning all kinds of new things. One positively answered production blue-collar, on the other hand, stated to be interested in receiving overall supply chain management related training/education. Two blue-collar respondents from both departments informed not to be interested in extra training/education.

To **summarize** the answers received to S20-S22 & S32-38, most of the white-collars believed to have a good understanding of the general meaning of supply chain managements. Only one disagreeing opinion was received from the production department. On the other hand, 2/3 of the blue-collars also believed to have good knowledge of the general ideology of supply chain management, whereas 1/3 informed to have gaps in the knowledge. Knowledge was lacking of respondents of both departments.

The respondents' definitions of supply chain management varied at least in articulated contents and scope. Some were very narrow and concentrated on, for example, either production or the outbound part of the process, whereas others pointed out several parts and/or elements of the supply chain process. Despite the differences, all definitions entailed some supply chain management related items, such as customer centricity and satisfaction, cost effectiveness, right timing, delivery reliability, producing right/promised quality, flawless products, sharing information, and working together towards a common goal. The part/role of other, external supply chain partners (for example, third party service providers) and inbound logistics/purchasing were only briefly discussed in single definitions. On the other hand, 11 respondents (5 white-collar, 6 blue-collar) out of 25 did not provide their definition. For example, no definition was received from the warehousing and dispatch blue-collars.

Both respondent groups informed to be very well aware of both the role and duties of their own department and the role and duties of the other two concerned departments in the Diamond Mill's supply chain. Only one production department blue-collar informed to lack in understanding the roles and duties of the other departments.

Approximately one third of the white-collar and one fifth of the blue-collar respondents had experience of work duties of more than one of the concerned departments. Practically no white- nor blue-collar respondent had taken part in job rotation organized by the employer, though one white-collar respondent had participated in organizing one for the blue-collar employees. The employees had

neither been offered the possibility to job rotation; however, seven respondents out of 25 informed to be interested in job rotation, if it was organized and offered.

Approximately one third of the white-collar and only one of the blue-collar respondents informed to have received training/education of the operations of the other concerned departments and/or of overall supply chain management. Based on the answers received, it seems that the cross-departmental knowledge is gained through working in several duties or cross-departmental teams; the amount of formal training/education received and offered, on the other hand, seems very low. However, approximately two thirds of the white-collar and half of the blue-collar respondents would be interested in receiving extra cross-departmental and/or overall supply chain management related training/education.

Comparing the answers received to S20-S22 and S32-S38, especially in the blue-collar side, educating the employees further could enhance their overall supply chain knowledge and understanding of supply chain principles and entirities. On the other hand, providing similar education also for the white-collars could be worth it. Though the white-collar respondents stated to understand both the general meaning of SCM and the roles of different departments in the supply chain process, the various definitions of supply chain management received signal that the understanding may still vary from one respondent to the other. The concept may, for example, be wider than believed.

On the other hand, the different employees' cross-departmental understanding and knowledge could be enhanced through job rotation, if possible to organize and manage. Several employees in both respondent groups informed to be interested in joining job rotation programs.

### ***5.3.5.2 Cross-Departmental Consideration and Consultation***

The objective of Statements S23-S27 was to examine the respondents' opinions on whether the different employees and departments consider how their own actions affect the operations of the other two departments. The responses received to **Statement 23** (S23) "*When I make decisions in my own work, I consider how they affect the operations of the other two departments*" and **Statement 24** (S24) "*When the representatives of the other two departments make decisions in their work, they consider how they affect the operations of my own department*" are presented in Table 40.

Table 40 Considering Effects of Own Decisions on Others – Responses Received

Statement	Respondent group	Fully disagree	Somewhat disagree	Do not agree or disagree	Somewhat agree	Fully agree	Can not state my mind	n, answers received
23 <i>When I make decisions in my own work, I consider how they affect the operations of the other two departments</i>	White-collar	0	0	0	4	12	0	16
	Blue-collar	0	1	0	4	3	1	9
24 <i>When the representatives of the other two departments make decisions in their work, they consider how they affect the operations of my own department</i>	White-collar	0	0	4	6	3	3	16
	Blue-collar	0	2	0	3	1	2	8

Both the white- and blue-collar responses received to S23 were mainly very positive. All of the white-collars either somewhat (four out of 16) or fully agreed (12 out of 16) that they consider how their own decisions affect the operations of the other two departments. 7 out of 9 blue-collars also had a positive opinion (4 somewhat agree, 3 fully agree), whereas one warehousing and dispatch blue-collar stated to somewhat disagree with the statement and one production department blue-collar could not state his/her mind. Thus although being mainly positive, the mill's blue-collar respondents were also a bit more hesitant whether they consider the effects of their own actions on others.

The answers received to S24, on the other hand, showed more dispersion. Whereas 9 white-collars out of 16 still somewhat (6) or fully agreed (3) that also the representatives of the other departments consider how their actions affect the operations of the respondent's department, four respondents did not agree or disagree, and three could not tell. The "do not agree or disagree" answers were received from representatives of all departments (1 production planning, 2 production, 1 warehousing and dispatch) and "cannot state my mind" answers from production planning. It can thus be interpreted that some of the white-collar respondents have mixed feelings of the decision making influencers of the representatives of the other departments, and some simply do not know, how the decisions are made.

The blue-collar answers received to S24, on the other hand, included more clearly negative responses. Half of the respondents (four out of 8) either somewhat (3; 2 production, 1 warehouse and dispatch) or fully agreed (1, production) with the statement, whereas two respondents somewhat disagreed (1 production, 1 warehousing and dispatch) and two could not state their mind (production). The other departments' representatives' decision making influencers thus divided the opinions of the respondents of both blue-collar departments. Some individual respondents had a positive stand, whereas others had a negative stand; in addition, some did not know how the decisions are made.

Statements 25-27 continued with the same theme and enquired whether the different departments consult the other departments when making decisions that affect the operations of the other departments. The answers received to **Statement 25** (S25) “*Production planning consults production and/or warehousing and dispatch before making decisions that affect the operations of production and/or warehousing and dispatch*”, **Statement 26** (S26) “*Production consults production planning and/or warehousing and dispatch before making decisions that affect the operations of production planning and/or warehousing and dispatch*”, and **Statement 27** (S27) “*Warehousing and dispatch consults production planning and/or production before making decisions that affect the operations of production planning and/or production*” are presented in Table 41.

Table 41 Cross-Departmental Consultation – Responses Received

Statement	Respondent group	Fully disagree	Somewhat disagree	Do not agree or disagree	Somewhat agree	Fully agree	Can not state my mind	<i>n</i> , answers received
25 <i>Production planning consults production and/or warehousing and dispatch before making decisions that affect the operations of production and/or warehousing and dispatch</i>	White-collar	0	0	2	6	8	0	16
	Blue-collar	1	3	0	3	2	0	9
26 <i>Production consults production planning and/or warehousing and dispatch before making decisions that affect the operations of production planning and/or warehousing and dispatch</i>	White-collar	0	2	1	10	3	0	16
	Blue-collar	0	1	1	4	2	1	9
27 <i>Warehousing and dispatch consults production planning and/or production before making decisions that affect the operations of production planning and/or production</i>	White-collar	0	0	3	8	3	2	16
	Blue-collar	0	1	2	3	1	2	9

The white-collar answers received to S25 were mainly quite or very positive; thus generalized it can be said that the white-collar respondents believe that production planning consults the other departments before making decisions that affect the operations of the other departments. The white-collar answers received to S26, on the other hand, showed more dispersion. Whereas again most of the respondents somewhat (10 out of 16) or fully agreed (3; 2 production, 1 production planning) that production consults the other two departments before making decisions that affect their operations, also two somewhat disagreeing opinions were presented. One production planning and one warehousing and dispatch white-collar had a somewhat negative opinion of the consultations executed by the production department. One production department white-collar additionally did not agree or disagree with S26.

The white-collar answers received to S27 also showed more dispersion. Again, two thirds of the white-collar respondents (11 out of 16) believed warehousing and dispatch to consult the other departments before making decisions that affect the operations of the other two departments. However, two respondents could not state their mind (1 production planning, 1 production) and three had mixed feelings (2 production, 1 warehousing and dispatch). No clearly negative answers were received.

The responses received from the blue-collar respondents to S25-S27 were clearly more negative than the responses received from the white-collar respondents. Whereas five respondents out of 9 somewhat (3; 2 production, 1 warehousing and dispatch) or fully agreed (2, production) that production planning consults the other departments before making decisions that affect the operations of the other departments, three respondents somewhat disagreed (1 production, 2 warehousing and dispatch) and one fully disagreed (production). Thus approximately half of the blue-collar respondents had a positive and half a negative opinion of the consultation executed by the production planning representatives.

Similar, though somewhat more positive dispersion was visible in the blue-collar responses received to S26. Six respondents out of 9 somewhat (4; 3 production, 1 warehousing and dispatch) or fully agreed (2, production) that production consults the other departments before making decisions that affect the operations of the other departments, whereas one warehousing and dispatch blue-collar somewhat disagreed and one could not state his/her mind. One production department blue-collar also did not agree or disagree with the statement. It thus seems that the production department representatives have a more positive view of the consultation executed by their own department than the warehousing and dispatch employees.

Finally, the blue-collar responses received to S27 showed dispersion from one side to the other. All options received answers, except "fully disagree". One production department blue-collar stated to fully agree and one production and two warehousing and dispatch blue-collar to somewhat agree that warehousing and dispatch consults the other departments before making decisions that affect the operations of the other departments. Two respondents, on the other hand, did not agree or disagree (production), one somewhat disagreed (warehousing and dispatch), and two could not state their mind (production). The consultation executed by the warehousing and dispatch department thus divides the opinions of each blue-collar respondent. Also some self-criticism was presented; the responses received from the representatives of production department, on the other hand, varied from side to side.

To **summarize**, all of the white-collar and also most of the blue-collar respondents informed to consider how their own decisions affect the operations of

the other concerned departments. Two blue-collar, however, were more negative or hesitant in their opinion.

The question whether the representatives of the other concerned departments consider how their decisions affect the operations of the respondent's own department, on the other hand, divided the opinions. Whereas a bit more than half of the white-collar respondents still had a positive stand, the rest either had mixed feelings of the decision making influencers of the representatives of the other departments or did not know how the decisions are made. Half of the blue-collar opinions received, on the other hand, were also at least somewhat positive; the responses received, however, also included some clearly more negative stands and some respondents did not know how the decisions are made.

The white-collar opinions on cross-departmental consultation, on the other hand, were mainly quite or very positive; some negative opinions were, however, presented concerning the consultation executed by the production department. Moreover, the consultation executed by each department also received some "do not agree or disagree" opinions. Most "do not agree or disagree" or "can not state my mind" opinions were received of the consultation executed by the warehousing and dispatch department.

The blue-collar opinions of the cross-departmental consultation, on the other hand, were more negative than the opinions of the white-collar respondents. Consultation executed by the production planning department received criticism. The production department blue-collar, on the other hand, had a more positive view of the consultation executed by their own department than the warehousing and dispatch blue-collar. Some internal criticism, on the other hand, was presented concerning the consultation made by the warehousing and dispatch department. However, it should be noted that although the blue-collar answers received entailed more negative responses than the responses received from the white-collar, also some very positive opinions were received. The cross-departmental consultation thus clearly divided the opinions of the blue-collar respondents.

The difference between the tone of the answers received from the white-collar and blue-collar respondents concerning the cross-departmental consultation is worth noticing. The more negative answers could, for example, be due to not understanding the background influencers of the other departments – not understanding why people do what they do. The reason behind the negative answers, however, needs more clarification. If the reason is indeed lack of understanding, it could be improved by extra cross-departmental experience and/or training/education discussed in Statements 32-38.

### 5.3.5.3 Synchronizing of Activities, Common Vision and Goals

The objective of Statements 28-30 was to research the opinions of the respondents on whether the different, concerned departments work together as one entity, towards a common goal or whether the concentration is rather on functional matters. The responses received to **Statement 28** (S28) “*The mill’s production planning, production, and warehousing and dispatch work as one entity*”, **Statement 29** (S29) “*The mill’s production planning, production, and warehousing and dispatch concentrate each on optimizing their own operations*”, and **Statement 30** (S30) “*The mill’s production planning, production, and warehousing and dispatch work towards a common goal and vision*” are presented in Table 42.

Table 42 Working as One Entity – Responses Received

Statement	Respondent group	Fully disagree	Somewhat disagree	Do not agree or disagree	Somewhat agree	Fully agree	Can not state my mind	n, answers received
28 <i>The mill’s production planning, production, and warehousing and dispatch work as one entity</i>	White-collar	0	2	4	8	1	1	16
	Blue-collar	1	3	1	3	1	0	9
29 <i>The mill’s production planning, production, and warehousing and dispatch concentrate each on optimizing their own operations</i>	White-collar	2	1	1	8	4	0	16
	Blue-collar	0	0	2	4	3	0	9
30 <i>The mill’s production planning, production, and warehousing and dispatch work</i>	White-collar	0	1	1	10	4	0	16
	Blue-collar	0	2	2	2	3	0	9

Statement 28 divided the opinions of both respondent groups. Whereas 9 out of 16 white-collar either fully (1, production planning) or somewhat agreed (8) that the different departments work as one entity, two respondents somewhat disagreed (1 production, 1 warehousing and dispatch) and one respondent could not state his/her mind (production planning). In addition, four production department respondents did not agree or disagree. As a whole, the production department respondents seemed to have a bit more hesitant opinion of the different departments working as one entity. On the other hand, reviewing all answers did not reveal great differences between the answers given by the lower and upper level white-collar.

The blue-collar responses received to S28 were dispersed from very positive to very negative; the responses were divided evenly between both ends. Whereas one respondent fully agreed (warehousing and dispatch), another fully disagreed (warehousing and dispatch), that the different departments work as one entity. Additionally, three respondents both somewhat agreed (production) and disagreed (1 warehousing and dispatch, 2 production) with the statement. One pro-

duction department blue-collar did not agree or disagree. The blue-collar responses received to S28 were thus completely dispersed, also within separate departments.

The white-collar answers received to S29, on the other hand, dispersed from fully agreeing (4 out of 16; 2 production planning, 1 production, 1 warehousing and dispatch) to fully disagreeing (2, 1 production planning, 1 production) that the separate departments concentrate on optimizing their own operations. In addition, 8 respondents somewhat agreed and one somewhat disagreed (general management) with the statement. One respondent had a more neutral stand.

Statement 29 was meant to operate as a control question for Statement 28; according to theoretical discussion of supply chain management, in order for the chain to properly work as one entity, the concentration should rather be on developing the whole chain as such, instead of concentrating on separate functions within it. Generalizing, S28 was thus consequently meant to be more positive and S29 more negative in nature. The white-collar responses received to S29, however, revealed that the respondents did not necessarily interpret the statement to be negative and/or opposing to S28. Approximately one third (5-7 out of 16, depending on the interpretation) of all – and three to five out of 6 upper level white-collar – responses received correlated as suspected (positive answer to S28, negative answer to S29, and vice versa), the rest not. The same respondent could have answered positively or negatively to both statements. Thus, some of the respondents believed that the different functions could simultaneously concentrate on optimizing their own operations and still work as one entity with the other departments.

Most of the blue-collar answers received to S29, on the other hand, stated to either somewhat (4 out of 9) or fully agree (3) that the different departments concentrate on optimizing their own operations. In addition, two respondents did not agree or disagree. Two thirds (6 out of 9) of the responses correlated as expected with S28, one third not.

Statement 30 was again meant to be more positive in nature and to correlate positively with Statement 28 and negatively with Statement 29. The white-collar responses received to S30 were again mainly positive; four (out of 16) respondents stated to fully agree (all departments and general management) and 10 to somewhat agree that the different departments work towards a common goal and vision. However, also one somewhat disagreeing (warehousing and dispatch) and neutral (production) opinion was given.

The white-collar answers received to S30 were mainly (15 out of 16) in line with the answers received to S28; thus if the respondents believed the different departments to work as one entity (S28), they also believed it to work towards a common goal and vision (S30), and vice versa. On the other hand, comparing the white-collar answers given to S29 & S30, approximately one third (5-6 out of 16)

of the responses correlated negatively as expected. Thus if, for example, the respondents did not believe the different departments to concentrate on optimizing their own functional operations (S29), they believed them to work towards a common target (S30). However, as discussed above, as obviously many of the respondents did not interpret S29 to be negative, a, for example, positive answer may have been given to all of the statements S28-S30.

On the other hand, the blue-collar responses received to S30 varied again from positive to negative. Whereas five (out of 9) respondents either fully (3; 2 production, 1 warehousing and dispatch) or somewhat agreed (2; production) the different departments to work towards a common goal and vision, two respondents somewhat disagreed (1 production, 1 warehousing and dispatch) and two did not agree or disagree (1 production, 1 warehousing and dispatch). S30 thus divided the opinions of all blue-collar respondents, also within separate departments.

Comparing the blue-collar answers received to S28 & S30, 8 out of 9 of the responses correlated positively with one another. On the other hand, approximately half (four out of 9) of the responses received to S29 & S30 correlated negatively with one another, as expected.

To finalize the current theme, **Statement 31** (S31) enquired the respondents' opinions on whether "*it is important that the concerned departments work together in order to guarantee the mills operability and continuity*". The responses received are presented in Table 43.

Table 43 Importance of Working Together – Responses Received

Statement	Respondent group	Fully disagree	Somewhat disagree	Do not agree or disagree	Somewhat agree	Fully agree	Can not state my mind	n, answers received
31 <i>It is important that the concerned departments work together in order to guarantee the mills operability and continuity</i>	White-collar	0	0	0	2	14	0	16
	Blue-collar	0	0	0	1	8	0	9

Both white- and blue-collar responses received were very unanimous; 22 out of 25 respondents fully and the rest somewhat agreed (3) that it is important that the different departments work together. No objections or negative opinions were presented.

To **summarize** the responses received to S28-S31, the question whether the different departments work together as one entity (S28) divided the opinions of both respondent groups. Whereas some respondents agreed, others disagreed. With the white-collars, somewhat more negative responses were received from

the production department. The blue-collar responses, on the other hand, were totally dispersed, also within departments.

S29 was meant to be a more negatively toned control question for S28, basing on the ideology that if departments concentrate on optimizing their own operations (S29), they cannot operate that well as one entity (S28). However, the answers received revealed that the respondents did not necessarily regard the two statements to oppose one another and be exclusive – that one could not exist with the other. Some respondents believed that the departments could operate as one entity, while simultaneously concentrating on optimizing their own operations. Approximately one third of the white-collar responses received to S28 & S29 correlated as expected – a positive answer to the first and negative to the second, and vice versa –, the rest not. Most of the expectedly correlated answers were received from the upper level white-collars. Moreover, interestingly two thirds of the responses received from the blue-collars, on the other hand, to S28 & S29 correlated as expected.

Also the question whether the different departments work towards a common goal and vision (S30) divided the opinions in both respondents groups. Most of the white-collars fully or somewhat agreed, but also some single, more hesitant opinions were presented. The blue-collar answers received, on the other hand, were more dispersed. The opinions ranged from positive to negative, also within departments.

S30 was again meant to be more positive in tone and operate as a control question for both S28 & S29. Most of the answers received to S28 & S30 in both respondent groups correlated as expected; if the respondent saw the different departments to work as one entity, he/she also regarded the different departments to work towards a common goal and vision, and vice versa. The answers received to S29 & S30, however, did not again all correlate as expected, supposedly due to not having regarded S29 as negative. Approximately one third of the white-collar and half of the blue-collar responses received correlated as expected; if the respondent saw the different departments to concentrate on optimizing their own operations, he/she had a more hesitant opinions of them working towards the same direction (generalizing), and vice versa.

However, all respondents shared the opinion that it is important that the different departments work together to guarantee the operability and future of the mill. 22 out of 25 fully and three somewhat agreed with the statement.

Consequently, it thus seems that the importance of working together is very well assimilated at the mill in both respondents groups. The current status of synchronizing of activities and working together as one cross-departmental entity may, however, have some room for improvement. At least the reasons behind the differing/negative responses received should be further scrutinized.

### 5.3.6 Collaboration – Collaboration Atmosphere & Overall Satisfaction with Cross-Departmental Collaboration

The purpose of Statements 39-41 was to enquire the respondents' opinions on the overall cross-departmental atmosphere at the mill. The responses received to **Statement 39** (S39) "*The mill's production planning, production, and warehousing and dispatch departments get along well with each other*", **Statement 40** (S40) "*The mill's production planning, production, and warehousing and dispatch departments have reciprocal tension/conflicts/conflicts of interest*", and **Statement 41** (S41) "*The representatives of mill's production planning, production, and warehousing and dispatch departments have reciprocal tension/conflicts/conflicts of interest*" are presented in Table 44.

Table 44 Overall Cross-Departmental Atmosphere – Responses Received

Statement	Respondent group	Fully disagree	Somewhat disagree	Do not agree or disagree	Somewhat agree	Fully agree	Can not state my mind	n, answers received
39 <i>The mill's production planning, production, and warehousing and dispatch departments</i>	White-collar	0	0	2	6	8	0	16
	Blue-collar	0	1	0	4	4	0	9
40 <i>The mill's production planning, production, and warehousing and dispatch departments have reciprocal tension/conflicts/conflicts of interest</i>	White-collar	10	2	0	2	0	1	15
	Blue-collar	2	5	1	1	0	0	9
41 <i>The representatives of mill's production planning, production, and warehousing and</i>	White-collar	6	5	2	2	0	1	16
	Blue-collar	3	3	1	1	0	1	9

The white-collar responses received to S39 were mainly positive; 14 out of 16 respondents either fully (8) or somewhat agreed (6) that the different departments get along well with each other. In addition, two "do not agree or disagree" statements were received from the production department.

The white-collar responses received to S40 followed mainly the same lines; most of the answers received were very positive, although some deviant opinions were also presented. 10 out of 15 white-collars fully disagreed that the different departments would have reciprocal tensions, conflicts, and/or conflicts of interest. In addition, two respondents somewhat disagreed.

However, also two somewhat agreeing opinions were received, one from production and one from warehousing and dispatch department. In addition, one production planning respondents could not state his/her mind. Thus although most of the white-collar respondents believed that no tension and/or conflict exists between the departments, some did not share that opinion.

The white-collar responses received to S41, on the other hand, showed some more dispersion. As again 11 out of 16 respondents either fully (6) or somewhat disagreed (5) that tension and/or conflicts would exist between the representatives of the different departments, two respondents somewhat agreed (1 production, 1 warehousing and dispatch) and two did not agree or disagree (production) with the statement; in addition, one respondent could not tell (production planning). Comparing the answers received to S40 & S41, the somewhat agreeing responses received to both statements were received from the same respondents. In addition, reviewing all the white-collar answers received, the responses received to S41 show a slight movement towards the “agreeing direction” when compared to the responses received to S40. Thus although most of the responses received to both statements signal that no tension and conflicts would exist, at least not on a large scale, if it indeed *does exist*, the tension would rather exist between the representatives of the different departments than the departments as such.

The blue-collar responses received, on the other hand, followed principally the same lines with the white-collar responses. Whereas most blue-collar respondents (8 out of 9) believed the different departments to get along well, also one somewhat disagreeing opinion was presented (production) (S39). On the other hand, most respondents also did not believe tension and/or conflicts to exist between the different departments (7 out of 9; S40) or their representatives (6 out of 9; S41). However, both statements also received one somewhat agreeing (production) and one average, do not agree or disagree, opinion (production) from the same respondents. The slight shift towards more agreeing direction between the answers received to S40 & S41, discussed above with the white-collar, was not visible in the blue-collar answers.

**Statement 42** (S42) “*If something goes wrong, the departments rather concentrate on placing blame/finding the guilty party than on finding common solutions to the problem*”, on the other hand, enquired the respondents’ opinions on solving cross-departmental problem situations. The responses received are presented in Table 45.

Table 45 Placing Blame vs. Finding Common Solutions – Responses Received

Statement	Respondent group	Fully disagree	Somewhat disagree	Do not agree or disagree	Somewhat agree	Fully agree	Can not state my mind	n, answers received
42 <i>If something goes wrong, the departments rather concentrate on placing blame/finding the guilty party than on finding common solutions to the problem</i>	White-collar	4	3	2	4	2	1	16
	Blue-collar	1	4	2	1	1	0	9

S42 divided the opinions of both respondent groups from one end to the other. Whereas seven out of 16 white-collar either fully (4; 3 production, 1 general management) or somewhat disagreed (3; 2 production, 1 warehousing and dispatch) that concentration would rather be on placing blame, six respondents either somewhat (4; 2 production planning, 1 production, 1 warehousing and dispatch) or fully agreed (2; 1 production planning, 1 warehousing and dispatch). In addition, two respondents did not agree or disagree (1 production planning, 1 warehousing and dispatch) and one could not state his/her mind (production planning). Generalizing it seems that the representatives of production planning and warehousing and dispatch have somewhat more negative opinions of the situation, whereas the representatives of production department more positive. All in all the opinions vary.

The dispersion of opinions was also visible amongst the blue-collar respondents. Whereas five blue-collar out of 9 either fully (1; production) or somewhat disagreed (4; 2 production, 2 warehousing and dispatch) with the statement, one respondent fully (warehousing and dispatch) and one somewhat agreed (production). In addition, two production department respondents did not agree or disagree. Comparing the answers given by the white-collar and blue-collar respondents, it seems that the blue-collar have a somewhat more positive overall opinion of cross-departmental problem solving; the answers entailed more positive than negative responses. As mentioned above, the blue-collar opinions, however, varied from positive to negative, also within departments. The production department opinions were slightly more positive than the opinions of warehousing and dispatch.

**Statement 43** (S43), on the other hand, enquired the respondents' overall satisfaction with the cross-departmental collaboration; "*On a general level I am satisfied with the cross-departmental collaboration occurring between the concerned departments*". The responses received are presented in Table 46.

The white-collar responses received were generally very positive; 14 out of 15 respondents informed to be either fully (5) or somewhat satisfied (9) with the collaboration. Only one production department respondent did not agree or disagree with the statement.

Table 46 Overall Satisfaction with Cross-Departmental Collaboration – Responses Received

Statement	Respondent group	Fully disagree	Somewhat disagree	Do not agree or disagree	Somewhat agree	Fully agree	Can not state my mind	n, answers received
43 <i>On a general level I am satisfied with the cross-departmental collaboration occurring between the concerned departments</i>	White-collar	0	0	1	9	5	0	15
	Blue-collar	0	2	1	4	2	0	9

The blue-collar responses received, on the other hand, had some more dispersion. Whereas six respondents (out of 9) informed to be fully (2; 1 production, 1 warehousing and dispatch) or somewhat satisfied (4; 3 production, 1 warehousing and dispatch) with the collaboration, two production department blue-collar informed to somewhat disagree with the statement. In addition, on warehousing and dispatch respondent did not agree or disagree. Thus though larger part of the blue-collar seem to be at least somewhat satisfied with the cross-departmental collaboration, also disagreeing opinions exist.

To **summarize** the responses received to S39-S43, both white- and blue-collar respondents generally believe that the concerned departments get along well with each other. Single differing opinions were presented, but otherwise the respondents shared a positive opinion. Likewise, the majority of all respondents also believed that there are no tension/conflicts between the different departments or their representatives. However, some deviant opinions were again received. Especially with the white-collar, reviewing all the responses received, it seems that if some tension/conflicts *do indeed* exist, they rather exist between the representatives of the different departments than the departments as such. Similar tendency was not visible in the responses received from the blue-collar.

Placing blame versus finding common solutions to problem situations divided the opinions of both respondent groups. The responses received varied from one end to the other; from very positive to very negative. The blue-collar seemed to have a somewhat more positive opinion on a general level than the white-collar. Amongst the white-collar respondents, on the other hand, on a general level the production planning and warehousing and dispatch employees seemed to have a somewhat more negative opinion of the behavioral manners in problem situations (placing blame & finding the guilty party) than the production department representatives. All in all, as mentioned above, the concerned statement divided the opinions of all respondents and thus the issue of placing blame vs. finding common solutions to problems should be further scrutinized.

On the other hand, on a general level, the white-collar respondents informed to be satisfied with the cross-departmental collaboration occurring between the concerned departments. The blue-collar respondents, however, were somewhat more

hesitant in their opinions. Whereas two thirds of the respondents informed to be somewhat or fully satisfied with the collaboration, one third informed to be somewhat dissatisfied or to have mixed feelings.

### 5.3.7 Coordination – Top and Middle Management Support

The last part of the survey concentrated on coordination activities of cross-departmental/functional information sharing and collaboration executed at the mill. Statements 44-45 enquired the respondents' opinions on whether the mill's top and middle management support and encourage the different departments to work together. The responses received to **Statement 44** (S44) "*The mill's top management (management team) encourages the different departments to operate and work together*" and **Statement 45** (S45) "*The mill's manager level (other than management team) encourages the different departments to operate and work together*" are presented in Table 47.

Table 47 Top and Middle Management Support – Responses Received

Statement	Respondent group	Fully disagree	Somewhat disagree	Do not agree or disagree	Somewhat agree	Fully agree	Can not state my mind	n, answers received
44 <i>The mill's top management (management team) encourages the different departments to operate and work together</i>	White-collar	0	1	2	7	6	0	16
	Blue-collar	0	2	1	3	2	1	9
45 <i>The mill's manager level (other than management team) encourages the different departments to operate and work together</i>	White-collar	0	0	3	9	3	1	16
	Blue-collar	1	1	1	3	2	1	9

Most of the white-collar respondents (13 out of 16) either fully (6) or somewhat agreed (7) the mills' management team to encourage the different departments to work together (S44). However, one somewhat disagreeing opinion was received from the production department and two production department representatives did not agree or disagree.

Similarly, three quarters of the white-collar respondents (12 out of 16) also informed to at least somewhat agree that the mill's middle management level encourages the different departments to work together. In addition, three "do not agree or disagree" opinions were received from the production department and one production planning representatives could not state his/her mind. All in all, reviewing all the white-collar answers received to S44 & S45, most of the white-collars thus at least somewhat believe and agree the mill's top and middle management to support cross-departmental collaboration. However, some disagreeing and mixed feelings opinions exist in the production department.

The blue-collar responses received to S44 & S45, however, again showed more dispersion. Whereas five out of 9 respondents either fully (2; production) or somewhat agreed (3; 1 production, 2 warehousing and dispatch) the mill's management team to encourage the different departments to work together, two production department representatives somewhat disagreed and one production department representative did not agree or disagree (S44). In addition, one warehousing and dispatch blue-collar could not state his/her mind.

Similarly, the blue-collar responses received to S45 varied from very positive to very negative. As again 5 out of 9 respondents either fully (2; production) or somewhat agreed (3; 1 production, 2 warehousing and dispatch) the mill's middle manager level to encourage cross-departmental collaboration, one warehousing and dispatch employee fully disagreed and one production department employee somewhat disagreed. In addition, one "do not agree or disagree" and one "can not state my mind" response was received from the production department. S45 thus fully dispersed the opinions of the blue-collar respondents, also within departments; approximately half of the opinions received were positive, half negative or mixed.

Comparing the blue-collar answers received to S44 & S45, the distribution of answers received to both questions was very similar, only one "somewhat disagree" response received to S44 moved to "fully disagree" in S45. Most of the respondents had answered similarly to both questions; however, some respondents' answers clearly differed moving from S44 to S45.

To **summarize**, most of the white-collar respondents either fully or somewhat agreed that both the mill's top management (management team) and middle manager level encourage the different departments to operate and work together. However, some disagreeing opinions were received from the production department.

The blue-collar opinions, on the other hand, were more dispersed. Whereas a bit more than half of the respondents shared the positive opinion of the white-collar, the rest either disagreed or had mixed feelings of the top and middle management support given on cross-departmental collaboration. The opinions varied within both departments. The blue-collar answers received to middle management support very slightly more negative than to top management support, although the distribution of opinions was quite even between the statements.

### ***5.3.8 Coordination – Departmental Goals, Evaluation and Incentive System***

Due to clarity, the separate – though linked – items within the theme are presented in separate sub-sections.

### 5.3.8.1 Departmental Goals

The purpose of Statements 46-48 was to enquire the respondents' knowledge of the goals of their own department, the other departments, and the whole mill. The answers received to **Statement 46** (S46) "*I know the goals of my own department*", **Statement 47** (S47) "*I know the goals of the other departments*", and **Statement 48** (S48) "*I know the mill level goals*" are presented in Table 48.

Table 48 Knowledge of Different Goals – Responses Received

Statement	Respondent group	Yes	No	<i>n</i> , answers received
46 <i>I know the goals of my own department</i>	White-collar	15	1	16
	Blue-collar	9	0	9
47 <i>I know the goals of the other departments</i>	White-collar	8	8	16
	Blue-collar	3	6	9
48 <i>I know the mill level goals</i>	White-collar	13	3	16
	Blue-collar	7	2	9

Both the white- and blue-collar respondents believed to have good knowledge of the goals of their own department. Only one production planning white-collar informed not to know the goals of his/her department. All respondents were also asked to additionally define the goals of their department, if they stated to know them; the responses received are presented in Table 49. Five white-collar and five blue-collar respondents did not provide their definitions.

Reviewing the definitions received, respondents representing different departments, both white-collar and blue-collar, stated similar goals, such as operating efficiency, production amount, safety, work wellbeing, and cost effectiveness. Three white-collar respondents also stated that the goals of their department are the same as the goals of the whole mill. In addition, two white-collar informed the goals of the department to equal with the incentive goals.

Some of the definitions articulated/emphasized more the departmental operations (DS in Table 49) whereas others were more generic in nature, stating more overall goals (G in Table 49). In reality, the goals of the different departments are the same and equal with the mill level and incentive goals; in other words, the mill only has one set of goals that are the same for all and also used for evaluation and rewarding (Human Resources Manager, 22.6.2015).

Table 49 Respondents Definitions of the Goals of Their Own Department – Responses Received

Respondent Group	Department	Definition	Generic (G) vs Departmentally Specific (DS) Definition
White-collar	Production	Safety goals, incentive goals	G
White-collar	Production	Incentive goals: overall operating efficiency, production amount, production of pulp, fixed costs, work wellbeing	G
White-collar	Production planning	Balancing orders, deliveries, and production capacity. Delivering orders on time. The goals of the department are the same as the goals of the whole mill/other departments.	DS/G
White-collar	Production planning	As good and fast customer service as possible - keeping promises while minimizing costs. Best possible trim efficiency taking into consideration the orders' ex mill dates and cost efficiency. Follow up and utilization of surplus stock reels - selling further vs. returning to production to be used as raw material.	DS/G
White-collar	Production	Safety, efficiency, work wellbeing (presence %)	G
White-collar	Production	Zero accidents, operating efficiency, fixed costs, presence	G
White-collar	Production	Operating efficiency, production, quality, safety, work wellbeing, presence	G
White-collar	Production	Operating efficiency, presence %, zero accidents, production amount/year, fixed costs	G
White-collar	Warehousing and dispatch	Same as the mill's	G
White-collar	General management	Same as the mill's	G
Blue-collar	Production	Producing goods ordered by the customer as well as possible.	DS
Blue-collar	Warehousing and dispatch	Dispatching ordered goods in proper condition to the right destination, at the right time.	DS
Blue-collar	Warehousing and dispatch	Operating efficiency of PM3, production tonnage of PM3	DS/G
Blue-collar	Warehousing and dispatch	Producing efficiently, safely, and cost effectively good quality paper for the customers.	G

The answers received to question whether the respondents know the goals of the other departments (S47), on the other hand, showed more dispersion. Thus whereas the goals of the own department were generally regarded to be familiar to the respondents, the goals of the other departments were less well known. Half of the white-collar (8 out of 16) and one third of the blue-collar respondents (three out of 9) informed to know the goals of the other departments; the rest not.

Reviewing the responses deeper, all of the higher level white-collars (6) informed to know the goals of the other departments. Additionally, two lower level white-collars (1 production planning, 1 production) out of 10 informed to know the goals of the other departments. Within the blue-collar respondents, on the other hand, two positive answers were received from the production department and one from the warehousing and dispatch.

All in all, a large amount of both lower-level white- and blue-collar employees thus have a lack of knowledge concerning the goals of the other departments.

Consequently they do not know that the goals of the different departments are the same/in line with each other and equal with the mill level goals.

The goals of the mill, on the other hand, were informed to be relatively well known by both respondent groups (S48); 13 out of 16 white-collars and 7 out of 9 blue-collars stated to know the mill level goals. The negative responses were received from two production planning and one production department white-collars, in addition to two production department blue-collars.

The respondents were also asked to define the mill level goals, if they stated to know them. The definitions received are presented in Table 50. Four white-collar and four blue-collar respondents did not provide their definitions.

Table 50 Respondents Definitions of Mill Level Goals – Responses Received

<b>Respondent Group</b>	<b>Department</b>	<b>Definition</b>
White-collar	Production	All have approximately the same goals
White-collar	Production	Same incentive targets mentioned in Statement 46
White-collar	Production planning	Cost effective, safe, competent, responsibly operating, profitable, and renewable quality leader. Incentive targets include the division's and mill's EBITDA, operative working capital, paper machine efficiency, pulp production, yearly production amounts, fixed costs, and presence percentage.
White-collar	Production	Safety, efficiency, work wellbeing
White-collar	Production	Same as in Statement 46
White-collar	Production	Efficiency, production, costs
White-collar	Production	Can be found in intranet
White-collar	Warehousing and dispatch	Zero accidents, X safety notifications/year, presence percentage > X %
White-collar	General management	Profit, efficiency (pulp, paper), presence, safety
Blue-collar	Production	Delivering ordered, good quality products on time.
Blue-collar	Production	Fixed costs, work wellbeing - presence percentage. In addition, zero tolerance thinking with accidents, disruption emissions, ignitions etc. These, however, are not incentive targets; possible rewarding through separate rewards.
Blue-collar	Warehousing and dispatch	Producing cost effectively good quality paper fulfilling the customer's needs and delivering it on time to the customer.

Despite the respondent's department, the white-collar definitions received discussed similar matters, such as safety, presence, efficiency, production amount, and costs. Two respondents noted the goals to be the same as the goals of their own departments (S46). One respondent also mentioned the goals to be approximately the same for all.

Two of the blue-collar definitions received, on the other hand, were more operational, concentrating on well managed operative actions. The third definition,

received from the production department, however, discussed similar factors as the white-collar definitions.

To **summarize** the responses received to S46-48, both respondent groups informed to be well aware of the goals of their own department. Despite the group, such goals were mentioned as operating efficiency, production amount, safety, work wellbeing, and cost effectiveness. Single white-collar also specifically mentioned that the departmental goals equal with the goals of the other departments (one respondent), mill level goals (three respondents), and /or the incentive goals (two respondents). Some of the definitions received concentrated more on department specific targets, whereas others were more generic/wider in nature. 10 out of 24 respondents did not provide their definition.

The goals of the other departments, however, were clearly less well known. Half of the white-collar and one third of the blue-collar informed to know the goals of the other departments. The positive white-collar answers were mainly received from the upper-level white collars; all upper level white-collar informed to know the goals of the other departments.

However, very few of both lower level white-collar and blue-collar employees informed to know the goals of the other departments. Consequently they do not know that the goals are the same for every department and the whole mill. This factor could be more actively communicated at the mill in the future.

The mill level goals, on the other hand, were again fairly well known within both respondent groups; though also negative responses were received from both groups. Despite the department, the white-collar definitions of mill level goals discussed similar matter, such as safety, presence, efficiency, production amount, and costs. Single respondents also mentioned that the mill level goals equal with goals of their own department (two respondents) and that the goals are the same for all (one respondent).

Two of the blue-collar definitions received, on the other hand, were more operational, concentrating on well managed departmental operations. The third, however, discussed more generic matters, as the white-collar definitions. A definition was not received from four white- and four blue-collar. Thus especially in the blue-collar side, though the respondents would have answered to know the goals of the whole mill, it is difficult to say, whether they truly know and work towards the common mill level targets or whether the concentration is rather on the operations of their own department.

All in all, the employees' knowledge of the common mill level goals could be further enhanced. Consequently they would learn that the separate departments are working towards the same direction and trying to reach the same goals.

### 5.3.8.2 Evaluation and Incentive System

The last two statements in the survey concentrated on the evaluation and incentive system used at the mill. The answers received to **Statement 49** (S49) “*I am rewarded based on an evaluation and incentive system*” and **Statement 50** (S50) “*I know the criteria behind my incentives/bonuses*” are presented in Table 51. In reality, all employees at the mill are evaluated and rewarded based on an evaluation and incentive system. The incentives are partly based on the mill level operational goals that are the same for the whole mill and each and every employee. Part of the bonuses is also based on the financial results of both the mill and the division it belongs to. Some upper level white-collars additionally have personal incentive targets that are based on their individual duties and responsibilities. (Human Resources Manager, 22.6.2015.)

Table 51 Membership in Evaluation and Incentive System, Knowledge of Incentive Criteria – Responses Received

Statement	Respondent group	Yes	No	Can not state my mind	n, answers received
49 <i>I am rewarded based on an evaluation and incentive system</i>	White-collar	16	0	0	16
	Blue-collar	8	1	0	9
50 <i>I know the criteria behind my incentives/bonuses</i>	White-collar	14	2		16
	Blue-collar	7	2		9

Both white- and blue-collar respondents generally answered positively to S49 enquiring their membership in an evaluation and incentive system. Only one production department blue-collar informed not to belong to such a system. Additionally, two white-collars had answered the statement negatively but based on their responses to the following statement it was evident that they *in fact knew* that they *indeed belong* under an evaluation and incentive scheme. Thus their answers were moved from “No” to “Yes” in S49.

The incentive criteria were also relatively well known in both groups (S50); though two out of 16 white-collar (1 production, 1 warehousing and dispatch) and two out of 9 blue-collar respondents (1 production, 1 warehousing and dispatch) stated to be unaware of the criteria behind their bonuses. The blue-collar answering negatively to S49 also answered negatively to S50.

The respondents were also additionally asked to define their incentive criteria, if they stated to know them; the definitions received are presented in Table 52.

Table 52 Respondents Definitions of Their Incentive Criteria – Responses Received

Respondent Group	Department	Definition
White-collar	Production planning	Overall operating efficiency, production amounts (paper, pulp), fixed costs, work wellbeing, EBITDA targets, etc.
White-collar	Production planning	Overall operating efficiency, production amounts (paper, pulp), fixed costs, work wellbeing, presence %
White-collar	Production planning	Part is based on the result of the mill, part on the result of the division
White-collar	Production	Incentive criteria and their weighing can be found from the intranet
White-collar	Production planning	Personal incentive criteria (exact definition modified by the author or the disseration)
White-collar	Production	Result, result, result, result
White-collar	Production	Personal incentive criteria (exact definition modified by the author or the disseration)
White-collar	Production	Production efficiency, safety notifications, presence %, costs
White-collar	Production	Criteria can be found from the intranet. The current incentive consist of virtually everything else than the production or the mill's financial result?
White-collar	Production	Largely based on the yearly result of the corporation; unfortunately not so much based on the results of the mill. The result of the own mill should affect more.
White-collar	Warehousing and dispatch	Result of the mill and the corporation; and some other factors I do not remember
White-collar	General management	Profit, safety, production efficiency, presence
Blue-collar	Production	Employer defines the criteria
Blue-collar	Production	Results of the mill and the division, reaching of operational mill targets. Total incentive is based on the realization of all targets, and is calculated based on the salary/wage of the regular working hours. More exact definition can be found from the corporate
Blue-collar	Production	Result of the corporation, result of the mill, result of the division. Operating profit, overall operating efficiency, production amount (paper, pulp), fixed costs, work wellbeing/presence

Generally it seems that most respondents in both groups have a relatively clear overview of the criteria behind their incentives. Although all criteria would not have been specifically listed, the definitions contained right elements. Some of the respondents additionally did not provide an exact definition of the criteria; they, however, knew where to find them (intranet).

Some minor mistakes could also be found in the definitions; two respondents commented the incentive to be partly based on the results of the corporation. In reality the incentive is, however, based on the results of the *division* of the corporation the mill belongs to, not the whole corporation. Cautiously interpreting, the definitions received may signal the respondents' interest in the matter and com-

position of their total personal income. Whereas, for example, one blue-collar informed the criteria to be decided by the employer, another could define exactly how the incentive is comprised and based on which criteria.

Personal incentive criteria listed by two upper level white-collars are not discussed in detail as the criteria vary from person to person, based on the duties and responsibilities. The personal incentive criteria received were thus purposely omitted from Table 52. What, however, should be noted, as the personal criteria may be set at a different corporate organ and/or by different persons as the goals for the rest of the mill, the individual targets may not all be especially lined with the mill targets.

To **summarize**, all except one blue-collar respondent (24 of 25) knew that they are rewarded based on an evaluation and incentive system. The incentive criteria were also relatively well known by most of the respondents; two out of 16 white-collars and two out of 9 blue-collar stated not to know them.

The different definitions of incentive criteria received also showed that most respondents either have a very clear or at least average knowledge of the incentive criteria applied. Moreover, if the respondents did not specifically list the criteria, they knew where to find them (intranet). Some of the definitions received were really specific whereas others were more undetailed.

Some mistakes in the incentive criteria listed could also be noticed; some respondents informed the incentive to be partly based on the result of the whole corporation, not the division. The personal incentive criteria received from two upper level white-collars, on the other hand, differed from the criteria of the other respondents. As some mill employees may thus have totally differing incentive criteria, it should be carefully confirmed that the targets of those people also guide towards the same direction as the targets of the rest of the personnel.

All in all, the membership in an evaluation and incentive system and the rationale behind the determination of the incentives seemed to be quite well known amongst both respondent groups.

#### **5.4 Diamond Mill's Internal Integration in Spring-Autumn 2015 – Interview Results**

Based on the responses received to the www –survey (see Section 5.3), additional interviews were decided to be organized in order to receive extra clarification to the items that divided the opinions within or between the respondent groups. The interview themes were chosen amongst the statements of the www –survey; some individual statements were combined into wider scope interview themes, if applicable. The actual interview questions are presented in Appendix 11.

The results of the interviews are presented below. Four of the interviewees were white-collar and two blue-collar employees. Comments from the warehousing and dispatch blue-collar employees remained lacking. Due to guaranteeing anonymity, the answers of all respondents are mainly discussed simultaneously. If a clear distinction could be seen between the responses received from the white- and blue-collar employees, a comment of the varying opinions is, however, presented. It should be noted that the answers received from all respondents represent their personal opinions and as such cannot be generalized. The aim of the interviews was consequently to receive some explanations and clarifications to the responses received to the www –survey, not to make generalizations. Some explaining factors were indeed received whereas the reasons behind dispersion of opinions in some matters were left unrevealed.

#### ***5.4.1 Overall Status and Efficiency and Adequacy of Information Sharing***

**Question 1** enquired the interviewees' opinions on whether information is shared between the concerned three departments and whether they regard the information sharing to be efficient and adequate (survey Statements 1, 3, & 4). In addition, the interviewees were asked to justify their opinions.

Two of the interviewees commented the information sharing occurring between production planning, production, and warehousing and dispatch to be efficient and adequate from their perspectives. One of the positively answered interviewees additionally commented that the information sharing activities have in fact greatly improved during summer 2015 due to the new Mill Execution System (MES) development project that had different organizational level representatives from all the concerned departments. The other interviewees, however, commented that the overall information sharing occurring between the concerned departments has room for improvement; information is indeed shared but not in all circumstances, and the level and style of information sharing varies between the different departments.

Based on the responses received, the information sharing occurring between production planning (PP) – production (P) and production planning (PP) – warehousing and dispatch (WD) seems to operate better than the information sharing between P and WD. Moreover, based on the comments received it also seems that the information sharing occurring between PP and P works better from PP to P than from P to PP.

According to the interviewees, in some cases needed information is lost between P and PP. On the other hand, PP may also sometimes forget to inform P of, for example, changes made to production runs. It was commented that in normal situations adequate information is shared between PP and P departments; howev-

er, in urgent disturbance situations information sharing may be forgotten, although it would be important, as concentration is on solving the situation.

It was, additionally, wished that PP representatives would visit more the production department and discuss with the employees concerning common interests – trims, overall paper machine efficiency, and so forward. It was seen that this type of closer information sharing and discussion would help in creating a common understanding of joint matters. Related to the same matter, another respondent commented that this type of closer communication had in fact already begun during the summer 2015. Co-operation in the new MES project had brought the representatives of different departments (mentally) closer to one another and had thus enabled freer exchange of ideas and information; when people know each other, it is also easier to contact one another.

The information sharing occurring between PP – WD and WD – PP, on the other hand, was seen to operate well from both perspectives. Each party informs the other of, for example, changes made that affect the operations of the other department. WD representatives also visit regularly PP department.

On the other hand, several respondents mentioned that information is not too extensively shared between P and WD departments, to either destination; warehouse was seen to operate quite independently and isolated. It was commented that the WD is not represented in the common production department morning meetings. Additionally, it was also commented that the persons in the two departments do not even know each other. However, it should be noted that based on the answers received, the situation is different between the different shifts. In some shifts the employees of the two departments are more in contact with each other than in others.

It was also commented that fault can be found in both departments; both departments could be more active in cross-departmental information sharing. Information coming from P may, for example, reach the WD blue-collar level, but not the superiors; new Mill Execution System was seen to help in this matter. On the other hand, WD representatives do not actively inform P department of certain matters, as they not know what would be relevant and wished information to be distributed.

All in all, although most of the interviewees commented that the cross-departmental information sharing could be developed and improved, many of them also commented that adequate amount of information sharing is a relative concept. What is adequate, changes from person to person. In addition, information sharing has two parties – the sender and the receiver. Although information would be shared, it may not always be accepted, absorbed, and utilized.

#### 5.4.2 *Keeping Information Relevant to Others Consciously within Departments*

**Question 2** enquired the interviewees' opinions on whether they believe that information that is relevant to the other departments is consciously kept within the departments (survey Statement 2). The interviewees were also asked to justify their opinions.

None of the interviewees believed in conscious concealing of relevant information within the departments. One of the respondents commented that this kind of concealing of information had happened in the past but that the situation had lately improved. It was commented that if relevant information is not shared, most probably it is due to simply not understanding or forgetting that someone would need it. It was also commented that the mill has a really good spirit amongst all employees. Discussion is very open and all people despite the department or organizational level are very easy to approach. Additionally, it was also commented that it is not worth it to conceal some information; the concealing will be revealed at some point anyhow.

No explanation for the stands somewhat agreeing with the survey Statement 2 “*The different departments keep information which is relevant to the other departments consciously to themselves*” were thus received.

#### 5.4.3 *Information Sharing Climate*

**Question 3** enquired the interviewees' opinions on whether they regard the mill's climate to be open and encouraging towards information sharing (survey Statements 8 & 9). In addition, the interviewees were asked to justify their opinions.

All of the interviewees had a relatively or very positive stand concerning the matter. At the least, it was mentioned that the climate does not prevent information sharing. On the other hand, it was several times mentioned that the mill's overall positive spirit enables and fosters information sharing. The climate is relaxed and communicative, and matters can be handled and discussed with anyone – employees from blue-collar level to top management are part of the same “gang”. Related to this cohesiveness, it was also mentioned that the Mill Director visits regularly the production department and discusses with all employees, including the blue-collar paper machine operators. This was seen as a very positive gesture of building good team spirit.

On the other hand, as a development proposal it was suggested that the information sharing climate could be improved by receiving representation from the WD department to the production department morning meetings. It would further lower the threshold of contacting each other over the departmental borders. Oth-

erwise the interviews did not provide development proposals or explanations to the somewhat negative stands received to the survey Statements 8 “*The mill’s climate is open towards information sharing executed between the concerned departments*” and 9 “*The mill’s climate encourages information sharing between the concerned departments*”.

#### **5.4.4 Accessibility and Usability of Other Members of the Organization**

**Question 4** enquired the respondents’ opinions on whether they regard it to be easy to get time of the representatives of the other two departments to go through common issues (survey Statement 13). The interviewees were also asked to justify their opinions.

The overall opinion was that, for example, in urgent cases (production disturbances, production planning or warehousing problems, and so forward) the time is always found; the cases must be solved and thus also time must be found. Many times the cases are solved by simply calling or visiting the representatives of the other department. Such an amount of time is always found. It was consequently mentioned that the urgent cases have never been left unsolved due to lack of time of the relevant persons.

Based on the interview discussions, the less urgent cases might be somewhat more problematic. Moreover, based on the responses received, the availability of time itself may not be the only or main issue, but the lack of knowledge of the responsible person(s). Some cross-departmental development cases, or similar, may, for example, be discussed in the production department morning meeting – “such and such issues should be developed and/or taken care of”. A responsible person may, however, be left unnamed and thus the actions are not really taken care of by anyone. Additionally, if the responsible person is missing from one department, the representatives of the other two departments do not know whom to contact.

The production department morning meeting, on the other hand, was mentioned as a good place to go through common issues. However, it was also mentioned that as, for example, production planning is usually represented only once a week, it may slow down solving of some common matters. Similarly, the absence of representative of warehousing and dispatch was seen to complicate the cooperation.

Finally, one of the respondents also wished that a common, less formal get-together would be organized for the representatives of the three departments outside the mill and office hours. Such an event was seen to enable better cross-departmental information sharing and collaboration as people get to know each other better on a personal level and may consequently tie personal relationships.

### **5.4.5** *Cross-Departmental Consideration in Decision Making*

**Question 5** enquired the interviewees' opinions on whether they believe that the representatives of the other two departments consider how their decisions affect the operations of the interviewee's department while making them (survey Statement 24). Additionally, the interviewees were asked to justify their opinions. Questions 5 and 6 (below, Section 5.4.6) were in some cases discussed simultaneously; thus the results of the two questions may partly overlap.

Two of the interviewees did not have a clear opinion of the matter. One of the respondents stated that his/her department (production) does not always consider the other departments when making decisions but he/she did know how the other two departments operate. The other interviewee, on the other hand, commented that his/her experience of the matter is limited but following from the side has noted that sometimes it is not thought how some decision affects the other departments. For example, such reels may have been sent forward from the mill that should have been rejected due to quality problems. The reels may thus have consequently been forced to be pulled back from the harbor or customer, causing additional transportation, reproduction, and production planning pressures. Such a decision made by the production department has thus sometimes caused extra work and problems for both production planning and warehousing and dispatch operations. On the other hand, providing another example, the warehousing and dispatch employees may have at some point rejected some reels due to, for example, handling damages. However, the production planning may not have been informed of the decision. Consequently the production planning representatives may have heard of the lacking reels only from the customer, demanding explanation and fulfilment of the order. A decision made by the warehousing and dispatch operations may thus sometimes have caused extra pressure for both production planning and production operations. The interviewee providing the examples, however, commented that most probably the people making decisions in the different departments do not aim at causing problems for the others. They just simply do not always understand or remember to think how their decisions affect the others in the chain.

The other interviewees, on the other hand, had a quite clear opinion that people in the different departments do indeed consider how their decisions affect the operations of the other departments. Production planning was several times mentioned as a good example. Production planning was seen to have competent employees, who are very good at considering how their own decisions affect both the production and warehousing and dispatch operations. Production planning was also several times mentioned to work as a link between production and warehousing and dispatch. If, for example, there has been a lack of trailers or wagons, warehousing and dispatch has contacted production planning representa-

tives who have consequently changed the order of the production runs, taking into consideration the view of the production operations. It thus seems that production planning operates as a mediating link between production and warehousing and dispatch – the production planners ensure that the viewpoints of all departments get considered.

On the other hand, providing another example of good consideration, it was mentioned that if, for example, the warehouse is reaching its capacity limits, the full warehouse does not force machine standstills but new warehousing capacity is searched from somewhere else, for example, the harbors. On the other hand, as an example of opposite behavior, it was also mentioned that production may not always consider matters from the perspective of the warehousing and dispatch. For example, large amounts of rejected goods may sometimes be delivered to the warehouse without considering how the decision affects the operations within the warehouse.

To finalize the discussion, one of the respondents commented that on a strategical (management board) level, things are surely considered from the perspectives of the different departments. However, in some more minor, daily cases the cross-departmental consideration may be lacking; people may be in a hurry, have lack of resources, or simply forget or do not understand that things should be considered from several perspectives. According to the interviewee, the situation could be improved through knowing better the work field, duties, and motives of the different departments.

To summarize, the interviews thus provided some explanations and examples to the varying opinions received to survey Statement 24 “*When the representatives of the other two departments make decisions in their work, they consider how they affect the operations of my own department*”.

#### **5.4.6 Cross-Departmental Consultation in Decision Making**

**Question 6** enquired the interviewees’ opinions on whether they believe that the different, concerned departments consult one another before making decisions that affect the operations of the other two departments (survey Statements 25-27). In addition, the interviewees were also asked to justify their opinions. As mentioned above, the questions 5 and 6 were in some interviews handled simultaneously; thus the discussion in Sections 5.4.5 and 5.4.6 may partly overlap. In addition, the examples of cross-departmental consideration discussed in Section 5.4.5 also work as examples of situations where cross-departmental consultation has and has not been made.

The overall feeling amongst the interviewees was that cross-departmental consultation is generally made between the concerned departments; it is part of nor-

mal, daily operations. The blue-collar respondents commented that they do not see the consultation at their level, or that they are not personally consulted, but still believed it to happen. Whether consultation is done *before* or *after* the decision making depends on the situation. If, for example, some production problem occurs during the night time, the production planners may not be awakened to give comments on the matter; the problem is solved by the production department employees and the cross-departmental discussion is left to the next morning. In some special cases, the production planners may, however, also be contacted during the night time. Moreover, despite the time of the day, some production problems may demand immediate actions and thus consultations are not executed before solving the matter. Consultations additionally could not have changed the situation to one way or the other – the situation simply has to be solved and production planning and warehousing and dispatch need to deal with the consequences afterwards.

As discussed already in Section 5.4.5, based on the answers received, production department and warehousing and dispatch do not seem to consult each other directly too extensively. Only in some special occasions, the two departments may contact each other directly. Otherwise the communication goes through production planning. If some problems occur at the production department, the production employees contact the production planners who consequently contact the warehousing and dispatch representatives, and vice versa. The production planners thus seem to possess a very important role in guaranteeing the operability of the mill's internal – and consequently external – supply chain. They operate as a gatekeeper of information flow occurring between the different departments.

To finalize the discussion, one of the respondents commented that the new MES will improve knowledge and information sharing of actions occurring at the different, though linked departments. By looking at the MES screens containing data from several departments, the representatives of different departments may become aware of, for example, problem situations before the actual consultation activities are even begun.

The interviews, thus, shed some light on the varying opinions received to the survey concerning the cross-departmental consultation. However, no explanation was received to, for example, the somewhat negative blue-collar responses concerning consultation executed by the production planning department (survey Statement 25). All the comments received concerning production planning were rather positive than negative. This issue should thus be further researched. However, as both blue-collar interviewees commented that they do not actually see the consultation personally, it could be suspected that the negative responses are rather based on feelings, not knowledge. Additionally, the negative responses could also be due to not knowing the reasons why production planning operates the way it does. One of the blue-collar interviewees commented that the blue-

collar level should receive more training and/or education concerning the duties and operations of the other departments. This deduction is, however, quite purely guessing.

#### 5.4.7 *One Chain vs. Functional Silos*

**Question 7** enquired the interviewees' opinions on whether they regard the three concerned departments to operate as one entity/chain or whether they rather regard the concentration of each department to be on managing and developing its own operations (survey Statement S28 & S29). The interviewees were also asked to justify their opinions.

Question 7 was the only question that clearly divided the opinions between the blue-collar and white-collar interviewees. Both of the blue-collar interviewees commented that the different departments still rather operate as separate, functional entities than as a larger chain. They regarded it to be a settled way of working; it may not be intentional, but has been the way "things have always been done". According to the blue-collar interviewees, the different departments are not that much in contact with each other and that the organizational structures and separate budgets make boundaries between the departments. They also regarded the reward system to support concentration on departmental matters as different departments have different targets.

One of the blue-collar employees commented that the situation could be changed by working in different positions across departmental borders. He/she also suggested that there could be one vacancy that would entail production planning, production, and warehousing and dispatch duties. This would enable freer movement across current departmental borders, teach the different employees the duties of one another, and consequently enable them to rather think of a larger entity than separate functions.

All of the white-collar interviewees, on the other hand, regarded the concerned departments to work as one entity. They commented that the different departments work as one chain, where each link affects one another. If problems occur at some part of the chain, it will also be visible in the other parts.

The interviewees, however, also additionally commented that in addition to considering the larger chain, each function should also concentrate on managing its own operations as well as possible. Each function was also mentioned to possibly have its own interests, priorities, and targets; however, according to the interviewees, the functional interests should be such that they lead towards reaching the common targets. As one interviewee phrased it, the interests of all departments should be optimized while aiming at satisfying the customers.

#### **5.4.8 *Placing Blame vs. Finding Common Solutions to Problems***

**Question 8** enquired the interviewees' opinions on whether in cross-departmental problem situations the concentration is rather on placing blame/finding the guilty party or on finding common solutions to problems (survey Statement S42). The interviewees were also asked to justify their opinions.

All of the interviewees shared the opinion that concentration is on finding common solutions, not on placing blame. It was commented that some negatively toned discussing may occur, for example, in coffee table discussions but despite it the concentration is on solving the cases. Additionally, it was also mentioned that some mill-internal competition may occur and due to it, certain types of issues may be brought up in suitable occasions and forums. However, a culture of placing blame or finding the guilty party was still not regarded to exist.

It was mentioned that people working at the different departments are professionals who are not afraid of doing extra work if needed. Problems are discussed and solved, it is considered how they can be prevented in the future, and after that all move on. Criticism and constructive feedback may also be presented but the target of it is not to put the blame on anyone or any party; it should not also be taken as such.

It was also commented that years of rationalization of operations have taught all employees the importance of finding common solutions. In addition, it was also mentioned that all employees should rather be able to act when needed than freeze due to being afraid of making mistakes.

The interviews thus did not provide explanation to the survey responses somewhat or fully agreeing with the survey Statement 42 "*If something goes wrong, the departments rather concentrate on placing blame/finding the guilty party than on finding common solutions to the problem*".

#### **5.4.9 *Personal Satisfaction with Cross-Departmental Collaboration***

**Question 9** enquired the interviewees' opinion on whether they are personally satisfied with the cross-departmental collaboration occurring between the concerned three departments (survey Statement 43). The interviewees were also asked to justify their opinions.

All of the interviewees were somewhat satisfied with the current situation; however, almost all of the interviewees also presented development suggestions/wishes. It was commented, for example, that the current situation does not prevent the execution of work duties, all departments have professional employees willing to work together, and that change situations are handled willingly in all concerned departments. However, it was also wished that the production

planning and warehousing and dispatch employees would be more visible in the production department. In addition, it was also wished that some less formal cross-departmental get-togethers would be organized. The more there would be reciprocal interaction in different forms, the higher the level of collaboration that could also consequently be reached.

It was additionally wished that the warehousing and dispatch employees would join the common production department morning meeting at least every now and then – to both deliver and gain needed information and to get to know one another better. The need for this participation was also recognized in the warehousing and dispatch department itself. Especially as the operating environment is changing, it was seen that the cross-departmental cooperation should be more active.

Additionally, it was also commented that in order to improve the cross-departmental collaboration, the blue-collar employees should receive more information, training, and/or education of the tasks and work duties executed at each of the concerned departments. This would increase their understanding of the priorities and motives of operating of each department, and consequently would improve the foundation of cross-departmental collaboration. It was also seen that such extra training/education would be worthwhile to be organized now as the mill is starting its new operations.

On the other hand, it was also seen that the level of cross-departmental collaboration had in fact already improved from spring 2015, when the survey was answered; this was seen to be due to, for example, the common MES project. Moreover, it was also commented that the future operating environment could improve the cross-departmental collaboration spontaneously. It was seen that the world would in some sense become simpler (for example, less products, less grammages, and so forward), and consequently would also make the collaboration easier.

The answers received thus did not clearly provide explanations to the negatively toned blue-collar answers received to survey Statement 43, “*On a general level I am satisfied with the cross-departmental collaboration occurring between the concerned departments*”. However, several development suggestions were nevertheless received.

#### ***5.4.10 Encouragement of Cross-Departmental Collaboration by Top Management***

**Question 10**, finally, enquired the interviewees’ opinions on whether they believe that the mill’s top management (management board) encourages cross-

departmental collaboration. The interviewees were also asked to justify their opinions.

The overall opinion amongst the interviewees seemed to be that *most probably* the mill's management board *does encourage* collaboration but clear examples where this encouragement would be visible could not be provided. It was commented that it may be brought up in discussions that information sharing and collaboration should be enhanced but that it does not lead to concrete actions. In addition, it was also commented that cross-departmental collaboration is not discouraged, but its encouragement is not clearly visible either.

However, one of the interviewees, on the other hand, commented that as the collaboration works relatively well as it is, no clear management board "intervention" has been needed. According to the interviewee, a good, overall level of collaboration has been reached; the situation can surely be developed but it does not require imperative actions.

All in all, reviewing all the answers received, if the mill wishes the different departments to work more actively and visibly together, the mill's top management could communicate this matter more openly.

## 6 DIAMOND MILL, PM3 – IN NEW PRODUCTION MODE (2015-)

The objective of the current chapter is to describe the future operations and operating environment of the Diamond Mill as it will commence and execute the carton board production. The emphasis is on describing the three internal functions, production planning, production, and warehousing and dispatch operations, as the dissertation focuses on the internal integration of these functions. However, additional information of, for example, the mill's future sales related matters is also provided in order to create a more profound overview of the coming operating environment.

As the actual operations have not yet started and, on the other hand, as the final modes of operation will develop based on experience received, the future operations, duties, etc. cannot be described as profoundly and detailed as the operations of the fine paper production (see Chapters 4-5). Rather, the current chapter aims at providing an overview of what the future of the mill will *presumably* look like; the target of the discussion is to address such matters that make it possible to compare the characteristics of the old operating environment with the characteristics of the new operating environment.

### 6.1 Commencement of Diamond Mill's Carton Board Production – Basic Data

As has already been briefly discussed earlier, the actual *conversion of the Diamond PM3* from fine papers to carton board will be executed during the autumn of 2015. Fine paper orders will still be produced until the end of August, after which all operations of the mill are turned to carton board. The actual carton board production is expected to commence during the last quarter of the year. (Pearl Group Website, 2014.)

Consequently, as of September 1<sup>st</sup> 2015, Diamond Mill will change its *position in the Pearl Group*. In the future the mill will belong to the Pearl Group Packaging Division, which also includes container board mills in South Finland (Crystal Mill, virgin fiber based semi-chemical fluting) and in North East Poland (Topaz Mill, recycled fiber based testliner and wellenstoff), in addition to several converting plants in ten countries in Europe and Asia. (Production Manager, 4.5.2015; Pearl Group Website, 2015.) The role of Diamond PM3 in the division

is to produce virgin fiber based brown and white top kraftliner which have earlier been missing from Pearl Group's product portfolio (Production Manager, 4.5.2015). According to Pearl Group (2015c), "[Pearl Group Packaging Division] [...] develops innovative fiber-based packaging solutions to build brand value for customers, support their sales, and optimize their performance to reduce total cost. Packaging [Division] operates in every stage of the value chain, from pulp production, material and packaging production to recycling."

The *new organizational structure* of the mill is still under development (spring 2015). The organization will, however, not stay in its earlier/present form; some changes have already been informed (see Section 6.3.1, production planning and warehousing organization), whereas other changes/confirmations of the final organizational structure and the consequent responsibilities are still to be decided and announced. The final organization should be ready when the production starts. (Production Manager, 4.5.2015.)

## 6.2 Produced Products, Production Details and Characteristics

The current section is mainly based on discussions had with Diamond Mill's Production Manager on 4.5.2015; additional sources are separately presented.

Starting Q4 2015 Diamond PM3 will produce virgin fiber based brown and white top kraftliner for its new customers. The overall *capacity* of the mill will be approximately 400,000 tons, out of which approximately two thirds will be used for brown kraftliner (KL) and one third for white top kraftliner (WTKL).

The products will principally be produced out of self-produced, virgin fiber brown *pulp* (pine, spruce, some aspen) and externally purchased, virgin fiber bleached pulp (mixture, mainly birch, some pine). Each product will have two layers, a brown bottom layer (made of own pulp) and either a brown (own pulp) or white (externally purchased pulp) top layer. In addition, some recycled fiber based raw material may be used in the bottom layer of the products in certain qualities and grammages.

The products will consequently be further refined into corrugated cardboard, together with other raw materials (fluting), in the next step of the value chain. The raw material sufficiency of the mill is in the future challenged by the fact that the mill's pulp mill has a smaller capacity than the capacity of the PM3. In practice this means that the mill's overall production and running order of different products/orders should be very carefully planned and managed in order to optimize and balance the raw material resources at all times.

The products will be produced in wide *grammage ranges*, ranging between 80 – 250 g/m<sup>2</sup>. In the beginning of the production, the grammage range will, howev-

er, be narrower; the emphasis is then on *truly* starting the production and reaching acceptable quality levels.

The *width of the paper machine*, on the other hand, will be 7,800 mm. The coming *reel widths*, ordered by the customers, are expected to be much wider than during the fine paper production. The coming widths are supposed to vary approximately between 800 – 2,800 mm. The maximum achievable trim width will also be 7,800 mm; this may be reached, for example, by combining three wide reels, 2 X 2,500 mm and 1 X 2,800 mm. (Production Manager, 4.5.2015; Transport Manager, 12.5.2015.)

The final *diameters* of the reels, on the other hand, are yet to be decided. The mill is likely to only produce the goods in two or three diameters, ranging within 1,200 – 1,500 mm. The **core** to be used will be 110 mm. Combining the reel width of 2,800 mm and a diameter of 1,500 mm would result in a computational *maximum weight* of 4,300 kilos per reel. The *average reel weight* is expected to be between 2,800 – 3,000 kilos. (Production Manager, 4.5.2015; Transport Manager, 12.5.2015.)

In addition, all external orders will be produced according to orders received, utilizing *MTO* (make-to-order) principles. Some product-grammage-width combinations to internal customers, Pearl Group's own corrugated cardboard mills, will be produced to stock (*MTS*, make-to-stock) and sold utilizing consignment stock principles. (Operational Supply Chain Director, 4.5.2015.)

The final *production organization* (white-collar, blue-collar) is still under development; the duties and responsibilities of different people are yet to be announced.

Compared to the fine paper production, in the future the mill will have *fewer different products/qualities* to produce, but *a very large range and dispersion of grammages*. The actual production operations are not expected to become easier than in the past, but in some sense may even become more difficult. The large grammage range offered, for example, results in extensive “zig-zaging” between the different grammages; consequently the need of at least slight production parameter changes will be constant.

Small grammage changes, however, are not expected to cause *production waste*; the paper machine may be set to “slide” flexibly from one grammage to the other – similarly as was with the fine paper production. Large amount of waste, however, is expected to be caused due to changing the production regularly from KL (brown) to WTKL (white), and vice versa. The quality change between the two products is very large and thus results in large amount of unacceptable production waste and loss of time, production amount, and efficiency. Broadly, the change between the two products is expected to cause more waste than the changes of quality settings of the current fine paper production.

However, as has been briefly discussed earlier, the Diamond Mill's future production operations may be most challenged by finding the *balance between the capacities* of the pulp mill and the actual paper machine at all times. The ideal, future production cycles (changing of products and grammages, duration/length of each cycle, etc.), that would optimize both production amount and customer deliveries, have been modelled in advance. However, the future will show how well the plan can be applied in reality; very much is dependent on, for example, the actual orders received from the customers and the runnability and functionality of the paper machine.

Moreover, the sufficiency of the raw material is not the only concern in this matter. The need of personnel resources in different parts of the manufacturing process changes radically according to the products produced. The mill should thus simultaneously be able to *optimize* both the sufficiency and timeliness of raw materials and *manpower*; the right amount of personnel should be available at the right place at the right time. Moreover, all people should have meaningful duties at all times.

The new Manufacturing Execution System (see Section 5.2) has been tried to be planned and designed in a manner that would help the optimization of both raw materials and workforce. As has been discussed earlier, different parties will have screens through which they will see how their own actions affect the other parts of the manufacturing process. The screens of production planners, for example, will also show details of raw material levels. Consequently they will see how their own actions affect the sufficiency of pulp. For example, as the production of light grammages uses more pulp, the more the production planners plan light weight orders for production, the more they demand from the mill's raw material resources.

In addition, due to the changing workload in different parts of the production process, in the future all production employees need to be more multi-skilled and able and willing to flexibly change their workplace and responsibilities as the situation demands. The mill will employ a rotation program of the production duties in order to be able to both balance and optimize the work load in different parts of the process and of different employees.

As has been mentioned several times earlier, the actual carton board production will start during the last quarter of year 2015. In the very beginning, the production operations are expected to face *quality and production problems*. The production amount of acceptable quality board is expected to increase little by little; the *full capacity* is potentially expected to be reached during year 2017.

### **6.3 Production Planning and Warehousing and Dispatch**

The current section is mainly based on discussions had with Diamond Mill's coming Operational Supply Chain Director on 4.5.2015 and 25.6.2015, in addition to unpublished Operational Supply Chain Organization Material (received 4.5.2015); additional sources are presented separately. Section 6.3.2 presents the researcher's analyses of the organizational changes.

Diamond Mill's production planning and warehousing and dispatch organizations will change as of September 1<sup>st</sup> 2015. The current (spring 2015) MOP –team members and Warehouse and Dispatch Foreman 1 (WDF1) will have a new superior, new titles, new colleagues, and partly also new responsibilities.

September 2015 onwards the MOP –team members and the WDF1 will move to the mill-external supply chain organization, common for all Packaging Division mills, and will work under the supervision of Operational Supply Chain Director (OSCD). The current superior of the MOP –team, Senior Manager, Master Planning, will continue to work for the Printing Division. The current superior of the WDF1, Transport Manager, on the other hand, will likely continue in his old duties in the mill organization, however, without the superior position of WDF1.

In the future, the customer service tasks (confirmation of orders, invoicing, documenting, etc.), in addition to some transporting related tasks (organizing and booking of foreign direct trucks, etc.), will be taken back to the mill and to the operational supply chain organization. During 2014-2015 these duties were handled by the mill-external Customer Service Centers (CSCs, see Section 4.1.6). This change consequently affects the duties of the current MOP –team members. In addition, new people have already been hired, for the mill to be able to handle all its future customer service, production planning, and logistics related responsibilities.

#### **6.3.1 Operational Supply Chain Organization**

The Operational Supply Chain (OSC) organization will include three mills, Diamond and Crystal Mills in Finland and Topaz Mill in Poland (see more of the mills in Section 6.1), and will operate under the Pearl Packaging Division's Supply Chain Management, in direct supervision of the OSCD. Diamond and Crystal Mills will form a common OSC Team Finland, and will consequently work in close co-operation with each other in the future. The OSC organization will also include 57 employees in Poland, at Topaz Mill. However, as the operations of the Topaz Mill will not affect the operations at the Diamond Mill, they will not be further discussed in the description below.

In the new organization, the duties of the employees are divided into customer service, supply and production planning, and logistics. The Supply Chain Coordinators for *Customer Service* (SCCCS) are in charge of the whole order handling process of orders coming from, for example, certain geographical areas or specific customers: receiving and confirming orders, invoicing, crediting, creating transporting documentation, monitoring inventory levels, acting as a contact point for the customers, agents, and/or foreign sales offices, etc. What is worth noticing, in the future, each SCCCS will handle orders of *both mills*, Diamond and Crystal. Customers and sales office representatives will thus have a one-face-approach for all of their interrelated carton board needs and questions (kraftliner/Diamond Mill and fluting/Crystal Mill). The SCCCSs, on the other hand, consequently need to be multi-skilled and know the products and individual characteristics of both mills. In the beginning, the Finnish OSC organization will include 8 SCCCSs.

The *production planning* duties, on the other hand, will be divided between Supply Chain Coordinator for Supply Planning (CSCSP) and two Supply Chain Coordinators for Production Planning (SCCPP). The SCCSP will be located at Crystal Mill and will be in charge of long term supply and production planning of both mills (coming 4 weeks – 6 months), utilizing the common sales system. He will be in charge of, for example, setting sales/production quotas of both mills based on guidance received from the sales organization, executing long term rough production planning in the sales system/balancing anticipated demand and capacities, controlling old stock levels, identifying long term side run needs, etc. Both mills, on the other hand, will have a separate SCCPP, specialized in the production planning of each mill. The duties of the SCCPPs will include short term, rough production planning (up to two weeks) and fine production planning in the mill system (trimming, forming and activating production runs, etc.), identifying side run needs for the coming production runs, planning production for the mill's re-winder, etc. The two mills will employ a different Manufacturing Execution System. Thus the substitution of each production planner, when needed, will be organized within each mill instead of the production planners substituting one another.

The *logistics* duties of the OSC organization, on the other hand, will be handled by two Supply Chain Coordinators for Forwarding (SCCFs) and two Forwarding Foremen (FFs). Each mill will have one SCCF and FF; the two SCCFs, however, will operate in co-operation and execute their duties on behalf of both mills. The FFs, on the other hand, will concentrate on the operations of their own, individual mills.

The duties of the SCCFs will include organizing the direct land deliveries to foreign customers or inland terminals: selecting suppliers and booking land transportation to selected destinations, combining and optimizing part loads, op-

timizing costs vs. service provided to customers together with the SCCCSs, monitoring land transportation costs and delivery reliability, and matching outbound and inbound transportation, if possible. The contracts with the different trucking companies are and will be organized by Pearl Group's separate logistics organization, Pearl Logistics (PL), as currently (spring 2015).

The FFs, on the other hand, will operate as supervisors of each mill's loading operations and staff. The Diamond FF, however, will not act as the administrative superior of the mill's loading staff; they will remain in the mill organization. In practice the employees will, nevertheless, work under the command of the FF. The FFs will be responsible for the effective and efficient loading and dispatching operations, in addition to their safety. The FFs will also be responsible for the operability and maintenance of the forklifts utilized in the loading operations, acting as a contact person towards the railway operator, planning and organizing stuffing of containers at the mill, and booking pre-carriage trucks for port delivery.

As mentioned above, the OSCD, on the other hand, will operate as a superior of the whole OSC organization. She will be responsible for the overall operative supply chain activity (customer service, production planning, dispatch logistics) and personnel at Diamond, Crystal, and Topaz Mills. In addition, she will hold a process owner position of production planning activities. In this role she will be responsible for all development actions of the mills' production planning activities. The OSC organization will also have a named process owner for customer service and logistics; the target of the process owners is to work together in order to optimize the overall functionality of the OSC operations.

In addition to the OSCD, each mill will also have a local team leader, chosen amongst the OSC employees. The team leaders (except for Poland) will not have a superior position but will in charge of, for example, organizing holiday substitution and a weekly supply outlook meeting at each mill. To finalize the discussion of the duties of the various OSC employees, in addition to all the separate duties mentioned above, all employees are also responsible for communicating daily with relevant, linked supply chain parties.

### ***6.3.2 Consequences of Organizational Change on Diamond Mill's Production Planning and Warehousing and Dispatch Operations***

Discussing the Diamond Mill separately and concentrating on the production planning and warehousing and dispatch operations, in the future the mill will only have one supply chain coordinator specializing in the production planning activities. One of the current MOP –team members will adopt the position of the future production planner. If at some point needed, she will be temporarily sub-

stituted by one/some of the other Diamond Mill's OSC employees. In addition to the "named" production planner, at least two or three other OSC employees will thus also be trained to manage the production planning duties (Operational Supply Chain Director, 25.6.2015).

Compared to the current fine paper production, the duties of the production planner will be narrowed to some extent; for example, the quota management actions will be handled by the SCCSP in the future. The actual fine production planning duties (trimming, forming of production runs, etc.) will, however, remain practically the same; though the production planning systems used will largely change due to the deployment of the new MES.

Compared to the current situation (spring/summer 2015), the production planner will have new information sharing and collaboration parties: a new superior, OSCD and new colleagues (SCCSP, SCCCSs, and SCCFs) both at the own and Crystal Mill. All of the future OSC employees to-be-working at the Diamond Mill have a long background in the Diamond Mill Integrate. The new Crystal Mill colleagues, however, are all new acquaintances.

Some of the current information sharing and collaboration parties of the production planner will also cease to exist: current superior Senior Manager, Master Planning and external Customer Service Center representatives. The current WDF1 will continue in the position of the mill's FF, and therefore the link between the production planner and FF will remain the same as currently. In the future the production planner and the WDF1 will also belong administratively to the same organization. The production planner's link to the sales organization will also remain the same as the former fine paper Director, Product Segment moved to operate as a Sales Director of the new carton board production. The information sharing and collaboration connections towards the production organization, on the other hand, still remain to be seen, as the production organization is still searching its final shape.

As mentioned above, the WDF1 will primarily continue in his old duties; however, under a supervision of a new superior (OSCD). The division of duties between the current WDF1 and WDF2 will, however, change, as currently the WDF2 has been in charge of, for example, operating as a contact person towards the railway service provider and organizing the stuffing of containers at the mill. In the future the WDF1 and WDF2 will belong to different organizations. The WDF1 will be part of the OSC organization, whereas the WDF2 will continue in the mill organization under the supervision of the Transport Manager. Despite the organizational separation, the foremen are likely to substitute each other as earlier (Operational Supply Chain Director, 4.5.2015).

As mentioned earlier, in the future the WDF1 will also not operate as a superior of the warehouse and dispatch employees. The OSC organization will purchase the service of 12 warehouse and dispatch blue collars. Administratively the

employees will, however, remain in the mill organization, either under command of the WDF2 or the Transport Manager. (Ibid.)

Apart from the new superior, the WDF1's information sharing and collaboration parties remain primarily the same. While substituting the WDF2 during the fine paper production, the WDF1 has already been in contact with the railway operator and the container suppliers. Moreover, as was the case with the production planner, the WDF1's future contact links to the production organization still remain open, due to the open production organization structure.

### ***6.3.3 Warehousing and Dispatch Details and Characteristics***

The actual warehousing and dispatch operations are expected to remain largely unchanged after the commencement of the corrugated board production. If the situation demands, the operations will be up-dated according to the experience received.

The increasing reel size, however, will bring some changes to the warehousing and dispatch operations. As both the widths and average weight of the reels-to-be-handled will increase significantly in the future, the mill will need to purchase/lease bigger forklifts in order to be able to handle the larger reels. The mill's road transport loading places will also be modified to better suit the new dimensions of the future reels. One new loading bridge for side-loading will be built; in addition, one current (spring 2015) loading bridge meant for rear-loading will be changed to side-loading. In the future the mill will thus have three loading bridges for side-loading and three loading bridges for rear-loading. (Operational Supply Chain Director, 4.5.2015; Transport Manager, 12.5.2015.)

What should, however, be noted, despite the new road transport loading bridges, in the future the mill will most probably deliver more by rail. This is due to being unable to load the very wide reels into normal trucks, in addition to emergence of new delivery destinations/markets, unreachable by direct trucks. (Transport Manager, 12.5.2015.)

Discussing the capacity and physical outlook of the warehouse, due to the change of the production mode, the amount of possible tonnage-to-be-stored will increase and the amount of separate orders and reels to-be-stored will decrease. Computationally, in the future the warehouse will be able to fit 10,000 – 13,000 tons of reels, whereas the current maximum capacity is approximately 5,500 tons. On the other hand, in the future the warehouse will handle approximately 140,000 reels per year, whereas the current figure is 290,000 reels. (Ibid.)

In practice the changing reel size thus means that weight-wise the capacity of the Diamond Mill's warehouse will double, whereas the amount of separate reels-to-be-handled will halve. The bigger reels and fewer orders, on the other

hand, enable better utilization of the separate warehousing locations; the main passageways may be widened and fewer side aisles will be needed. The separate warehousing locations can thus be better utilized in the future. (Ibid.)

All in all, in the future the Diamond Mill's warehouse employees need to be able to manage bigger reels, whereas the overall need of reel handling is expected to decrease. Operating in the warehouse, on the other hand, may become somewhat easier, as the warehouse facility will have more room for movement and fewer orders to warehouse, locate, fetch, and dispatch. No special instructions have yet been received from the new Division; some warehouse and dispatch related instructions are, however, anticipated. (Ibid.)

## 6.4 Future Sales and Customers

In order to receive a more comprehensive overview of the Diamond Mill's future operating environment, the mill's future sales and customer related matters are also briefly discussed below. The emphasis is given to such matters that may affect the operability of the mill's internal supply chain from production planning to warehousing and dispatch operations. The section is mainly based on discussions had with Diamond Mill's coming Sales Director on 18.6.2015, in addition to unpublished sales material received (received 12.5.2015). Additional sources are separately mentioned.

The mill's future sales will be handled by a mill-external *sales organization*. As has been briefly mentioned earlier, the mill's previous Director, Product Segment – in charge of the mill's fine paper sales – moved to work as a Sales Director of the new carton board production. He will be physically sitting at the mill, but will administratively belong to an external sales organization.

The Diamond Mill's sales will be executed together with and by the same staff as the sales of Pearl Group's Crystal and Topaz Mills, belonging to the same Division and producing linked products. Simplifying, the connections to the customers will be handled by the Finnish and foreign salesmen, and the orders coming from the customers will be handled by Pearl Group's sales offices, Packaging Division's customer service centers (order entry only), and the mill's OSC organization

The Diamond Mill's products will be sold under specific *brands and trademarks*. As discussed briefly earlier, they will be two layered products which strength properties are based on the virgin fiber raw materials, pine and spruce. The products will be further refined in corrugated board production and will be used for various types of industrial and consumer packaging. The *end uses of the products* include, for example, fruit and vegetable boxes, direct food contact boxes (fast food, frozen or chilled food), transport packaging and consumer dis-

plays, in addition to heavy duty packaging (household appliances, electronics, industrial parts and goods). Thus, as the Diamond Mill's products will be produced out of clean, virgin fiber, they will also be suitable for end uses requiring high purity.

The future *customer relationships* of Diamond Mill are currently (spring 2015) being tied. The mill has constructed a plan for selling its first, very likely down-graded production tonnage to a certain destination. In addition, the acceptability of the first production tonnage is planned to be tested and improved together with Pearl Group's internal customers.

The external customer base, on the other hand, is planned to be massively increased during years 2015 and 2016. As the products of Diamond and Crystal Mills will be used in the same end products, the mill already has knowledge and information of a large pool of potential customers. The majority of the customer base will be formed of corrugated board converters, whereas also direct brand owners (for example, fruit producers) are also targeted. The mill aims at focusing on such customer segments that show healthy growth and in which there is a clear need for the features provided by the virgin fiber raw material base. The target is consequently also to aim at such segments in which there is a low risk of substitution or cannibalization by recycled fiber based, competing products.

The target of the mill is to *win the customers* by understanding the customers better than the competitors, offering them solutions instead of mere products, and consequently by creating them superior value. In order to reach the target, the mill aims at providing the customers with excellent quality of both products and service level, created based on excellent internal resources and capabilities. In addition, the mill also aims at utilizing the broad portfolio of products offered by the different Pearl Group Mills in its sales and marketing efforts; the target of the mill is thus to communicate the ideology and benefits of the "one stop shop" in its customer contacts.

The mill and its sales organization have put a great effort into creating and communicating a specific, new marketing concept. The target of the concept is to offer and provide the customers with everything they may need – "one strong offer combining products and services". Discussing the products, the ideology of the concept is that the customers may receive the products of three different mills –Diamond, Crystal, and Topaz – "at one stop", from one place. The services offered, on the other hand, include diverse e-business solutions, product optimization/right grading and weighing, active technical customer service, and recycling service, currently in operation in Poland. The concept is currently (spring/summer 2015) being actively promoted amongst the potential customers around the world. The target is to build the concept into a strong brand that would communicate the potential and existing customers all they need to know in order to choose Pearl Group as their supplier.

In addition to the customer centricity, the mill also aims at reaching high cost competitiveness. Profitable business can only be executed by simultaneously monitoring and optimizing own costs, while concentrating on the customer needs. All in all, the mill's survival in the markets is dependent on how well it is able to deliver its message to the customers and to answer the customers' requests and demand. The global container board market is growing considerably and is thus tempting also other new, competing producers. Most of the newcomers, however, enter the recycled grades market. Therefore, as mentioned above, it is important for the mill to concentrate on those segments in which the customers truly value the characteristics provided by the virgin fiber raw materials.

After the initial contact to the potential customers has been made, the actual customer relationships are planned to be begun with trial orders.

The future of the mill's sales and customer relations remains to be seen. Much is dependent on the start-up of the PM3, quality levels reached, and fulfilment of initial customer (trial) orders. The initial *sales plans* have been made in collaboration with the Finnish and foreign salesmen, based on their inside knowledge of the different market conditions and demand. In the future the sales are expected to be distributed approximately to 60 % to Europe, 30 % to Asia, and 10 % to the rest of the world (for example, Middle East, Africa, and South America). Big future target markets include such countries as, for example, Germany, Italy, Spain, Philippines, and Egypt. Large potential for profitable growth, on the other hand, is seen in such markets as, for example, Mexico, Chile, Peru, Costa-Rica, Ecuador, Colombia, Morocco, Turkey, India, and China.

Due to the final end use of the products, the *demand forecasting* of the Diamond Mill's future products has some unusual characteristics. For example, the final demand of fruit and vegetable boxes is dependent on the yearly weather conditions and consequent crop yield at each target market. The changing demand conditions of fruit and vegetable boxes consequently affect the demand of Diamond Mill's products, used as raw material of the boxes. The demand of Diamond Mill's kraftliners is thus partly subject to both short-term seasonal and irrational demand changes, unforeseeable beforehand.

The senescence of different crops in different parts of the world balances the seasonal demand fluctuations of the Diamond Mill. On the other hand, giving an example of an irrational fluctuation, a natural disaster may destroy a whole fruit crop, resulting in severely decreased demand for fruit packaging. It, should, however, be noted that, for example, the large irrational fluctuations are moderated by the mill's future customer base. As most of the mill's future customers will be converters, not the final end users, their target is naturally to keep their own production running despite of, for example, a bad or late fruit crop. Thus the converters efforts in balancing and increasing their own demand moderate the negative demand fluctuation visible in the Diamond Mill's order books. Moreo-

ver, if the decreasing demand in some part of the world can be suspected beforehand – due to, for example, bad weather conditions –, the mill’s sales organization will also start proactively fulfilling the order books from other customers and other parts of the world. (Sales Director, 18.6.2015; Sales Product Owner, 24.6.2015.)

On the other hand, the demand of, for example, electronics and household appliance packaging is dependent on the consumer demand for such appliances, and consequently the overall, long-term economic climate. The better the economic climate and the better purchasing power the consumers have, the more there is demand for different appliances and consequently their packaging. (Sales Director, 18.6.2015; Sales Product Owner, 24.6.2015.)

In addition, the long term demand of Diamond Mill’s products is also affected by three global trends: emphasis on environmental friendliness, digitalization, and growing usage of self-ready-packaging (SRP)/retail-ready-packaging (RRP) and point-of-sale stands (POS). Corrugated boxes offer a much more environmentally friendly choice for packaging than their substitute plastic packages. Therefore, the demand of corrugated packaging can be expected to grow in the future, as the environmental issues will remain to be of and grow in importance. (Sales Director, 18.6.2015; Sales Product Owner, 24.6.2015.)

On the other hand, while being negative for the office paper business, digitalization is expected to increase the demand of corrugated packaging. As people, for example, order goods increasingly through the internet, more deliveries – requiring suitable packaging – are also done through normal mail. A positive demand trend is suspected both for minimalistic, “down-to-earth” home delivery packaging and very high class, printed, and visually pretentious packaging. (Sales Director, 18.6.2015; Sales Product Owner, 24.6.2015.)

SRP/RRP, on the other hand, refers to (printed) packages that are set on the store shelves as such and that contain separately packaged and sold, individual items. The SRP/RRP packages operate in dual roles, as protective cover during the transportation and as marketing material while the goods-within are being sold in the stores. The usage of SRP/RRP reduces the workload and fastens the operations in stores as the individual items within the SRPs do not need to be separate handled and unloaded from the outer packaging. (Sales Director, 18.6.2015; Sales Product Owner, 24.6.2015.)

Finally, the POSs refer to a form of selling where the producer of, for example, fruits sells its own different produce in grocery stores on separate stands provided by the producer itself. The target of POSs is to minimize the usage of plastics and to sell the products in environmentally sound forms, for example, in corrugated packaging. The POSs are developed for ecologically and environmentally conscious consumers, for a growing target group of young adults. (Sales Product Owner, 24.6.2015.)

All of the three trends discussed above are seen to support the demand of corrugated packaging, and consequently the demand of Diamond Mill's products. All in all, the future of the mill and the demand of its future products are seen to be promising. (Sales Director, 18.6.2015.)

Summarizing the discussion above, the future demand of the Diamond Mill's products will be subject to both long-term economic cycle and trend related fluctuations, in addition to short-term seasonal and irrational fluctuations. Currently (spring/summer 2015), however, the main concerns are in starting both the carton board production and the initial customer relationships.

## 7 DISCUSSION

Chapters 4-6 have presented a description of the case mill's operations during three different eras – in the old production mode and operating environment (2013-2014), during transition (2014-2015), and in the new production mode and operating environment (autumn 2015 onwards) –, in the light of the three internal integration elements defined in the research under scrutiny – formal and informal information sharing, collaboration, and their coordination. The main emphasis has been on describing internal integration existing between the case mill's production planning, production, and warehousing and dispatch departments. However, for example, the mill's history and sales related matters both in the old and new production mode are also presented in order to provide a more holistic overview of the mill's prevalent operations and operating environment.

Chapter 4 aimed at providing an as detailed description of the case mill's sales & customer service, production planning, production, and warehousing and dispatch operations as possible in the mill's old production mode (2013-2014). The description includes an overall presentation of each function, in addition to providing detailed work descriptions and tables of collaboration and information sharing parties of various employees involved in the mill's internal supply chain.

Chapter 5, on the other hand, provided a description of the internal integration elements existing between the mill's production planning, production, and warehousing and dispatch departments during the transition from the old production mode to the new (2014-2015). Already occurred changes in the operating environment compared to the old (2013-2014) are presented; in addition the opinions of various level employees of the concerned functions concerning the internal integration existing between the three departments are presented. The phenomenon of internal integration is looked, presented, and compared from the perspectives of three organization levels – upper level white-collars, lower level white-collars, and blue-collars.

Chapter 6, finally, aimed at describing the future operating environment of the mill (autumn 2015-). The similar matters are discussed as in the old operating environment (Chapter 4) – sales, production planning, production, and warehousing and dispatch. However, the similar depth was impossible to be reached as the future operations and operating environment were yet to be formed while writing the description. Chapter 6, however, aimed at providing an as deep description as possible.

The current chapter, on the other hand, aims at discussing the findings of the entire research and linking them back to the previous research discussion concerning the phenomenon of internal integration. Section 7.1 presents conclusions of the elements and overall level of internal integration existing between the case mill's concerned departments during Spring-Autumn 2015, in the light of the existing research literature. Section 7.2, on the other hand, provides a projection of the mill's existing level of internal integration into its future operations and operating environment; taking into account both the coming changes and existing research discussion on the topic.

On the other hand, whereas in Sections 7.1 and 7.2 the matters are discussed more from the case mill's perspective – although utilizing existing research literature –, in Section 7.3 the lens is turned entirely back to theoretical discussion – how do the findings of the research appear while compared to the previous research literature. The theoretical and methodological contributions of the research under scrutiny are finally discussed in Section 7.4.

## **7.1 Current Internal Integration of Diamond Mill (Spring-Autumn 2015) – Research Findings Compared to Previous Research Literature**

The current section presents conclusions of the current status (spring-autumn 2015) of internal integration elements of Diamond Mill's production planning, production, and warehousing and dispatch departments. The conclusions are drawn based on the description written concerning the operations of the three functions (2013-spring 2015), executed web –survey (spring 2015) and consequent interviews (autumn 2015), in addition to objective observations done by the researcher during the progression of the research (2013, 2015); the conclusions are drawn by comparing the various empirical findings with the existing theoretical discussion. As it became evident while checking the up-to-datedness of the description written during year 2013 that the matters written and described also represented the situation in years 2014 & 2015 (until autumn), the description was consequently regarded to represent the current reality (spring-autumn 2015) of the operations of the three, concerned departments. Therefore, no indications to the earlier, past status of internal integration (2013) are made separately.

Section 7.1.1 presents detailed findings and consequent analyses of the internal integration elements of the concerned three functions, divided by internal integration elements defined in the research under scrutiny – formal and informal information sharing, collaboration, and coordination. Section 7.1.2, on the other hand, consequently presents an overall analysis and conclusions of the current

status of internal integration of the Diamond Mill's concerned departments. Finally, managerial development suggestions for the case mill in question are presented in Section 7.1.3.

### ***7.1.1 Elements of Internal Integration – Formal and Informal Information Sharing, Collaboration, and Coordination***

Tables 53, 54, & 55 present separate empirical findings emerged during the progression of the research and consider whether the findings are positive or negative for the formation of tighter internal integration. The separate findings are categorized under the internal integration elements defined in the research under scrutiny; in addition, the source of empirical findings (description, survey, interview, observation) and a linkage to previous theoretical discussion are provided.

Table 53 Formal and Informal Information Sharing – Findings and Analyses

Formal and Informal Information Sharing					
Sub-Element	Component/Factor	Enabler (+)/ Inhibitor (-)	Source of Information	Theoretical Linkage	
Overall Status of Information Sharing	Differing opinions on overall level and efficiency and adequacy of information sharing occurring between the concerned departments (both white-collar & blue-collar)	-	S, I	a); i); j); k); l); n)	
	No "concealing"/protection of departmental, internal information	+	S	i)	
Form and Regularity of Information Sharing in Work Duties	White-collars attending cross-departmental formal meetings and having formal cross-departmental discussions relatively rarely	- ?	D, S, O	d); f); i); j); k)	
	Blue-collars attending cross-departmental formal meetings relatively rarely and having formal cross-departmental discussions very rarely	- ?	S	d); f); i); j); k)	
	Warehousing and dispatch not represented in the production department daily morning meeting	-	D, I, O	d); f); i); j); k)	
	Production planning represented in the production department daily morning meeting once per week	+/-	D, I, O	d); f); i); j); k)	
	Both white-collars and blue-collars involved in the development project of the new Mill Execution System (formal meetings)	++	D, S, I	j); k)	
	Limited/low level of formal and informal information sharing occurring between production and warehousing and dispatch departments directly (white-collar and blue-collar)	-	D, S, I	d); f); i); j); k)	
	Limited/low level of blue-collar cross-departmental informal information sharing on a general level	-	S, I	d); f); i); j); k)	
	High level of informal information sharing occurring between production planning and production (white-collar)	+	D, S, I, O	d); f); i); j); k)	
	High level of informal information sharing occurring between production planning and warehousing and dispatch (white-collar)	+	D, S, I, O	d); f); i); j); k)	
	Production planning operating as a link between production and warehousing and dispatch departments	+/-	D, I	d); f); i); j); k)	
	Physical separation of the concerned departments	-	D, O	j); k)	
	Managerial separation (in practice) of the concerned departments	-	D, O	j); k)	
Other related factors	Some false information provided in the old mill system	-	D, O	j); k)	
	Assistant Superintendent visiting regularly the production department and discussing with the blue-collar employees concerning all matters	+	D	j); k)	
	Mill Director visiting regularly the production department and discussing with the blue-collar employees concerning all matters	++	I	j); k)	

**Source of Information:** D = Description, S = Survey, I = Interviews, O = Observations

**Theoretical Linkage, Discussed in:**

**Internal Integration:**

a) Basnet (2013); b) Chen et al. (2007); c) Ellinger (2000); d) Ellinger et al. (2000); e) Gimenez (2004); f) Gimenez & Ventura (2003, 2005); g) Kahn & Mentzer (1994); h) Kahn and Mentzer (1998); i) Mollenkopf et al. (2000); j) Pagell (2004); k) Pagell & Wu (2006); l) Parente et al. (2002); m) Sawhney & Piper (2002); n) Stank et al. (2001b)

**Supply Chain Skills:**

o) Fawcett et al. (2010); p) Green (2010); q) Sunday Business Post (2013); r) Trunick (1998); s) Van Hoek & Wagner (2013)

Table 53 Formal and Informal Information Sharing – Findings and Analyses  
(Continued)

Sub-Element	Component/Factor	Enabler (+)/ Inhibitor (-)	Source of Information	Theoretical Linkage
<b>Information Sharing Climate, Approachability and Usability of Other Members of the Organization</b>	Relaxed and communicative mill climate (white-collars, part of blue-collars)	+	S, I, O	j); k); l)
	Widely dispersed blue-collar opinions on the openness and encouraging nature of the mill climate towards information sharing	-	S	j); k); l)
	Positive overall spirit	+	I, O	j); k); l)
	Lack of organized, cross-departmental and cross-organizational level informal get-togethers enabling the different parties to know one another better and to tie personal relationships	-	I	l)
	General opinion that all mill people are easy to approach despite their department and/or organizational status (including top management); matters can be handled and discussed with anyone	++	S, I, O	i); j); k); l)
	Mill Director visiting regularly the production department and discussing with the blue-collar employees concerning all matters	++	I	j); k)
	Time is always found/received to solve urgent matters cross-departmentally	+	S, I	a); l)
	Receiving time from the representatives of the other concerned departments to handle less urgent cases may be more challenging	-	S, I	a); l)

**Source of Information:** D = Description, S = Survey, I = Interviews, O = Observations

**Theoretical Linkage, Discussed in:**

**Internal Integration:**

a) Basnet (2013); b) Chen et al. (2007); c) Ellinger (2000); d) Ellinger et al. (2000); e) Gimenez (2004); f) Gimenez & Ventura (2003, 2005); g) Kahn & Mentzer (1994); h) Kahn and Mentzer (1998); i) Mollenkopf et al. (2000); j) Pagell (2004); k) Pagell & Wu (2006); l) Parente et al. (2002); m) Sawhney & Piper (2002); n) Stank et al. (2001b)

**Supply Chain Skills:**

o) Fawcett et al. (2010); p) Green (2010); q) Sunday Business Post (2013); r) Trunick (1998); s) Van Hoek & Wagner (2013)

Table 54 Collaboration – Findings and Analyses

Collaboration					
Sub-Element	Component/Factor	Enabler (+)/ Inhibitor (-)	Source of Information	Theoretical Linkage	
<b>Formal and Informal Cross-Departmental Teams, Purpose of Teamwork</b>	Amount of white-collar workers working in cross-departmental, formal teams relatively low	- ?	S	j); k)	
	Amount of blue-collar workers working in cross-departmental, formal teams relatively high (MES development project)	+	S	j); k)	
	Informal, cross-departmental teams nonexistent	- ?	S	a); d); f); i)	
	On a general level, cross-departmental teamwork believed to be used for several purposes (pro- and reactive problem solving, improving cost effectiveness, several other purposes)	+	S	b); d); j); k)	
	Overall negative opinion of the purpose of teamwork shared amongst the warehousing and dispatch employees (both blue-collar and white-collar)	-	S	b); d); j); k)	
<b>Mutual/Overall SC Understanding, Synchronizing of Activities, Common Vision and Goals, Importance of Collaboration</b>	Most white-collar workers believe to understand the basic ideologies of supply chain management	+	S	o); q)	
	Two thirds of the blue-collar workers believe to understand the basic ideologies of supply chain management	+/-	S	o); q)	
	Employees' (both blue-collar & white-collar) definitions of supply chain management vary in contents and scope	- ?	S	o); q)	
	Both blue- and white-collar workers believe to understand the role of their own department in the mill's supply chain	+	S	a); b); c); d); f); h); j); k); o); q); r)	
	Both blue- and white-collar workers believe to understand the role of the other concerned departments in the mill's supply chain	+	S	a); b); c); d); f); h); j); k); o); q); r)	
	<b>Antecedents</b>	Minority of both blue- and white-collar employees have work experience of duties of several, concerned departments	-	S	j); k); o)
	Employees have no experience of job rotation (w-c & b-c)	-	S	j); k); o)	
	Employees have not been offered a possibility to job rotation (w-c & b-c)	-	S	j); k); o)	
	Minor job-rotation occurring between production and warehousing and dispatch blue-collar workers	+	D	j); k); o)	
	Employees are interested in job rotation, if offered (w-c & b-c)	+	S	j); k); o)	
	Amount of formal education or practical training received concerning overall supply chain matters and/or operations of the other concerned departments very low (w-c & b-c)	-	S	i); p); s)	
	Involvement in new MES development project has taught both blue-collar and white-collar employees operating principles, priorities, and concerns of the other concerned departments	+	I	i); p); s)	
	Majority of employees interested in receiving extra education/training if offered (both b-c & w-c)	+	S	i); p); s)	

**Source of Information:** D = Description, S = Survey, I = Interviews, O = Observations

**Theoretical Linkage, Discussed in:**

**Internal Integration:**

a) Basnet (2013); b) Chen et al. (2007); c) Ellinger (2000); d) Ellinger et al. (2000); e) Gimenez (2004); f) Gimenez & Ventura (2003, 2005); g) Kahn & Mentzer (1994); h) Kahn & Mentzer (1998); i) Mollenkopf et al. (2000); j) Pagell (2004); k) Pagell & Wu (2006); l) Parente et al. (2002); m) Sawhney & Piper (2002); n) Stank et al. (2001b)

**Supply Chain Skills:**

o) Fawcett et al. (2010); p) Green (2010); q) Sunday Business Post (2013); r) Trunick (1998); s) Van Hoek & Wagner (2013)

Table 54 Collaboration – Findings and Analyses (Continued)

Sub-Element	Component/Factor	Enabler (+)/ Inhibitor (-)	Source of Information	Theoretical Linkage	
<b>Mutual/Overall SC Understanding, Synchronizing of Activities, Common Vision and Goals, Importance of Collaboration (continued)</b>	On a general level, employees believe to consider the effects of their own decisions on the operations of the other functions when making them	+	D, S, O	e); j); k)	
	Decision making influencers of and cross-departmental consideration executed by the representatives of the other departments <u>divide the opinions more and are less well known</u>	-	S, I	e); j); k)	
	Generalizing, white-collars believe cross-departmental consultation to be executed between the concerned departments; though it may be done reactively, <u>not proactively depending on the situation</u>	+	D, S, I	m)	
	Consultation between production and warehousing and dispatch - and vice versa - executed through production planning; role of production planning crucial	+/-	I	m)	
	Some blue-collar opinions concerning cross-departmental consultation clearly more negative; consultation also not visible at their level	-	S, I	m)	
	<hr/>				
	Largely differing opinions (both white-collar and blue-collar) on whether the three departments work as one chain/entity vs. separate functions	-	S, I	a); b); i); j); k)	
	Top management team working tightly together, as one	+	I	j); k)	
	Largely differing opinions (more blue-collar but also white-collar) on whether the three departments work towards the common vision and goals	-	S	a); b); c); d); h)	
	<hr/>				
All employees regard cross-departmental collaboration to be important for the operations and future of the mill	+++	S	E.g. b); d); h); j); k); n)		

**Source of Information:** D = Description, S = Survey, I = Interviews, O = Observations

**Theoretical Linkage, Discussed in:**

**Internal Integration:**

a) Basnet (2013); b) Chen et al. (2007); c) Ellinger (2000); d) Ellinger et al. (2000); e) Gimenez (2004); f) Gimenez & Ventura (2003, 2005); g) Kahn & Mentzer (1994); h) Kahn and Mentzer (1998); i) Mollenkopf et al. (2000); j) Pagell (2004); k) Pagell & Wu (2006); l) Parente et al. (2002); m) Sawhney & Piper (2002); n) Stank et al. (2001b)

**Supply Chain Skills:**

o) Fawcett et al. (2010); p) Green (2010); q) Sunday Business Post (2013); r) Trunick (1998); s) Van Hoek & Wagner (2013)

Table 54 Collaboration – Findings and Analyses (Continued)

Sub-Element	Component/Factor	Enabler (+)/ Inhibitor (-)	Source of Information	Theoretical Linkage
<b>Collaboration Atmosphere, Overall Satisfaction with Cross-Departmental Collaboration</b>	All concerned departments get along well	+	S, O	a); g); i); l)
	No tension exists between the concerned departments	+	S, O	i); l)
	No tension exists between the representatives of the different, concerned departments	+	S, O	i); l)
	Representatives of different departments value highly the professionalism of the representatives of the other departments	+	I, O	i); l)
	Largely differing opinions (both white-collar and blue-collar) on whether the concentration is on placing blame vs. finding common solutions in problem situations; white-collars more negative	-	S, I	j); k)
	Several changes occurred during the years (closures, investment decisions, etc.) have taught the employees to deal with constant changes and sudden problem situations; the situations are handled and then moved on	+	O	j); k)
	White-collars satisfied with the current status of cross-departmental collaboration	+	S, I	d)
	Blue-collar opinions on satisfaction with the current status of cross-departmental collaboration more dispersed	-	S, I	d)
	Blue-collar satisfaction with the status of cross-departmental collaboration increased during summer 2015 due to the new MES development project	+	I	d)

**Source of Information:** D = Description, S = Survey, I = Interviews, O = Observations

**Theoretical Linkage, Discussed in:**

**Internal Integration:**

a) Basnet (2013); b) Chen et al. (2007); c) Ellinger (2000); d) Ellinger et al. (2000); e) Gimenez (2004); f) Gimenez & Ventura (2003, 2005); g) Kahn & Mentzer (1994); h) Kahn and Mentzer (1998); i) Mollenkopf et al. (2000); j) Pagell (2004); k) Pagell & Wu (2006); l) Parente et al. (2002); m) Sawhney & Piper (2002); n) Stank et al. (2001b)

**Supply Chain Skills:**

o) Fawcett et al. (2010); p) Green (2010); q) Sunday Business Post (2013); r) Trunick (1998); s) Van Hoek & Wagner (2013)

Table 55 Coordination – Findings and Analyses

Coordination				
Sub-Element	Component/Factor	Enabler (+)/ Inhibitor (-)	Source of Information	Theoretical Linkage
<b>Top and Middle Management Support</b>	Majority of white-collar employees consider mill's top (management board) and middle management to support and encourage cross-departmental information sharing and collaboration	+	S, I	i); j); k); l)
	Blue-collar opinions on top and middle management support and encouragement more dispersed	-	S, I	i); j); k); l)
	Though believed to exist, the top management (management board) support on and encouragement of cross-departmental information sharing and collaboration not concretely visible to the employees (both blue-collar and white-collar)	-	I	i); j); k)
<b>Departmental Goals, Evaluation and Incentive System</b>	Formal goal setting; functional goals, measures, and rewards based on division and mill level goals and their achievement; goals same for all functions/departments	+	D	a); f); i); j); k)
	Good overall knowledge of the goals of the own department (both white-collar and blue-collar)	+	S	i); j); k); l)
	Knowledge of the goals of the other concerned departments lacking amongst lower level white-collars and blue-collars; consequently lack of knowledge that the goals are equal	-	S, I	i); j); k); l)
	All upper-level white collars have knowledge of the goals of the other departments and their equality	+	S	i); j); k); l)
	Mill level goals fairly well known by both white- and blue-collars	+	S	i); j); k); l)
	Knowledge of membership in an evaluation and incentive scheme good amongst all employees	+	S	j); k); n)
	Evaluation and incentive criteria relatively well known by most of the employees	+	S	j); k); n)
	Evaluation and incentive criteria available in the mill's intranet system, available to all employees	+	S, O	j); k); n)
	Some upper level white collars have personal incentive criteria	+/-	S	j); k); n)

Source of Information: D = Description, S = Survey, I = Interviews, O = Observations

Theoretical Linkage, Discussed in:

Internal Integration:

- a) Basnet (2013); b) Chen et al. (2007); c) Ellinger (2000); d) Ellinger et al. (2000); e) Gimenez (2004); f) Gimenez & Ventura (2003, 2005); g) Kahn & Mentzer (1994); h) Kahn and Mentzer (1998); i) Mollenkopf et al. (2000); j) Pagell (2004); k) Pagell & Wu (2006); l) Parente et al. (2002); m) Sawhney & Piper (2002); n) Stank et al. (2001b)

Supply Chain Skills:

- o) Fawcett et al. (2010); p) Green (2010); q) Sunday Business Post (2013); r) Trunick (1998); s) Van Hoek & Wagner (2013)

The following Section 7.1.2 presents an overall analysis and conclusions of the data presented in Tables 53, 54, & 55.

### 7.1.2 Overall Analysis and Conclusions

As has been mentioned above, the current section presents an overall analysis and conclusions of the status of internal integration of Diamond Mill's produc-

tion planning, production, and warehousing and dispatch departments based on the findings presented in Tables 53, 54, & 55.

The overall status of internal integration of Diamond Mill's concerned functions is good, but it also has room for improvement. Joint operations are running relatively well; certain matters, however, could and should be developed.

Reviewing all the separate research findings, three matters-to-be-developed in order to guarantee and improve the operations stand out from the crowd:

Information sharing and collaboration actions executed directly between production and warehousing and dispatch departments are minimal; practically all operations and communication are executed through production planning.

- Consequently, the role of production planning is overemphasized. Joint operations are currently operating well; however, should the operating efficiency of the production planning department be lowered for some reason or the other, it could have a clear effect on the operability of the mill's whole internal – and consequently external – supply chain.
- The opinions of the blue-collar and white-collar employees show clear dispersion. Whereas in many cases the white-collar opinions were positive, the responses received from the blue-collar employees were more negatively toned. Moreover, the responses received from different employees also showed a dispersion of opinions between the different departments; in several cases the production department representatives had more negative opinions than the representatives of the other departments.

On the other hand, to present some very positive features, the following factors stand out as positive enablers of tight internal integration:

- The mill has very low departmental and organizational borders. All people despite the department and/or organizational status are easy to approach.
- The mill's overall spirit is positive and communicative, forming a good platform for information sharing and working together; in addition, the professionalism and work contribution of other members of the organization are valued.
- All employees (survey respondents) regard cross-departmental collaboration to be important for the operations and future of the mill.

Reviewing all the research findings, the following description concerning the current status of internal integration of Diamond Mill's concerned functions can be drawn:

As mentioned above, the overall level of internal integration between the concerned functions is good; however, some factors-to-be-developed also exist.

**Formal and informal information sharing:** The overall level, efficiency, and

adequacy of information sharing divide the opinions of different employees. However, no actual “concealing” of relevant, departmental information is regarded to exist.

The white-collars attend organized, formal cross-departmental meetings and have formal cross-departmental discussions relatively rarely. This, however, may not be a problem if information is shared otherwise, more informally. Informal information sharing is indeed executed actively between production planning and production, and production planning and warehousing and dispatch. However, both formal and informal information sharing occurring between production and warehousing and dispatch directly seems very low. Information is shared between the departments but practically all communication goes through production planning. Production planning thus operates in a crucial role keeping the pieces of the puzzle, or links of a chain, together, acting as a distributor and filter of information. The current role of production planning can thus be seen as both a strength of and threat for the mill – a strength in that sense that it currently makes sure that the three departments are all informed of relevant matters and work towards the same destination, and a threat in that sense that if the level of production planning operability/efficiency lowers for some reason or the other, it may also decrease the operability/efficiency of the whole internal and consequently external supply chain.

Activating the information sharing and collaboration activities between production and warehousing and dispatch departments thus is a clear development suggestion for the mill’s top and middle management. One easy step towards better information sharing and collaboration would be to ensure warehousing and dispatch department’s representation in the production department daily morning meeting. During the progression of the empirical research, this factor arose several times. Attending joint formal meetings would also build a platform for informal interaction and sharing of information. On the other hand, related to the same matter and despite the active informal information sharing actions, production planning could also be represented in the morning meeting more often; once a week seems very rare. Attending the meeting daily would better ensure that all relevant cross-departmental information reaches all relevant parties.

Adding to the discussion concerning information sharing activities, the blue-collar employees do not currently share information cross-departmentally formally or informally. This is a fact that should be addressed and developed. A very positive exception of the lack of information sharing is the development project of the mill’s new manufacturing execution system (MES). The project has drawn together both blue-collar and white-collar representatives from different departments and has both enabled the sharing of internal, departmental information amongst the participants and given a possibility for learning the operating principles, concerns, and constraints of the other departments.

Whether the mill's climate is open and encouraging towards information sharing divides the opinions of the employees, blue-collars being more hesitant in their opinions. Looking from the point of view of an external observer, the mill, however, has a very positive overall spirit amongst all employees, enabling information sharing and collaboration activities. A very positive factor for the creation of tight internal integration is the fact that the employees generally regard it to be easy to approach anyone in the organization, despite the department or organizational status. The mill director has further lowered the threshold of also contacting the top management by regularly visiting the paper machine and discussing with the blue-collar employees concerning all matters. This has created a feeling of unity, being part of the same "gang".

In urgent daily cases time is always found from representatives of different departments to jointly solve the matters. However, less urgent cases may be more challenging; both timewise and knowing the responsible person from each department for all actions.

Finally, discussing briefly the background influencers of information sharing activities, the concerned departments are physically separated but it seems that the physical separation has not been the key to better or worse reciprocal contact. Production planning, for example, is physically as far away from the warehousing and dispatch representatives as the production department. All of the departments are also managerially separated (in practice), and thus it seems that the explanation for the better or worse connections does not lie in the organizational structure either, at least not totally.

**Collaboration:** In accordance with the rare attendance in formal meetings discussed above, the amount of white-collars working in named, cross-departmental teams seems relatively low. On the other hand, the amount of blue-collar survey respondents informing to belong to a cross-departmental formal team seems conversely relatively high; all of the blue-collars informed to belong the new MES development team. It is very positive that the blue-collars have been included in the development team; it guarantees that the voices of different users and perspectives get heard and incorporated into the final system. As has been discussed above, the membership in the development team has also given the blue-collars a possibility to educate themselves of the operations and principles of the other departments. It is highly likely that the blue-collar participation in formal teams will not stay as high in the future, as the MES –project is ending. However, if possible, it could be worth it to incorporate the blue-collar views on other matters as well, by having the blue-collar representation in other, future formal, cross-departmental teams.

Informal cross-departmental teams, on the other hand, are nonexistent at the mill. This may, however, be due to not understanding to be working in "an informal team" though sharing information and working in collaboration informally.

across departmental borders. Based on all the empirical findings, it seems that the mill's white-collar employees are mainly sharing information and working in collaboration with one another informally cross-functionally, rather than sitting in different, formal teams. If matters are handled more formally, for example, through formal consultations, the form of discussion seems to be dependent on the person with whom the discussion is had and on the situation; customer related matters, for example, are handled more formally than purely internal matters.

Whether formal or informal, cross-departmental teamwork is mainly seen to be fruitful to achieve several purposes. However, the warehousing and dispatch representatives' (both blue-collar and white-collar) opinions on the matter were clearly more negative than the opinions of the representatives of the other departments. Thus the teamwork efforts of the warehousing and dispatch department could be in need of further scrutiny and development.

All white-collar employees and majority of blue-collar employees believe to understand the basic ideologies of supply chain management; which is positive. However, the various employees' definitions of supply chain management vary in contents and scope, from quite narrow to wider perspectives. Thus it is difficult to definitely state whether the employees in fact *do understand* the wide nature of supply chain management or whether their concentration is rather on narrower matters.

Although only a minority of the employees have work experience of several of the concerned departments and although they have not participated in job rotation or received cross-departmental training/education, both white-collar and blue-collar employees believe to understand the role of their own and the other departments' in the mill's supply chain. The actual knowledge of operating principles, priorities, and constraints of the other concerned departments may, however, be lacking. This is especially visible in the blue-collar opinions received; for example, the blue-collar opinions on cross-departmental consideration in decision making and cross-departmental consultation vary from side to side, from very positive to very negative.

Picking one example from the survey and interview findings, whereas the cross-departmental consideration and consultation executed by the production planning department received positive feedback and even praise from the white-collar employees, the blue-collar opinions on the matters were very clearly more negative. Many of the blue-collar employees regarded the production planners not to consider and consult the other departments while making decisions in their work. The difference in opinions could be due to not understanding why production planning operates the way it does. Thus it is suggested that especially the blue-collar employees could be provided further training and/or education concerning the operations of the other departments and operating principles of the whole internal and external supply chain of the mill. As many white-collar employees also informed not to know the decision making influencers of the representatives of the other depart-

ments, providing further education for the white-collars could be worthwhile as well. Moreover, providing overall supply chain training/education for both personnel groups would improve the employees overall supply chain understanding and guarantee that supply chain matters are understood rather on a wider than a narrower perspective. Majority of the employees informed to be interested in extra training/education, if it is offered.

Furthermore, if possible to organize and manage, many of the employees would be interested in participating job rotation programs executed between the concerned departments; job rotation would be a good way to increase the employees' knowledge of the operations of the other, concerned departments.

A matter demanding further development efforts is operating as one entity, linked chain, instead of separate functions. Whereas some employees regard the three departments to already work as one entity, others regard the concentration to rather be on functional optimization. Based on the survey and interview findings, in addition to objective observations, it seems that the upper level white-collars and those employees that are actively involved in the cross-departmental, daily operations and decision making believe that the three functions *have to operate* as one entity in order to execute the operations as effectively as possible. The blue-collar level, a bit further away from the decision making, on the other hand, regards the concentration to rather be on functional operations and optimization. This division of thinking may sound natural considering the duties and responsibilities of the different employee groups; however, the ideology of working together as one entity, towards common vision and goals should be further emphasized. Further education might work towards reaching this target as well.

A very positive factor for creating tighter internal integration is that all employees participating in the research regard that it is important for the operations and future of the mill that the concerned departments work together. People are thus motivated and willing to work together across departmental borders. In addition, all concerned departments are considered to get along well and no tension exists between the departments or their representatives.

Whether concentration is on placing blame or finding common solutions to problems in problems situations, however, divides the opinions of the employees; white-collars being somewhat more negative. However, despite efforts, no explanations for or examples of placing blame could be received. Based on the interview discussions it seems that a culture of placing blame does not in fact exist; people may complain in coffee table discussions but concentration is still on jointly solving the matters at hand. Related to the matter, giving and receiving negative feedback and criticism was also discussed; people may have differing opinions on how to give and handle received negative feedback. A feedback meant for improving operations, may be interpreted as placing blame.

On the other hand, based on the interview findings and objective observations, the mill has one, supposedly not very common, characteristics enabling creation of tighter internal integration: the employees seem to value highly the professionalism and work contribution of the others. Years of operational changes and survival battle within the mill integrate have also taught the employees to be open and approbative towards new changes.

Considering all the factors discussed above, a good basis for both cross-departmental information sharing and collaboration thus exists at the mill. However, currently the white-collars are more satisfied with the overall level of cross-departmental collaboration than the blue-collars. This is a fact that should be further scrutinized and improved. However, based on the interview discussions, the blue-collar satisfaction may actually have increased during summer 2015 due to being involved in the new MES –project. This is a good example of how the blue-collar employees may both be educated of the operations of the other departments and be committed to execute the joint supply chain operations by involving them in cross-departmental development actions.

**Coordination:** Majority of the employees *believe* the mill's top and middle management to support and encourage cross-departmental information sharing and collaboration. However, this support is not clearly visible for the employees. Better information sharing may, for example, appear on a flipchart as a development target; it, however, does not lead to concrete actions. Thus, if the departments are wished to better work together, this wish and target could/should be more clearly communicated to all employees by the mill's top, and consequently middle, management.

The mill's goals are set on a correct way encouraging integration; functional goals and rewards are based on the division and mill level goals, and the goals and reward criteria are the same for all departments. All employees seem to know the goals of their own departments and the whole mill well; however, the knowledge of the goals of the other departments is lacking. Only the upper level white-collars informed to know the goals of the other departments – which is very positive – the rest not. Majority of the employees thus do not know that the goals in fact are the same for all departments and drive the departments towards reaching common targets. The interview discussions additionally revealed that at least some of the blue-collars actually believe the goals of the different departments to be different, and thus to encourage more functional, rather than internal supply chain wide, concentration. Communication concerning the goals of the different departments – and their equality – and the whole mill could/should thus be improved. When the different employees would know that all employees despite their department are in fact reaching towards the same targets, it would give more verification, for example, for the fact that decisions made in other depart-

ments are (usually) also done by considering and incorporating the views of the other departments (see discussion above).

Finally, the membership in an evaluation and incentive scheme, in addition to the incentive criteria, are known relatively well by all employees. Employees thus know that they can affect their own bonuses by executing their own duties in a manner driving the mill towards reaching its targets. Increasing the employees' knowledge of the equality of the different functional targets could make them also to better understand that the common targets may consequently be better reached through cross-departmental information sharing and collaboration than through pure functional concentration.

All in all, reviewing all the discussion above and as mentioned earlier, the current level of internal integration of Diamond Mill's production planning, production, and warehousing and dispatch is good, while it also has clear areas for development. The following Section 7.1.3 finalizes the discussion of current level of internal integration by listing managerial development suggestions for Diamond Mill's operations.

### ***7.1.3 Managerial Development Suggestions***

Based on all the empirical research findings discussed in Chapters 4-5 and Sections 7.1.1 & 7.1.2, the following managerial development suggestions can be provided:

- The information sharing and collaboration activities executed directly between production and warehousing and dispatch departments should be improved.
- Warehousing and dispatch representative should attend the production department morning meeting daily.
- Production planning representative should attend the production department morning meeting daily.
- The difference in the tone of opinions received from the white-collar and blue-collar employees should be noted; the in many cases more negative opinions of the blue-collar employees should be tried to be changed.
- Blue-collar employees should be given extra training/education concerning the operations and operating principles of the other concerned departments, in addition to overall supply chain management related training/education.
- Similar training/education mentioned above could also be given to the white-collar employees to guarantee their knowledge of the operations of the other departments and the very wide nature of supply chain management.

- Job rotation between the duties of the concerned departments could be organized for both white-collar and blue-collar employees, if possible, to familiarize the employees with the operating principles, priorities, and constraints of the other departments.
- Blue-collar employees should also be involved in the future cross-departmental development projects; similar as the new MES -project.
- The negative opinions of the warehousing and dispatch employees concerning the usefulness of formal and informal teamwork should be addressed, and operations improved accordingly.
- Cross-departmental, informal get-togethers outside the office hours and mill borders could be organized in order to make the representatives of different, concerned departments to get to know one another and to tie personal relationships, enabling better reciprocal understanding, information sharing, and collaboration.
- Communication concerning the equality of the goals of the different departments should be improved.
- The personal incentive criteria of some upper level white-collars should be checked to confirm that the targets of those employees also guide towards the same direction as the targets of the rest of the personnel.
- Top management's support on cross-departmental collaboration should be more actively communicated; it should be more visible and concrete.

One clear development area that additionally arose in the findings was the ideology of working together as one coherent entity instead of separate functions. This factor can be seen to improve by addressing and executing the development suggestions presented above.

## **7.2 Future Internal Integration of Diamond Mill (Autumn 2015 Onwards) – Projection to the Future Compared to Previous Research Literature**

The change of production mode and operating environment are about to bring several changes to the operations of the Diamond Mill, as described in Chapter 6. Mirroring the current status of internal integration of the mill's production planning, production, and warehousing and dispatch operations (Section 7.1) with the future operating environment, several factors both enabling and challenging the future integration endeavors can be identified. The current section concentrates on discussing such factors of the new operating environment that can either be seen to have an effect on the level of integration between the three concerned departments or to highlight the need of tight(er) integration. The earlier research

literature, based on which the conclusions and projections are made, are presented once in each, separate point (if applicable).

### **7.2.1 New Organization Structures**

The organizational changes coming into effect due to the change of production mode can be suspected to have both positive and negative effects on the level of integration between the concerned departments. While writing the conclusions (autumn 2015), the final form of the mill's production organization is still to be announced. The new organization structure of the mill's production planning and warehousing and dispatch operations was, however, already published in Spring 2015 and came into effect in the beginning of September 2015 (see Section 6.3.1).

As mentioned above, based on the current knowledge of the organizational changes, the future organization structure can be seen to both enable and inhibit the integration efforts of the three concerned departments. Starting with the new production planning and warehousing and dispatch organization, as the production planners and the warehousing dispatch foreman in charge of the mill's dispatch operations (WDF1/FF) will in the future belong to the same Operational Supply Chain organization and work under the supervision of same superior, the already closely and actively operating information sharing and collaboration actions between the production planning and warehousing and dispatch departments can be suspected to remain on a good level or even improve from the current status (Pagell, 2004; Pagell & Wu, 2006). However, while the organizational change may thus be seen to make the two departments to work even closely together, it does not improve the connection between the warehousing and dispatch and production departments, currently in need of improvement.

The organizational change of production planning and warehousing and dispatch may in fact isolate them more from the production department. This is due to the fact that as in the past all three departments belonged under the mill organization and in the end under the supervision of the Mill Director, in the future only the actual production operations will remain "in mill command" whereas the production planning and warehousing and dispatch operations will be guided and managed by a centralized, mill-external corporate body, Operational Supply Chain organization. Looking from a perspective of the mill's whole internal supply chain, whereas the change of the organizational structure may thus bring positive consequences for the joint operations of the production planning and warehousing and dispatch departments, it simultaneously also brings more complexity and new parties and influencers to the picture (Gimenez *et al.*, 2012). The challenge in the future is to guarantee that the targets of the Operational Supply

Chain organization (production planning & warehousing and dispatch) and the mill organization (production) guide the individual functions towards the same destination and that the perspectives of all departments get heard and taken into account, despite the organizational and managerial separation (Mollenkopf *et al.*, 2000; Parente *et al.*, 2002; Gimenez & Ventura, 2003; Pagell, 2004; Gimenez & Ventura, 2005; Pagell & Wu, 2006; Gimenez *et al.*, 2012; Basnet, 2013). This demands cooperation in the top management level; middle management alone cannot make the individual departments to work together and to form one, seamless entity (Mollenkopf *et al.*, 2000; Chen *et al.*, 2007; Basnet, 2013) unless the strategic guidelines and targets are set accordingly (Mollenkopf *et al.*, 2000; Parente *et al.*, 2002; Pagell, 2004; Pagell & Wu, 2006). In addition, both top and middle management of both organizations should possess an attitude and understanding that working together over departmental and organizational borders is crucial (e.g. Kahn & Mentzer, 1998; Ellinger *et al.*, 2000; Stank *et al.*, 2001a; Chen *et al.*, 2007; Childerhouse & Towill, 2011; Schoenherr & Swink, 2013). Otherwise the efforts of forming and maintaining one integrated entity are bound to fail.

Comparing the old internal supply chain structure/organization of the mill with the new, it can be said that the managerial separation is brought to a higher level (Pagell, 2004; Pagell & Wu, 2006). As earlier the concerned departments had separate middle managers, in the future also the top management level is separated. How the new production department organization, on the other hand, will affect the connections between the three concerned departments remains to be seen. What is sure, as mentioned above, the production department will remain in the mill organization; however, the persons responsible for each duty (for example, production manager) are yet to be announced. Thus, if, for example, the production manager changes, it is difficult to forecast how the new manager will affect and encourage the department's connections with the other two concerned departments (Mollenkopf *et al.*, 2000; Parente *et al.*, 2002; Pagell, 2004; Pagell & Wu, 2006). Much depends on the person and his/her understanding of the supply chain ideologies (Fawcett *et al.*, 2010; Sunday Business Post, 2013).

In addition, a factor bringing even more complexity to the future joint operations of the three concerned departments, are the new, mill-external (though corporate-internal) supply chain colleagues at the Crystal Mill, also planning Diamond Mill's production (long-term production and capacity planning) and handling Diamond Mill's orders (Gimenez *et al.*, 2012). Though the operations of these new colleagues may not affect the operations of the production and warehousing and dispatch departments directly, through the operations of the production planning department they may – and most probably *will* – also affect their operations indirectly (for example, mistakes in order handling and confirmed tonnage/delivery time needing changes of production runs, changes in long-term

production planning, etc.). What is consequently worth noticing, as in the old mode of production the role of the production planning department and the production planners was very central, if not even crucial, in the future the role will not diminish – it may even grow in importance due to the new, external influencers and operators. Thus the operability of the production planning department should be ensured in all circumstances. Production planning should also aim at maintaining the supply chain wide focus, although belonging to a different organization than, for example, the production department.

What can be regarded to be positive, in the future operating model the order handling of the mill's orders is brought back closer to the mill, from the external Customer Service Centers to the Operational Supply Chain (OSC) representatives partly located at the Diamond Mill (see Sections 4.1.6 & 6.3). Consequently more customer related information can be suspected to flow to the mill's internal supply chain (Stank *et al.*, 2001) and be available in operative decision making; the possibility of sharing and utilizing customer related information may also be increased through the fact that the Sales Director of the mill's products will be physically located at the mill, although belonging to a mill-external sales organization (Pagell, 2004; Pagell & Wu, 2006). Part of the OSC order handlers, however, will still remain to be located outside the mill and are new acquaintances with both the mill and its employees. In addition, in the future the long-term production planning of the mill will be executed outside the mill. Thus, all in all, in the future the mill will have more external parties who can and will also greatly affect the operations of the mill's internal supply chain and consequently the connections between the mill's production planning, production, and warehousing and dispatch departments.

Summarizing all the discussion above, whereas the organizational changes can be seen to bring positive consequences for the integration efforts of the production planning and warehousing and dispatch departments, they simultaneously bring new challenges in the form of greater internal supply chain complexity and new influencers. Looking from a corporate-wide perspective, the centralization of the operational supply chain tasks may very likely result in rationalization of operations and costs; however, for the operations of an individual mill it may also bring new challenges.

### ***7.2.2 Commencement of Carton Board Production and New Customer Relationships***

Keeping in mind the organizational challenges and unfinished final production organization structure discussed above in Section 7.2.1, the cross-departmental information sharing and collaboration actions will be crucial while actually start-

ing the new carton board production. As old and new technology have been combined while converting the paper machine from fine paper to carton board production, the functionality of the entirety will only be revealed when actually starting the paper machine. It is highly likely that unforeseen production problems and similar circumstances demanding changes of parameters and settings will occur while beginning the production operations. Consequently fast, joint actions are needed of the three concerned departments to solve the situations at hand and to change the course of the production runs as needed (Ellinger *et al.*, 2000; Sawhney & Piper, 2002; Basnet, 2013).

The crucial need of cross-departmental information sharing and collaboration actions executed between the concerned departments is further emphasized by the fact that while starting its paper machine and production operations, the mill is simultaneously trying to tie and start its new customer relationships (Kahn & Mentzer, 1996). Thus while still somewhat being in a testing phase of production operations, the mill's sales people are simultaneously making promises to the potential customers concerning the quality of the board-to-be-produced and delivery times.

Consequently, if – and highly likely when – some production problems occur, all three departments need to be immediately made aware of the situation (Stank *et al.*, 2001b) and be able to take cross-departmental corrective actions without delay (Kahn & Mentzer, 1996; Ellinger *et al.*, 2000; Sawhney & Piper, 2002; Basnet, 2013). The beginning phase of the customer relationship is critical. The customers will be constantly monitoring whether the quality promises given will be met and whether the goods are delivered as promised, at the right time, to the right place, in the right condition. In order for the mill to have future, it needs to be able to show its potential customers that it offers superior value compared to the competing products and producers, and is thus worth to be accepted and chosen as a future supplier (e.g. Kahn & Mentzer, 1996; Ellinger *et al.*, 2000; Stank *et al.*, 2001a; Stank *et al.*, 2001b; Sawhney & Piper, 2002; Chen *et al.*, 2007; Kim, 2009; Zhao *et al.*, 2014). Consequently, to reach this target the mill's internal and also external supply chain needs to operate in an effective, productive, and flawless manner from the very beginning of the commencement of the production operations. Without the customers, there is no future.

### **7.2.3 Continuation of Carton Board Production**

Trusting that the original customer relationships can be tied and that the carton board production will operate in an effective manner after the testing and adjustment phase, the future production operations of the mill have characteristics that can be seen to both ease and challenge the internal operations of the concerned

departments, and consequently cross-departmental information sharing and collaboration.

The basic parameters of the carton board production can be regarded to be somewhat easier than in the old, fine paper production; the mill will have less products and much wider, and consequently heavier and fewer in number, reels to produce. Thus, in this sense the production planning of the orders-to-be-produced (trimming, forming of production runs, and so forward), consequent actual production of the orders, and handling of produced reels could be seen to become somewhat simpler than in the past. Consequently the cross-departmental information sharing and collaboration could be seen to be less pressured due to the more simplified operations.

However, despite the small number of products (kraftliner, white top kraftliner), the mill will produce the two products in very wide grammage ranges, resulting in more difficult and complex production planning and consequent production. In addition, the quality difference between the two products is massive. Thus, if the mill's production operations face production problems and/or disturbances for some reason or the other, it will demand great effort from the production planning to re-plan the production runs – trying to take into account the view of all parties (Ellinger *et al.*, 2000; Sawhney & Piper, 2002; Basnet, 2013), production (production efficiency), warehousing and dispatch (warehousing and dispatch efficiency), and customer (delivery times and quality).

The challenges set by the future production characteristics are further emphasized by the capacity difference of the mill's pulp and final carton board production and the raw material structure of each product/quality. Simplifying, in order to balance both the sufficiency of raw materials and manpower needed in the raw material production, an ideal production order and timing of different products and grammages has been modelled in advance. However, reality quite seldom turns out to be as modelled. Thus, if and when some production problems occur or some changes have to be made to the earlier planned production runs due to, for example, mandatory customer requirements, it will be very challenging to fix the situation by incorporating the needs and requirements set by all different parties of the puzzle (Ellinger *et al.*, 2000; Sawhney & Piper, 2002; Basnet, 2013) – internal and external supply chain. Thus although not specifically addressed in the research under scrutiny, the operability of the mill's internal supply chain from production planning to warehousing and dispatch is also highly affected by the mill's pulp mill and pulp production.

To finalize the discussion, the mill's future production planning and production operations are also challenged by the more difficult demand forecasting of the coming demand (O'Leary-Kelly & Flores, 2002). Naturally, while being in the very beginning of the carton board production, it is difficult to forecast explicitly, how the customer relationships will be managed to begin and conse-

quently, how the order book of the mill will develop and grow. However, also in the future the demand forecasting of carton board has some more complicated characteristics than the demand forecasting of fine papers. Whereas the fine paper demand and production had clear, yearly repeating seasonal fluctuations, the carton board demand is subject to more irrational demand changes, unforeseeable beforehand. This is due to the final end use of the products utilizing Diamond Mill's board. For example, should a sudden, natural disaster take place in some target market, the need for fruit packaging utilizing Diamond Mill's carton would consequently drastically drop, and so would consequently the demand for Diamond Mill's products.

Considering all the factors discussed above, it can be suspected that Diamond Mill's production planning and actual production will in fact be at least as demanding and challenging as it has been in the past – the challenges are simply dictated by different factors. The complicated nature of balancing and optimizing both production efficiency and customer requirements sets consequently high demands for the cross-departmental information sharing and collaboration occurring between the mill's production planning, production, and warehousing and dispatch. As already mentioned earlier, the already very important role of production planning in the mill's internal supply chain is highly unlikely to decrease; on the contrary, it may still increase. The production planners need to be able to cope with potential production problems and possible over and under booking circumstances. The production planners, however, should not be left alone with this challenging task; information sharing and collaboration should be executed actively and promptly between all concerned departments – even more actively as currently – and decisions made jointly, incorporating the views of different departments.

#### **7.2.4 Organization Culture and Feeling of Togetherness**

As has been discussed in Section 7.1, one of the mill's strengths in its potential aspirations of reaching tighter internal integration is the overall positive spirit that prevails amongst the employees (Kahn & Mentzer, 1994; Mollenkopf *et al.*, 2000; Parente *et al.*, 2002; Basnet, 2013). The people have undergone several changes during the past years – all of which have not been so positive, for example, closures of several paper machines. It can be suspected that the converting project, executed with the help of and participated by a large amount of the mill's employees (Ellinger *et al.*, 2000; Pagell, 2004; Pagell & Wu, 2006), has further increased the employees feeling of togetherness – “we have done this together”. For example, in addition to the white-collar employees, also many blue-collar level employees have participated in the development project of the mill's new

Mill Execution System; this can be seen as a very positive example of involving and empowering the employees (Pagell, 2004; Pagell & Wu, 2006).

In addition, the employees have also seen the creation of the new paper machine from the very beginning and may consequently be regarded to have such pioneering and fundamental knowledge that is rarely available. Involvement in the cross-departmental MES project has also increased the employees' knowledge of the operating principles of the other departments (e.g. Kahn & Mentzer, 1998; Ellinger, 2000; Ellinger *et al.*, 2000; Chen *et al.*, 2007; Basnet, 2013). Having been part of creating something new and significant most probably also has increasingly committed the various employees to the mill and executing their own duties as well as possible.

This feeling of togetherness, possessed exceptional and increased knowledge, and supposed high level of commitment are factors that could and should be utilized while aiming at creating tighter internal integration at the mill. The mill's top management should further strengthen the positive characteristics of the mill climate by, for example, encouraging the different employees to also participate in future cross-departmental development projects and by clearly supporting the ideology of working together towards reaching common achievements (Mollenkopf *et al.*, 2000; Parente *et al.*, 2002; Pagell, 2004; Pagell & Wu, 2006).

The top management support is indeed crucial in both current and future integration endeavors at the mill (Mollenkopf *et al.*, 2000). However, as in the future the mill's internal supply chain will have parties from several higher level organizations, it is not enough that the *mill's* top management supports cross-departmental information sharing and collaboration. The top management of *all involved organizations* need to "be on the same page" and to understand the ideology and potential benefits of working together as one entity, despite organizational and departmental borders.

### **7.3 Overall Case Study Findings Compared to Previous Research Literature**

Sections 7.1 and 7.2 have presented a large amount of separate and detailed case study findings by utilizing the new definition and operationalization of internal integration designed in the research under scrutiny and by comparing the separate findings with the previous research literature. Generally speaking it can be stated that the findings of the current research are in line with the previous research literature. The aim of the research was to construct a new definition and operationalization for the concept of internal integration based on existing research literature and consequently to use the definition and operationalization to analyze the level of internal integration existing between the case mill's concerned three de-

partments. The aim of the research was thus not to study and test whether the elements and factors of internal integration presented in the previous research literature are valid; they were chosen and accepted to be such from the very beginning. Consequently the findings of the current research thus naturally follow the paths of the previous research literature.

However, moving from the details to a wider perspective, the research also provides findings that can be regarded to be additions to the existing discussion concerning the topic. To start with, as has been discussed earlier in Section 3.1, none of the existing researches have studied and discussed the elements and level of internal integration between the three functions discussed in the research under scrutiny – production planning, production, and warehousing and dispatch (van Hoek *et al.*, 2008). The current research, for example, revealed that the production planning department was in an overemphasized role – in practice enabling all information sharing and collaboration actions occurring between the three departments. Whether this situation is only valid at the case mill or whether it actually could also represents the situation in other, similar process industry context as well, should be further examined in other process industry settings/contexts.

Researching the three departments also revealed that the different departments may have differing opinions on the same matters related to integration. The past researches have mainly concentrated on researching the opinions of the “logistics department” in various companies (van Hoek *et al.*, 2008). The current research, however, proves that researching only one department may result in a false image and interpretation of the level of internal integration. The opinions of various parties involved in the same chain should thus be researched in order to be able to make at least somewhat justified conclusions of the level of internal integration. In the current research, for example, the production department on the whole seemed to have many times more negative opinions of the matters than the two other departments. Consequently, if only one of the three departments would have been researched, the findings and consequent conclusions of the research would have been totally different – and false.

On the other hand, in addition to concentrating only on one department, the existing researches have practically also fully concentrated on researching the phenomenon of internal integration through the eyes of the manager or director level (van Hoek *et al.*, 2008). The research under scrutiny, however, proves that only utilizing the manager/director perspectives may lead to a defective/incomplete analysis of the level of existing internal integration. The research under scrutiny researched the elements of internal integration through the opinions of three different organization levels – upper level white-collars (directors/managers), lower level white-collars (other office workers), and blue-collars (paper machine and warehouse operators). The research revealed that in many

cases the blue-collars were much more hesitant and/or negative in their opinions than the white-collar employees. Moreover, in some cases the opinions of the lower-level white collars and upper level white-collars also showed dispersion of opinions. To truly comprehend the actual level of internal integration existing in a certain setting, the opinions of various organization levels – representing different departments – should thus be researched and analyzed. Asking only the opinions of the managers and/or directors is not enough.

On the other hand, as the overall opinions of the different departments and employee groups may be contradictory, each individual naturally also has his/her own opinions of the internal integration matters – being either similar to or different from the opinions of the other representatives of the concerned department or employee group. Although the research under scrutiny has only scratched the surface of the matter, the background (for example, earlier work experience) and skills of each employee can be claimed to have an impact on the opinions of each employee – and consequently also the way of behaving in the internal the supply chain.

To support this claim, the research under scrutiny asked the different employees' opinions on whether they regard to understand the meaning of the concept of supply chain management and consequently asked them to define the term. Most of both the white-collars and blue-collars claimed to understand the meaning of the concept. However, the actual definitions given showed that the term in fact means a different thing to different people. The definitions also showed that in many cases the understanding of the concept was too narrow; only part of the actual concept of supply chain management was seen to represent the whole concept. Consequently, combining the answers given to both of these two questions, it can be interpreted that the different employees', involved in the chain, supply chain knowledge and skills vary, as does their understanding of the knowledge they believe to possess. Consequently it can be suspected that the either good or lacking knowledge is visible in managing the daily operations of the internal supply chain as well.

To conclude the discussion of the employees' supply chain knowledge and skills, although this topic has been very briefly touched in the research under scrutiny, the knowledge and skills the various level employees possess can be claimed to affect the operability and integration efforts of the internal supply chain of various companies – the chain in the end consists of humans with their own background, attitudes, knowledge, and skills, not of mechanically operating functions. The employee skills as linked to internal integration have not been discussed in the previous research literature. The current research is thus the first attempt to bring the meaning and importance of employees' skills to the discussion.

Finally, as the previous longitudinal internal integration research can be regarded to be nonexistent (van Hoek *et al.*, 2008), the current research offers an addition to the existing research literature by researching and describing an even on a global scale unique, longitudinal transformation process of the case mill from one production mode to another. The current research thus brings the longitudinal view to the integration discussion; more similar or longer time span longitudinal internal integration researches should be executed in the future.

To conclude the discussion, linked to the time aspect, the research under scrutiny also proves that internal integration may actually evolve and develop already during a relatively short period of time. One of the respondents of the current research informed his/her feelings of the internal information sharing and collaboration to have changed moving from spring to autumn, due to having been involved in a common cross-departmental development project. In best cases, integration efforts may thus also lead to fruitful results already in a relatively short period of time although they are usually regarded to be time and effort consuming (Song & Xie, 2000; Thai & Hsu, 2014; Zhao *et al.*, 2015).

Summarizing the discussion above, although the research under scrutiny has its background in the previous research literature and thus consequently follows the guidelines set by it, it also provides several new insights into the existing discussion concerning internal integration. The contributions of the research are further discussed in the following section, Section 7.4.

## 7.4 Theoretical and Methodological Contributions

Continuing the discussion started in Section 7.3, the research under scrutiny provides the existing internal integration discussion with several theoretical and methodological contributions. The theoretical and methodological contributions are discussed below separately.

Beginning with the *theoretical perspective*, the research under scrutiny provides *a new definition for the concept of internal integration*. So far a single, accepted, and generalizable definition for the concept of internal integration has been lacking. The existing definitions presented have varied from researcher to researcher, have used different terms to refer to the same matters, and despite the actual wordings used, have still been at least partly overlapping. Consequently, the research under scrutiny aimed at creating a more holistic and clear definition for the concept of internal integration, utilizing the three internal integration elements of formal and informal information sharing, collaboration, and coordination identified by the previous researchers. Although the concept is thus based on existing research literature discussing the topic, none of the already existing definitions combine the elements of internal integration in a similar manner. Accord-

ing to the current research, all three elements are needed in order to reach tighter internal integration.

Moreover, the research also provides *a new operationalization for the concept of internal integration*. Several analyses approaches have been presented and utilized in previous researches throughout the years in order to understand and analyze the existing level of internal integration. However, none of these approaches have been holistic and looked the matter from all relevant aspects; the aspects researched have reflected each researcher's understanding and definition of internal integration. In addition, none of the earlier analysis approaches have addressed the importance and potential benefits of tighter internal integration. Thus a new, more comprehensive operationalization was regarded to be needed and was consequently built with the ideology of aiming at combining the ideas and scales of different, earlier researchers into one, holistic entity.

Moreover, the research under scrutiny also *introduces the skills various level employees involved in the internal supply chain possess into the internal integration discussion*. The skills have not been earlier discussed as linked to internal integration; however, as the internal chains are in fact comprised of various employees, their knowledge and skills play a role in managing the internal supply chain successfully and in creating tighter internal integration. In addition, the skills of the lower organization level employees discussed in the literature part of the thesis also add to the skill literature itself. The skill discussion has heavily concentrated on the managers/directors and the lower level employees have been largely neglected. In the current research, the lower level employee skills needed in successful internal supply chain management are derived from and formulated based on the literature concerning the manager/director level.

Finally, as has been discussed in Section 7.3, by utilizing deviant research methods and subjects (see below), the research also resulted in new theoretical findings and contributions (for full discussion, refer to Section 7.3). The research revealed that:

- *The opinions of different departments involved in the same chain concerning internal integration may vary*; thus several departments should be targeted and researched while aiming at analyzing the actual level of internal integration.
- *The opinions of various organization levels concerning internal integration may vary*; thus all different organization level employees should be targeted and researched while aiming at analyzing the actual level of internal integration.
- *The opinions of different individuals within each department and employee group may vary*; thus representatives of several departments and organization levels should be targeted and researched *simultaneously*

(*multiple respondents*) while aiming at analyzing the actual level of internal integration.

- *Researching the internal integration phenomenon during a longer period of time may provide great, detailed insights and consequently deep understanding of the phenomenon within its context.*
- *Internal integration may also be advanced in a relatively short time, by relatively easy means* by involving the employees in common cross-departmental actions – the actions do not always need to be massive and time consuming.

To conclude the discussion of the theoretical contributions, although the findings of the current single case study research cannot be generalized as such, they can still be regarded to somewhat represent and illustrate the situations in similar contexts, in other high-volume, process industry settings (Yin, 1994). The case of the research under scrutiny may thus be regarded to operate as *an example of similar cases*.

On the other hand, the theoretical contributions/notions presented above, gained by utilizing deviant and seldom used research methods, lead us to discuss the *methodological contributions* of the research. To begin with, the research under scrutiny adopted a *qualitative research approach* and executed the research as *a single case study research*, utilizing a *selection of qualitative data collection methods* seldom used in researching internal integration (van Hoek *et al.*, 2008). According to van Hoek *et al.*, (2008), most of the existing knowledge concerning internal integration has been gained by utilizing a quantitative research approach and methods; only very seldom the topic has been researched through qualitative methods capable of providing deeper insights and understanding of the matter. Consequently the research under scrutiny aimed at answering the call for utilization of more qualitative methods.

Moreover, the previous research efforts concerning internal integration have mainly, if not solely, concentrated on researching the stand-alone opinions of single representatives (managers or directors), of single functions (usually logistics), across several companies (Ibid.). Consequently, the knowledge gained has been quite limited and one-sided. To fill the obvious methodological – and consequent theoretical – gaps, the research under scrutiny adopted a different perspective. The research focused on studying internal integration between *three separate functions* of the case company – production planning, production, warehousing and dispatch – by examining, incorporating, and comparing the different perspectives of *multiple of representatives of each function, representing three different organization levels* – upper level white-collars, lower level white-collars, and blue-collars. The research under scrutiny thus adopted simultaneously several new approaches, providing methodological contribution: several internal functions within the same chain (three), several organization levels (three),

and multiple respondents in each function representing the different organization levels. In addition, the methodological contribution is further enhanced by the fact that according to van Hoek *et al.* (2008), none of the earlier researches has studied the elements and level of internal integration between the three departments studied in the research under scrutiny.

Finally, the unique situation of the case mill also provided the current research with an opportunity to execute *longitudinal research*, researching and discussing the same topics during three different eras – in the old production mode, during transition, and in the new production mode. According to van Hoek *et al.* (2000), internal integration researches utilizing a longitudinal perspective have been non-existent so far. Thus, the longitudinal nature of the research under scrutiny can be regarded to be significant and exceptional, providing a clear methodological contribution.

Combining all the factors mentioned above, the current research thus utilized *a very rare combination of research methods and research subjects*; it researched qualitatively three functions, three organization levels, during three periods of time, through the perceptions of multiple respondents in each function. Consequently also exceptional research findings could be received; the uncommon research methods applied also consequently resulted in new theoretical knowledge, as has been discussed above.

The research in its entirety was executed from the inside; operating within the case mill although simultaneously maintaining a position of an objective researcher, not employed by the case company. This was possible due to the *deep and open access received to the case company*. Also this factor can be regarded to be exceptional and noteworthy, providing yet another methodological contribution. Very rarely an external operator is given such a deep access to the case organization without actually being a member or employed by it.

To finalize the discussion, the uncommon research approach and methods adopted can also be seen to have resulted in *a new model for assessing and analyzing the level of internal integration between various functions within an internal supply chain* (deep description, qualitative survey, consequent qualitative interviews). The created model can be applied and further validated in new, future research settings and contexts.

## 8 CONCLUSIONS

The previous chapters have presented the motivation and objectives, theoretical background, methodology and methods, and empirical findings of the research under scrutiny on a detailed level. In addition, the conclusions made based on the research findings and theoretical and methodological contributions of the entire research have been discussed. The purpose of the current chapter, on the other hand, is to review back to the research questions set in the beginning, and refined in the middle, of the research process and to discuss whether they have been thoroughly answered. In addition, the chapter also presents a summary of the theoretical and methodological contributions of the research, in addition to discussing its managerial implications. Finally, the chapter, and simultaneously the whole thesis, concludes with a discussion of potential further, future research topics.

### 8.1 Review and Evaluation of Answering Research Questions

The purpose of the current section is to turn back to the research questions set first in the beginning of and refined in the middle of the research process due to the changed conditions at the case mill. The aim of the discussion is to evaluate whether the research questions have been answered and whether the research was consequently able to research what it was aiming at researching.

The research had both theoretical and managerial, case mill related research questions. The theoretical research questions of the research were:

1. How can the concept of internal integration be holistically defined, taking into account the different elements presented in previous research literature?
2. How can (the level of) internal integration be holistically operationalized and analyzed, utilizing the new definition and taking into account the analyses models and approaches presented in previous research literature?
3. Are the findings of the current research in line with the earlier findings or does it result in deviant and/or additional results?
4. Which skills are needed of different organization level employees in order to manage the internal supply chain successfully?

Generally speaking it can be said the research was successful in answering all its theoretical research questions. A new definition for the concept of internal integration was created based on three elements – formal and informal information sharing, collaboration, and coordination – by utilizing, combining, and regrouping the ideas presented in previous research literature on the topic (see full discussion of the new definition in Section 2.4). In addition, a new operationalization for the concept of internal integration, and consequently an analysis model for analyzing the level of internal integration, was created by utilizing the new definition of internal integration constructed and several previous analyses models presented in earlier research literature, in addition to literature concerning the benefits/importance of tighter internal integration and employees' supply chain skills, insofar as applicable (see Section 2.6 and Appendices 5 & 6 for full discussion).

Moreover, while analyzing and making conclusions of the findings of the research, it was also considered whether the findings of the current research are in line with the previous research finding or whether something different and/or new was found. As the research leans heavily on earlier research literature, the findings received are naturally consequently in line with the previous research findings. However, by utilizing new methodological choices, the research was also able to create new theoretical knowledge and thus resulted through methodological contributions to new theoretical contributions as well. In addition, the new definition and operationalization of the concept of internal integration discussed above are also additions to the existing research literature. Moreover, the research also began the discussion concerning the different level employees' skills as linked to/as influencers of internal integration. The theoretical and methodological achievements of the research under scrutiny are more thoroughly discussed in Sections 7.3, 7.4, and 8.2.

Finally, as briefly mentioned above, the research also aimed at bringing the different organization level employees' skills into the internal integration discussion. In the end it is humans who comprise the internal – and external – supply chain, not machines or mechanical functions. Consequently their background, for example, earlier work experience, and supply chain related skills and understanding must play at least some sort of role in building and maintaining tighter internal integration. As this was first attempt to bring the skills to the discussion, the skills are only briefly addressed in the empirical research of the research under scrutiny. However, the topic of skills needed of both managers/directors and lower organizational level employees is more thoroughly though still concisely discussed in the literature part of the thesis; see Section 2.3.3 for full discussion concerning the skills needed in internal supply chain management. The preliminary review presented in the literature part of the thesis gives a basis for both the

researcher of the current research and other researchers as well to continue and deepen the discussion.

On the other hand, looking purely from the managerial, case mill perspective, the research also aimed at answering the following, more pragmatic questions:

1. How do the case mill's production planning, production, and warehousing and dispatch departments operate functionally and how and in which occasions and forms do they interact with one another?
2. What is the current level (spring-autumn 2015) of internal integration existing between the case mill's concerned departments?
3. How does the current level of internal integration appear in the light of the mill's future operating environment?

As was the case with the more theoretical research questions, the research under scrutiny was also successful in answering its more pragmatic research questions. The description written concerning the case mill's production planning, production, and warehousing and dispatch operations, in addition to their reciprocal internal integration actions, discusses on a detailed level how and under which principles each department operates, what kind of personnel it employs, which duties the different employees have, and with whom, in which occasions, in which form, and how regularly they share information and collaborate with one another.

Very detailed level information was able to be gained of the operations in the old production mode (spring 2013 - spring 2014). In addition, despite the large changes occurring in the case mill's operating environment, the description written concerning the situation in the old production mode was, however, still regarded to represent the reality until autumn 2015. The organization and functional operations remained quite largely settled until then. However, to provide an as truthful description of the prevalent operations as possible at all times, the changes happened in the concerned functions' operations during the transition period from the old production mode to the new (spring 2014 - autumn 2015) were also recorded. In addition, the new, future operating environment and functional operations (autumn 2015 onwards) were aimed at being described as thoroughly as possible, utilizing the limited amount of information available. The full description of the case mill's operations during the three discussed eras can be found in Chapters 4-6.

In addition, the research was also successful in analyzing the current level (spring-autumn 2015) of internal integration existing between the case mill's concerned three departments. Both already very well handled and positive matters and matters-to-be-improved were identified. The overall level of internal integration existing between the case mill's researched departments could be regarded to be good but the research and consequent analyses also revealed clear threats and issues demanding further concentration. The full analysis of the cur-

rent level (spring-autumn 2015) of internal integration existing between the case mill's concerned departments can be found in Section 7.1.

Finally, the research was also able to create a projection of the mill's current (spring-autumn 2015) level of internal integration into its future operating environment. Matters both enabling and hindering the integration efforts could be identified. Whereas some factors were thus seen to make the integration efforts easier, other factors seemed to pull the departments further away from each other and working together. The full analysis of the matters affecting the suspected future internal integration of the case mill's concerned functions can be found in Section 7.2.

All in all, summarizing the discussion above, the research under scrutiny can be regarded to have been able to answer both its more theoretical and pragmatic research questions on a good level. It can thus be claimed that the research really researched and achieved what it was aiming at researching and achieving.

## **8.2 Theoretical and Methodological Contributions**

The theoretical and methodological contributions of the research under scrutiny have been discussed on a detailed level in Section 7.4 (see the section for full discussion). A summary of the achieved contributions is presented in Table 56.

As can be seen in Table 56, the research under scrutiny has resulted in several both theoretical and methodological contributions, adding to the existing research literature concerning the phenomenon of internal integration.

Table 56 Theoretical and Methodological Contributions of the Research

<p><b>Theoretical Contributions</b></p> <ol style="list-style-type: none"> <li>1 New definition for the concept of internal integration.</li> <li>2 New operationalization for the concept of internal integration.</li> <li>3 Starting the discussion of employee skills as influencers of internal integration; discussing both manager/director and lower organization levels.</li> <li>4 Discussing and presenting the phenomenon of internal integration during a unique transformation process, during a longer period of time, on a detailed level.</li> <li>5 Providing an example case of similar cases - internal integration in similar high-volume, process industry settings.</li> <li>6 In addition, following separate theoretical findings:             <ol style="list-style-type: none"> <li>a The opinions of different departments concerning internal integration may vary.</li> <li>b The opinions of different organization levels concerning internal integration may vary.</li> <li>c The opinions of different individuals, representing a certain department and organization level, may vary; the opinions are affected by the persons' background and skills.</li> <li>d Internal integration may in best cases be advanced in relatively short time by relatively easy means.</li> </ol> </li> </ol> <p><b>Methodological Contributions</b></p> <ol style="list-style-type: none"> <li>1 Utilizing a qualitative research approach: single case study research, several qualitative data collection methods.</li> <li>2 Researching internal integration existing between three departments.</li> <li>3 Researching internal integration through the opinions of three organization levels.</li> <li>4 Researching internal integration through multiple respondents in each department, representing different organization levels.</li> <li>5 Executing longitudinal research; studying the phenomenon during three different eras.</li> <li>6 Executing the research from the inside though maintaining the role of an external, objective actor, due to an unusually deep access received to the case company.</li> <li>7 Creating a new model for analyzing the level of internal integration - to be further validated by future researches.</li> </ol>
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### 8.3 Managerial Implications

Starting with the case mill perspective, the research under scrutiny provides the Diamond Mill representatives with a deep and thorough description of the operations of the three concerned departments – production planning, production, and warehousing and dispatch – during three eras, in addition to detailed work descriptions and listings of information sharing and collaboration partners and occasions of the different employees involved in various duties within the concerned departments.

Moreover, the research also provides the mill representatives with a detailed analysis of the current (spring-autumn 2015) level of internal integration existing between the mill's concerned departments, in addition to projecting the current status to the mill's future operating environment (autumn 2015 onwards), concentrating on such matters that may be seen to either enable or hinder the mill's future internal integration endeavors.

Finally, the research also provides the case mill representatives with several managerial development suggestions, identified during the progression of the research. The suggestions can be used as a starting point for improving the current operations and planning the future internal integration development actions.

Looking from a broader perspective, internal integration is a matter that should not be overlooked by any company. If managed well, tighter internal integration may provide the different companies with both several operational and performance benefits, and may also help the companies in building tighter relationships with their up- and/or downstream partners in the wider supply chain – in integrating externally.

The current research has proved that internal integration is a stranded matter, it demands managing several matters simultaneously – the three different elements of internal integration, existing between different departments, seen in a different manner by individuals representing the different departments and organization levels, affected by their own individual backgrounds and skills. All three elements of internal integration – formal and informal information sharing, collaboration, and their coordination – must exist simultaneously to reach tighter internal integration. In addition, while analyzing the level of existing integration, the elements must be researched diversely. It is not enough to study the opinions of the managers or directors; it is not enough to study the opinions of single departments. Instead, in order to analyze and understand the *actual and true* level of internal integration existing between different departments within a company, all concerned departments and the opinions of all different organization levels involved in those departments should be researched. Only then the actual nature and status of internal integration can be revealed.

#### **8.4 Suggestions for Further Research**

Starting with the managerial view, *from the point of view of the case mill*, the level of integration existing between the other, unexamined functions involved in the mill's internal supply chain should be researched in order to receive a full overview of the level of internal integration existing within the mill. For example, the pulp and power production have been excluded from the research under scrutiny. Their effect on the functionality of the mill's production operations, and

consequently the whole internal and external supply chain, is, however, significant. Therefore their connectedness with the other, relevant internal supply chain functions should be further scrutinized.

Furthermore, the raw material/supply side of the internal supply chain of the mill has been left untouched in the research under scrutiny. Thus the purchasing department's information sharing and collaboration actions executed with the mill's other internal supply chain departments/functions should be further examined.

Moreover, the reciprocal information sharing and collaboration activities occurring *within* the concerned departments have not been investigated and addressed in the research under scrutiny. As the internal operations, however, can also be suspected to have an effect on the cross-departmental activities of each department, also the intra-functional operating modes should be analyzed in order to receive a full overview.

Finally, it would be both managerially and theoretically interesting to research how the level of integration existing between the case mill's concerned functions develops over time as the operating environment is currently undergoing extensive changes. It would be interesting to research whether the new operating environment has affected the level of internal integration as suspected in the research under scrutiny. The research could thus be repeated as such after a few years; bringing yet another longitudinal aspect to the matter.

On the other hand, looking *from a more theoretical perspective*, the combination of research instruments (introduction discussion questions, survey scales, and interview questions) created in the research under scrutiny, and used to create a holistic description of the case mill's concerned functions and their reciprocal integration, could be further validated by applying it in different contexts and/or cases. The combination/model could also be further refined by adding elements addressing *intra-functional* integration into the already existing selection of instruments.

Moreover, the topic of supply chain skills needed in successful internal supply chain management and in creation of tighter internal integration has only been briefly touched in the research under scrutiny; the research under scrutiny was the first attempt to bring the skills to the internal integration discussion. The skills needed of different organization levels in successful internal – and external as well – supply chain management is thus a research topic deserving and needing further research. In addition, linked to the same matter, a very interesting theme for further research would be to study the individual persons' overall role in the formation and creation of tighter internal integration. All in all, in the end all supply chains consist of humans; their personal behavior *must* play a role in the functionality, efficiency, and consequent competitiveness of all internal and external supply chains.

## REFERENCES

### Introduction Discussions

- Introduction to the Duties and Collaboration and Information Sharing Parties of the Assistant Superintendent. Assistant Superintendent, 21.8.2013 & 28.8.2013.
- Introduction to the Duties and Collaboration and Information Sharing Parties of the Shift Supervisors. Shift Supervisor, 29.8.2013 & 18.9.2013.
- Introduction to the Duties and Collaboration and Information Sharing Parties of the Superintendent. Superintendent, 3.9.2013 & 16.9.2013.
- Introduction to the Duties and Collaboration and Information Sharing Parties of the Warehouse and Dispatch Foremen. Foreman 1, 24.9.2013.
- Introduction to the Duties and Collaboration and Information Sharing Parties of the Warehouse and Dispatch Foremen. Foreman 1 & Foreman 2, 3.10.2013 & 4.10.2013.
- Introduction to the Duties and Collaboration and Information Sharing Parties of the Warehouse and Dispatch Foremen. Foreman 2, 15.10.2013.
- Introduction to the Mill. Mill Director, 3.5.2013.
- Introduction to the Mill's Evaluation and Incentive System. Human Resources Manager, 22.6.2015.
- Introduction to the Mill's Operational Supply Chain Organization (New Production Mode), Operational Supply Chain Director, 4.5.2015 & 25.6.2015.
- Introduction to the Mill's Production (Old Production Mode; New Production Mode). Production Manager, 12.8.2013, 19.8.2013, 29.4.2015, 4.5.2015, & 17.6.2015.
- Introduction to the Mill's Production Planning and to the Duties and Collaboration and Information Sharing Parties of the Production Planners. Production Planner, 26.6.2013 & 27.6.2013.
- Introduction to the Mill's Production Planning and to the Duties and Collaboration and Information Sharing Parties of the Production Planners. Production Planner & Senior Manager, Master Planning, 6.8.2013 & 29.4.2015.
- Introduction to the Mill's Sales Related Matters. Senior Manager, Master Planning & Director, Product Segment, 16.5.2013, 5.6.2013, 19.6.2013, & 3.7.2013.

- Introduction to the Mill's Sales Related Matters (New Production Mode). Sales Director, 18.6.2015.
- Introduction to the Mill's Sales Related Matters (New Production Mode). Sales Product Owner, 24.6.2015.
- Introduction to the Mill's Warehousing and Dispatch Operations. Transport Manager, 18.9.2013, 14.10.2013, & 12.5.2015.
- Sales Process Training, 16.5.2013 & 17.5.2013.

### Written and Electronic Sources

- Basnet, C. (2013), "The Measurement of Internal Supply Chain Integration", *Management Research Review*, Vol. 36 Iss. 2, pp. 153 – 172.
- Bernon, M. & Mena, C. (2013), "The Evolution of Customised Executive Education in Supply Chain Management", *Supply Chain Management*, Vol. 18 Iss. 4, pp. 440-453.
- Bisogni, P. (2008), "What Competencies and Skills Need the Modern Supply Chain Manager?", *Bulletin of the Transilvania University of Brasov*, Vol. 1 No. 50, pp. 1-4.
- Bramming, P. (1998), "Dansen med stoffet", *Beviset stilling – om kampen med stoffet*, IOA-årbog, pp. 26-33.
- Braunscheidel, M. & Suresh, N. (2009), "The Organizational Antecedents of a Firm's Supply Chain Agility for Risk Mitigation and Response", *Journal of Operations Management*, Vol. 27 No. 2, pp. 119-140.
- Cao, M. and Zhang, Q. (2011), "Supply Chain Collaboration: Impact on Collaborative Advantage and Firm Performance", *Journal of Operations Management*, Vol. 29, No. 3, pp.163–180.
- Chen, H., Mattioda, D.D.M. and Daugherty, P.J. (2007), "Firm-Wide Integration And Firm Performance", *International Journal of Logistics Management*, Vol. 18 No. 1, pp. 5-21.
- Childerhouse, P. and Towill, D. (2011), "Arcs of Supply Chain Integration", *International Journal of Production Research*, Vol. 49 No. 24, pp. 7441-7468.
- Chow, G. (1998), "Meeting Canada's Talent Pool Gap in Logistics, Supply Chain Management and Transportation", *Logistics and Supply Chain Journal*, August, pp. 17-21.
- Christopher, M. (1997), *Marketing Logistics*, Butterworth-Heinemann, Oxford.
- Christopher, M. (1998), Relationships and Alliances: Embracing the Era of Network Competition. In: Gattorna, J. (Ed.), *Strategic Supply Chain Management*. Gower Press, Hampshire (England), pp. 272–278.
- Christopher, M. (2005), *Logistics And Supply Chain Management*. 3rd ed. London: FT Prentice Hall.

- Collins, J. (2001), *Good to Great: Why Some Companies Make the Leap and Others Don't*, Harper Collins Publishers.
- Cooper, M.C., Ellram, L.M., Gardner, J. & Hanks, A. (1997), "Meshing Multiple Alliances", *Journal of Business Logistics*, Vol. 18 No. 1, pp. 67-89.
- Copacino, W. (1997), "Skills Development – The Best Defense against Downsizing", *Logistics Management*, January, pp. 42.
- Crittenden, V.L. (1992), "Close the Marketing/Manufacturing Gap", *Sloan Management Review*, Vol. 33 No. 3, pp. 41-52.
- Cuijpers, M., Guenter, H. & Hussinger, K. (2011), "Costs and Benefits of Inter-Departmental Innovation Collaboration", *Research Policy*, Vol. 40, pp. 565-575.
- Das, A. J., Narasimhan, R., & Talluri, S. (2006), "Supplier Integration – Finding an Optimal Configuration", *Journal of Operations Management*, Vol. 24 No. 5, pp. 563–582.
- Daugherty, P.J., Ellinger, A.E. and Gustin, C.M. (1996), "Integrated Logistics: Achieving Logistics Performance Improvements", *Supply Chain Management*, Vol. 1 No. 3, pp. 25-33.
- Denzin, N. & Lincoln, Y. (1994), *Handbook of Qualitative Research*, Thousand Oaks & London: Sage.
- Eisenhardt, K. (1989), "Building Theories from Case Study Research", *Academy of Management, The Academy of Management Review*, Oct. 1989, Vol. 14 No. 4, pp. 532-550
- Ellinger, A.E. (2000), "Improving Marketing/Logistics Cross-Functional Collaborations in the Supply Chain", *Industrial Marketing Management*, Vol. 29 No. 1, pp. 85-96.
- Ellinger, A.E., Daugherty, P.J. & Gustin, G.M. (1997), "The Relationship between Integrated Logistics and Customer Service". *Transpn Res.-E (Logistics and Transpn. Rev)*, Vol. 33 N. 2, pp.129-138.
- Ellinger, A.E., Daugherty, P.J. and Keller, S.B. (2000), "The Relationship between Marketing/Logistics Interdepartmental Integration and Performance in US Manufacturing Firms: An Empirical Study", *Journal of Business Logistics*, Vol. 21 No. 1, pp. 1-22.
- Ellinger, A., Ellinger, A. & Keller, S. (2002), "Logistics Managers' Learning Environments and Firm Performance", *Journal of Business Logistics*, Vol. 23 No. 1, pp. 19-37.
- Ellinger, A., Keller, S. & Hansen, J. (2006), "Bridging the Divide between Logistics and Marketing: Facilitating Collaborative Behavior", *Journal of Business Logistics*, Vol. 27 No. 2, pp.1-27.
- Enkel, E., Kausch, C., & Gassmann, O. (2005). "Managing the Risk of Customer Integration", *European Management Journal*, Vol. 23 No. 2, pp. 203–213.

- Eriksson, P & Kovalainen, A. (2008), *Qualitative Methods in Business Research*, SAGE Publications Ltd, TJ International Ltd: London.
- Ertimur, B., & Venkatesh, A. (2010), "Opportunism in Co-Production: Implications for Value Co-Creation", *Australasian Marketing Journal*, Vol. 18 No. 4, pp. 256–263.
- Eurich, M., Oertel, N. & Boutellier, R. (2010), "The Impact of Perceived Privacy Risks on Organizations' Willingness to Share Item-Level Event Data Across the Supply Chain", *Electron Commer Res*, Vol. 10, pp. 423-440, doi: 10.1007/s10660-010-9062-0.
- Fabbe-Costes, N. & Jahre, M. (2008), "Supply Chain Integration and Performance: A Review of the Evidence", *The International Journal of Logistics Management*, Vol. 19 No. 2, pp. 130-154.
- Fawcett, S., Andraski, J., Fawcett, A. & Magnan, G. (2010), "The Indispensable Supply Chain Leader", *Supply Chain Management Review*, September/October, pp. 22-29.
- Flynn, B., Huo, B. & Zhao, X. (2010), "The Impact of Supply Chain Integration on Performance: A Contingency and Configuration Approach", *Journal of Operations Management*, Vol. 28, pp. 58-71.
- Gammelgaard, B. & Larson, P. (2001), "Logistics Skills and Competencies for Supply Chain Management", *Journal of Business Logistics*, Vol. 22 No. 2, pp. 27-50.
- Gibbert, M. & Ruigrok, W. (2010), "The "What" and "How" of Case Study Rigor: Three Strategies Based on Published Work", *Organizational Research Methods*, Vol. 13 No. 4, pp. 710-737.
- Gimenez, C. (2004), "Supply Chain Management Implementation in the Spanish Grocery Sector: An Exploratory Study", UPF Economics & Business Working Paper (No. 668), Universitat Pompeu Fabra, Barcelona.
- Gimenez, C. & Lourenco, H. (2008), "e-SCM: Internet's Impact on Supply Chain Processes", *The International Journal of Logistics Management*, Vol. 19 Iss. 3 pp. 309 – 343.
- Gimenez, C., van den Vaart, T. & van Donk, D. (2012), "Supply Chain Integration and Performance: The Moderating Effect of Supply Complexity", *International Journal of Operations & Production Management*, Vol. 32 No. 5, pp. 583-610.
- Gimenez, C. & Ventura, E. (2003), "Supply Chain Management as a Competitive Advantage in the Spanish Grocery Sector", *International Journal of Logistics Management*, Vol. 14 No. 1, pp. 77-88.
- Gimenez, C. & Ventura, E. (2005), "Logistics-Production, Logistics-Marketing and External Integration: Their Impact on Performance", *International Journal of Operations & Production Management*, Vol. 25 No. 1, pp. 20-38.

- Golicic, S., Davis, D. & McCarthy, T. (2005), "A Balanced Approach to Research in Supply Chain Management", In: Kotzab, H., Seuring, S., Müller, M. & Reiner, G. (Eds.). *Research Methodologies in Supply Chain Management*. Physica-Verlag: Heidelberg.
- Green, A. (2010), "Building the Skills to Support a High-Performance Supply Chain", *Scemagazine*, July/August, pp. 16-17.
- Grover, V., Lim, J., & Ayyagari, R. (2006), "The Dark Side of Information And Market Efficiency in E-Markets", *Decision Sciences Journal*, Vol. 37 No. 3, pp. 297–324.
- GS1 Australia Supply Chain Futures Forum (2013), "*Supply Chain Management Graduate Knowledge Requirements Matrix*", available at: [http://www.gs1au.org/assets/documents/services/education/uni/se\\_matrix.pdf](http://www.gs1au.org/assets/documents/services/education/uni/se_matrix.pdf), accessed: 6.11.2013.
- Gummesson, E. (2000), *Qualitative Methods in Management Research*, Sage Publications: Thousand Oaks, CA.
- Gunasekaran, A. & Ngai, E. (2004), "Information Systems in Supply Chain Integration and Management", *European Journal of Operational Research*, Vol. 159 No. 2, pp. 269–295.
- Halldórson, A. & Arlbjorn, J. (2005), "Research Methodologies in Supply Chain Management – What Do We Know?" In: Kotzab, H., Seuring, S., Müller, M. & Reiner, G. (Eds.). *Research Methodologies in Supply Chain Management*. Physica-Verlag: Heidelberg.
- Hallikas, J., Puumalainen, K., Vesterinen, T. & Virolainen, V-M (2005), "Risk-Based Classification of Supplier Relationships", *Journal of Purchasing & Supply Management*, Vol. 11, pp. 72-82.
- Handfield, R. & Nichols, E. (1999), *Introduction to Supply Chain Management*, Upper Saddle River, New Jersey, Prentice Hall.
- Hayes, R.H. and Wheelwright, S.C. (1984), *Restoring Our Competitive Advantage*, New York, NY: John Wiley and Sons.
- Huo, B. (2012), "The Impact of Supply Chain Integration on Company Performance: An Organization Capability Perspective", *Supply chain Management: An International Journal*, Vol. 17 Iss. 6, pp. 596-610.
- Jahre, M. & Fabbe-Costes, N. (2005), "Adaptation and Dapatability in Logistics Networks", *International Journal of Logistics: Research and Applications*, Vol. 8 No. 2, pp. 143-157.
- Jaworski, B.J. & Kohli, A.K. (1993), "Market Orientation: Antecedents and Consequences", *Journal of Marketing*, Vol. 57, pp. 53-70.
- Jia, F., Gao, R., Lamming R. & Wilding, R. (2016), "Adaptation of Supply Management towards a Hybrid Culture: The Case of a Japanese Automaker", *Supply Chain Management: An International Journal*, Vol. 21 Iss. 1 pp. 45 – 62.

- Johnson, J., Wood, D., Wardlow, D. & Murphy, P. (1999), *Contemporary Logistics*, 7<sup>th</sup> Ed. Upper Saddle River, New Jersey, Prentice Hall.
- Kahn, K.B. and Mentzer, J.T. (1994), "Norms That Distinguish between Marketing and Manufacturing", *Journal of Business Research*, Vol. 30 No. 2, pp. 111-118.
- Kahn, K.B. and Mentzer, J.T. (1996), "Logistics and Interdepartmental Integration", *International Journal of Physical Distribution & Logistics Management*, Vol. 26 No. 8, pp. 6-14.
- Kahn, K.B. and Mentzer, J.T. (1998), "Marketing's Integration with Other Departments", *Journal of Business Research*, Vol. 42 No. 1, pp. 53-62.
- Karlsson, C. & Åhlström, P. (1997), "Changing Product Development Strategy – A Managerial Challenge", *Journal of Product Innovation Management*, Vol. 14, pp. 473-484.
- Keller, R. (2001), "Cross-Functional Project Groups in Research and New Product Development: Diversity, Communications, Job Stress, and Outcomes." *Academy of Management Journal*, Vol. 44 No. 3, pp. 547–555.
- Kim, S. (2009), "An Investigation on the Direct and Indirect Effect of Supply Chain Integration on Firm Performance", *International Journal of Production Economics*, Vol. 119, pp. 328-346.
- Larson, P.D. & Rogers, D.S. (1998), "Supply Chain Management: Definition, Growth, and Approaches", *Journal of Marketing Theory and Practice* 6 (Fall 1998)", pp. 1-5.
- Lawrence, P.R., and Lorsch, J.W. (1967), *Organization and Environment: Managing Differentiation and Integration*. Boston, MA: Graduate School of Business Administration, Harvard University.
- Le May, S., Carr, J., Periatt, J. & McMahon, R. (1999), *The Growth and Development of Logistics Personnel*, Oak brook, Illinois, Council of Logistics Management.
- Lee, A. (2003), "Generalizing Generalizability in Information Systems Research", *Information Systems Research*, Vol. 14, pp. 221-243.
- Lee, H. (2000), "Creating Value through Supply Chain Integration", *Supply Chain Management Review*, September (4), pp. 30–36.
- Lui, S., Ngo, H. & Hon, A. (2006) "Coercive Strategy in Interfirm Cooperation: Mediating Roles of Interpersonal and Interorganizational Trust", *Journal of Business Research*, Vol. 59 No. 4, pp. 466–474.
- Lynagh, P.M. and Poist, R. (1984), "Managing Physical Distribution/Marketing Interface Activities: Cooperation or Conflict?", *Transportation Journal*, Vol. 23 No. 3, pp. 36-43.

- McCarthy, T. & Golicic, S. (2005), "A Proposal for Case Study Methodology in Supply Chain Integration Research", In: Kotzab, H., Seuring, S., Müller, M. & Reiner, G. (Eds.). *Research Methodologies in Supply Chain Management*. Physica-Verlag: Heidelberg.
- Melbin, J. (1997), "No Longer in the Shadows", *Distribution*, March, pp. 34-39.
- Mentzer, J.T. (2004), *Fundamentals of Supply Chain Management: Twelve Drivers of Competitive Advantage*, Sage, Thousand Oaks, CA.
- Minahan, T. (1998), "How the Supply Chain Changes Your Job", *Purchasing*, February, pp. 57-58.
- Mollenkopf, D., Gibson, A. and Ozanne, L. (2000), "The Integration of Marketing and Logistics Functions: An Empirical Examination of New Zealand Firms", *Journal of Business Logistics*, Vol. 21 No. 2, pp. 89-112.
- Murphee, J. (2006), "Building a Better Supply Chain Professional", *Supply & Demand Chain Executive*, April/May, pp. 47-49.
- Murphy, P.R. and Poist, R.F. (1992), "The Logistics-Marketing Interface: Techniques for Enhancing Cooperation", *Transportation Journal*, Vol. 32 No. 2, pp. 14-23.
- Murphy, P. & Poist, R. (1996), "Comparative Views of Logistics and Marketing Practitioners Regarding Interfunctional Co-ordination", *International Journal of Physical Distribution & Logistics Management*, Vol. 26 No. 8, pp. 15-28.
- Murphy, P. & Poist, R. (2006), "Skill Requirements of Contemporary Senior- and Entry-Level Logistics Managers: A Comparative Analysis", *Transportation Journal*, Summer, pp. 46-60.
- Murphy, P. & Poist, R. (2007), "Skill Requirements of Senior Level Logisticians: A Longitudinal Assessment", *Supply Chain Management: An International Journal*, Vol. 12 No. 6, pp. 423-431.
- Narasimhan, R. and Kim, S.W. (2002), "Effect of Supply Chain Integration on the Relationship between Diversification and Performance: Evidence from Japanese and Korean Firms", *Journal of Operations Management*, Vol. 20 No. 3, pp. 303-323.
- Narver, J.C. & Slater, S.F. (1990), "The Effect of a Market Orientation on Business Profitability", *Journal of Marketing*, Vol. 54, pp. 20-35.
- O'Leary-Kelly, S.W. and Flores, B.E. (2002), "The Integration of Manufacturing and Marketing/Sales Decisions: Impact on Organizational Performance", *Journal of Operations Management*, Vol. 20 No. 3, pp. 221-240.
- Oliver, R. & Webber, M. (1982), "Supply Chain Management: Logistics Catches Up with Strategy", in Christopher, M. (Ed.), *Logistics: The Strategic Issues*, Pitman, London, pp. 63-75.

- Olson, E., Walker, O., Ruekert, R. & Bonnerd, J. (2001), "Patterns of Cooperation during New Product Development among Marketing, Operations and R&D: Implications for Project Performance", *Journal of Product Innovation Management*, Vol. 18, pp. 258–271.
- Pagell, M. (2004), "Understanding the Factors that Enable and Inhibit the Integration of Operations, Purchasing and Logistics", *Journal of Operations Management*, Vol. 22 No. 5, pp. 459-487.
- Pagell, M. & Wu, Z. (2006), "Enhancing Integration of Supply Chain Functions within a Firm: Exploring the Critical Factors through Eleven Cases", *Int. J. Integrated Supply Management*, Vol. 2, No. 4, pp. 295-315
- Parente, D.H., Pegels, C.C. and Suresh, N. (2002), "An Exploratory Study of the Sales-Production Relationship and Customer Satisfaction", *International Journal of Operations & Production Management*, Vol. 22 Nos 9/10, pp. 997-1013.
- Parnaby, J. (1979), "Concept of a Manufacturing System", *International Journal of Production Research*, Vol. 17 No. 2, pp. 123–135.
- Patrashkova-Volzdoska, R. , McComb, S., Green, S., & Compton, W. (2003), "Examining a Curvilinear Relationship between Communication Frequency and Team Performance in Cross-Functional Project Teams", *IEEE Transactions on Engineering Management*, Vol. 50 No. 3, pp. 262–269.
- Pearl Group Website (2013; 2014; 2015), details of actual webpages omitted due to anonymity requirements.
- Poist, R. (1984), "Managing Logistics in an Era of Change", *Defence Transportation Journal*, September/October, pp. 23-30.
- Porasmaa, M. & Ojala, L. (2011), "Supply Chain Visibility – An Overview of the Concept and Its Usage in Research Literature", In: Kersten, W., Blecker, T. & Jahn, C. (Eds.). *International Supply Chain Management and Collaboration Practices*. EUL Verlag.
- Prajago, D. & Olhager, J. (2012), "Supply Chain Integration and Performance: The Effects of Long-Term Relationships, Information Technology and Sharing, and Logistics Integration", *International Journal of Production Economics*, Vol 135, pp. 514-522.
- Radford, B., Fletcher, C. & Scott, M. (2010), "Diversity: The Key to Post-Recession Supply Chain Skills", *Scemagazine*, July/August, pp. 20-21.
- Razzaque, M. & Sirat, M. (2001), "Skill Requirements: Perception of the Senior Asian Logisticians", *International Journal of Physical Distribution & Logistics Management*, Vol. 31 No. 5, pp. 374-395.
- Richardson, H. (1998), "Create a Culture of Success", *Transportation and Distribution*, November, pp. 102.

- Richey, R., Tokman, M. & Wheeler, A. (2006), "A Supply Chain Manager Selection Methodology: Empirical Test and Suggested Application", *Journal of Business Logistics*, Vol. 27 No.2, pp. 163-190.
- Sandberg, J. & Alvesson, M. (2011), "Ways of Constructing Research Questions: Gap-Spotting of Problematization?" *Organization*, Vol. 18 No. 1, pp. 23-44.
- Sawhney, R. and Piper, C. (2002), "Value Creation through Enriched Marketing-Operations Interfaces: An Empirical Study in the Printed Circuit Board Industry", *Journal of Operations Management*, Vol. 20 No. 3, pp. 259-272.
- Schoenherr, T., and Swink, M. (2012), "Revisiting the Arcs of Integration: Cross-Validations and Extensions." *Journal of Operations Management*, Vol. 34 No. 1-2, pp. 99-115.
- Seuring, S. (2005), "Case Study Research in Supply Chains – An Outline and Three Examples", In: Kotzab, H., Seuring, S., Müller, M. & Reiner, G. (Eds.). *Research Methodologies in Supply Chain Management*. Physica-Verlag: Heidelberg.
- Sheremata, W.A. (2000), "Centrifugal and Centripetal Forces in Radical New Product Development Under Time Pressure." *Academy of Management Review* Vol. 25 No. 2, pp. 389-408.
- Silverman, D. (2005), *Doing Qualitative Research*. Sage: London.
- Solakivi, T., Töyli, J. & Ojala, L. (2015), 'Supply Chain Collaboration and Firm Performance in Manufacturing', *Int. J. Integrated Supply Management*, Vol. 9, No. 4, pp.343-366.
- Sohal, A. (2013), "Developing Competencies of Supply Chain Professionals in Australia: Collaboration between Businesses, Universities and Industry Associations", *Supply Chain Management: An International Journal*, Vol. 18 No. 4, pp. 429-439.
- Song, M., Thieme, R. & Xie, J. (1998), "The Impact of Cross-Functional Joint Involvement across Product Development Stages: An Exploratory Study", *Journal of Product Innovation Management*, Vol. 15 No. 4, pp. 289-303.
- Song, M. & Xie, J. (2000), "Does Innovativeness Moderate the Relationship Between Cross-Functional Integration and Product Performance", *Journal of International Marketing*, Vol. 8 No. 4, pp. 61-89.
- Sorenson, O. (2003), "Interdependence and Adaptability: Organizational Learning and the Long-Term Effect of Integration", *Management Science*, Vol. 49 No. 4, pp. 446-463.
- Spekman, R., Spear, J. & Kamauf, J. (2002), "Supply Chain Competency: Learning as a Key Component", *Supply Chain Management: An International Journal*, Vol. 7 No.1, pp. 41-55.

- Stank, T.P., Daugherty, P.J., and Ellinger, A.E. (1999), "Marketing/Logistics Integration and Firm Performance." *International Journal of Logistics Management*, Vol 10 No. 1, pp. 11–33.
- Stank, T.P., Keller, S.B. & Closs, D.J. (2001a), "Performance Benefits of Supply Chain Logistical Integration", *Transportation Journal*, Vol. 41 Nos 2/3, pp. 32-46.
- Stank, T.P., Keller, S.B. and Daugherty, P.J. (2001b), "Supply Chain Collaboration and Logistical Service Performance", *Journal of Business Logistics*, Vol. 22 No. 1, pp. 29-48.
- Stevens, G.C. (1989), "Integrating the Supply Chain", *International Journal of Physical Distribution & Materials Management*, Vol. 19 No. 8, pp. 3-8.
- Strauss, A. & Corbin, J. (1994), "Grounded Theory Methodology", In: Denzin, N., Lincoln, Y. (Eds.). *The handbook of Qualitative Research*. Sage: Thousand Oaks.
- Sunday Business Post (2013), "*Supply Chain Management: Sector Needs to Focus on the Basic Skills Required*", Ireland, Cork, 20.1.2013.
- Swink, M., Narasimhan, R., and Wang, C. (2007), "Managing Beyond the Factory Walls: Effects of Four Types of Strategic Integration on Manufacturing Plant Performance." *Journal of Operations Management*, Vol. 25 No. 1, pp. 148–164.
- Swink, M. & Schoenherr, T. (2014), "The Effects of Cross-Functional Integration on Profitability, Process Efficiency, and Asset Productivity", *Journal of Business Logistics*, pp. 1-19.
- Swink, M., Song, M. (2007), "Effects of Marketing-Manufacturing Integration on New Product Development Time and Competitive Advantage", *Journal of Operations Management*, Vol. 25, pp. 203–217.
- Troy, L., Hirunyawipada, T. & Paswan, A. (2008), "Cross-Functional Integration and New Product Success: An Empirical Investigation of the Findings", *Journal of Marketing*, Vol. 72, pp. 132–146.
- Trunick, P. (1998), "New Demands for Tomorrow's Manager", *Transportation and Distribution*, December, pp. 18-19.
- Tsai, K-H. & Hsu, T. (2014), "Cross-Functional Collaboration, Competitive Intensity, Knowledge Integration Mechanisms, and New Product Performance: A Mediated Moderation Model", *Industrial Marketing Management*, Vol. 43, pp. 293-303.
- Uhl, M. & Graen, G. (1998), "Individual Self-Management: Analysis of Professionals' Self-Managing Activities in Functional and Cross-Functional Work Teams", *Academy of Management Journal*, Vol. 41 No. 3, pp.340-350.

- Unpublished Job Descriptions of Director, Product Segment & Senior Manager, Master Planning, received: 7.6.2013.
- Unpublished Mill Presentation Slides, received: 6.5.2013.
- Unpublished Office Paper Sales Presentation Material, received: 7.6.2013.
- Unpublished Operational Supply Chain Organization Material, received: 4.5.2015.
- Unpublished Production Material, Age Distribution of Production Department Employees, Effect of Grammage on Production Tonnage, received: 12.8.2013.
- Unpublished Production Planning Material, Screen Shots from the Different Systems, received: 26.6.2013.
- Unpublished Sales Material, received: 12.5.2015.
- Unpublished Sales Process Guidelines, Sales Process Guidelines Training Material, and Implementation Brochure, received: 5.6.2013.
- Unpublished Warehouse and Dispatch Material, Various Shipping Lists, Example of a Truck List, received: 24.9.2013.
- Vafidis, D. (2007), *Approaches for Knowledge and Application Creation in Logistics – An Empirical Analysis Based on Finnish and Swedish Doctoral Dissertations Published between 1994 and 2003*, Publications of the Turku School of Economics, Esa Print Tampere: Tampere.
- Van de Ven, A. & Ferry, D. (1980), *Measuring and Assessing Organizations*, New York: Wiley.
- Van Hoek, R. & Chapman, P. (2006), "From Tinkering Around the Edge to Enhancing Revenue Growth: Supply Chain – New Product Development", *Supply Chain Management*, Vol. 11 No. 5, pp. 385-389.
- Van Hoek, R., Ellinger, A. & Johnson, M. (2008), "Great Divides: Internal Alignment between Logistics and Peer Functions", *The International Journal of Logistics Management*, Vol. 19 No. 2, pp. 110-129.
- Van Hoek, R. & Wagner, B. (2013), "Supply Chain Management (SCM): Current Education Provision and Practitioner Future Needs", *Supply Chain Management: An International Journal*, Vol. 18 No. 4.
- Villena, V. H., Revilla, E., & Choi, T. Y. (2011), "The Dark Side of Buyer–Supplier Relationships: A social capital perspective", *Journal of Operations Management*, Vol. 29 No. 6, pp. 561–576.
- Voss, C., Tsikriktsis, N. & Frohlich, M. (2002), "Case Research in Operations Management", *International Journal of Operations & Production Management*, Vol. 22 Iss. 2 pp. 195 – 219.
- Williamson, O.E. (1985), *The Economic Institutions of Capitalism*. New York: The Free Press.

- Wong, W.Y., Chee, Y.W. & Boon-itt, S. (2013), “The Combined Effects of Internal and External Supply Chain Integration on Product Innovation”, *International Journal of Production Economics*, Vol. 146, pp. 566-574.
- Wu, Y-C., Huang, S., Goh, M. & Hsieh, Y-J. (2013), “Global Logistics Curriculum: Perspective from Practitioners in Taiwan”, *Supply Chain Management: An International Journal*, Vol. 18 No. 4, pp. 376-388.
- Yin, R. (1994), *Case Study Research: Design and Methods*, Sage Publications: Beverly Hills, CA.
- Yin, R. (2003), *Case Study Research – Design and Methods*, Third Edition, Sage: Thousand Oaks.
- Yin, R. (2013), “Validity and Generalization in Future Case Study Evaluations”, *Evaluation*, Vol.19 Iss. 3, pp. 321-332.
- Zhao, G., Feng, T. & Wang, D. (2015), “Is More Supply Chain Integration Always Beneficial to Financial Performance?”, *Industrial Marketing Management*, Vol. 45, pp. 162-172.
- Zirger, B. & Hartley, J. (1996), “The Effect of Acceleration Techniques on Product Development Time”, *IEEE Transactions on Engineering Management*, Vol. 43 No. 2, pp. 143–152.

## APPENDICES

### Appendix 1 Interview Protocol Used by Pagell (2004)

#### *A.1. Pre-tour questions*

##### *A.1.1 General company information*

- 1 Plant employment?
- 2 Product sales - last 3 years?
- 3 Products made at plant?
- 4 Are there other plants within the company that do the same or similar tasks?
- 5 What type of markets do you serve? (OEM, consumer, B to B, etc.)
- 6 Would you describe the company as ETO, MTO, ATO, or MTS?

#### *A.2. Post-tour questions*

##### *A.2.1. Strategy*

- 1 How does your plant/company compete - in other words why does a customer buy your product as opposed to the competition?
- 2 Who do you compete with (locations/numbers/etc.)?
- 3 Uncertainty - number of competitors?
- 4 Speed of growth/retrenchment?
- 5 Speed of technological change?
- 6 Ease of predicting demand?
- 7 Ability to predict/direct changes in the competitive space?
- 8 Delineating order winners versus order qualifiers. Based on the competitive priorities of quality, delivery, cost, flexibility, innovation and service.
- 9 Which of these order winners and qualifiers are most important to your functional area? In order words if you had to prioritize the, for your function what order would you put them in? If this differs from the overall company's prioritization, please explain.
- 10 We are going to as managers of the other functional areas the same question. How will they answer it? Can you explain any deviations they have from the overall company's/plant's prioritization?

##### *A.2.2. Integration*

- 1 How much cross-functional integration does your company have?
- 2 Why do you say you have \_\_\_\_ levels of integration? In other words what does integration mean to you and how have you determined ho much you have?
- 3 Give me a few examples?
- 4 Is this integration mostly aimed at solving problems or preventing problems?
- 5 What mechanisms does your company use to create/discourage integration?
- 6-10 Questions of external integration
- 11 When you make decisions in your function, how much do you consider the impact of these decisions on other functions?
- 12 Why they make decision in other functions, how often do they consider the impact of these decision on your function?
- 13 Do you use cross-functional teams? If so, how often and where (managerial or operational)?
- 14 Do managerial employees rotate from function to function?

*A.2.3. Measurement*

- 1 How is your function's performance evaluated?
- 2 What are the key things your function tracks (i.e. defects, efficiency, etc.)? What do you do with this
- 3 How are you (as an individual) assessed and rewarded? In other words what percentage of your rewards are dependent on individual performance/functional performance (including teams within the function)/the performance of the entire plant (including cross-functional teams/the company's performance (for multiplant system)?
- 4 If rewards are at least somewhat cross-functional - ask them to explain.

*A.2.4 Performance*

- 1 How well does your company/plant perform in the market it serves? Please explain.
- 2 How does your function perform in terms of meeting the goals of your organization? Please explain.
- 3 How does your function perform compared to other in the industry? Please explain.
- 4 How do the other functions perform in terms of meeting organizational goals? Please explain.

## Appendix 2 Questionnaire used by Mollenkopf *et al.* (2000)

<p><b>DEPENDENT VARIABLES</b></p> <p><b>Integration</b></p> <p><b>Information Dissemination</b></p> <p>In this firm, information</p> <ul style="list-style-type: none"> <li>is communicated between marketing and logistics people through the use of (for example) reports, newsletter, e-mails, formal discussion, informal discussion</li> <li>regarding this firm's customers/target segments is communicated to our logistics people</li> <li>regarding this firm's products is communicated to our logistics people</li> <li>regarding this firm's warehousing or transportation issues is communicated to our marketing people</li> </ul> <p><b>Coordination of Activities</b></p> <p>Marketing and logistics people in this firm do not</p> <ul style="list-style-type: none"> <li>discuss with each other the issues affecting this firm's marketing and logistics functions</li> <li>spend time discussing customer future needs with each other</li> <li>coordinate their work activities</li> </ul>
<p><b>INDEPENDENT VARIABLES</b></p> <p><b>Strategic Management (Combination of Top Management Emphasis and Mutual Goals)</b></p> <p>Top managers in this firm</p> <ul style="list-style-type: none"> <li>communicate to marketing and logistics people that working together is essential to meet customers' needs</li> <li>encourage marketing and logistics people to sort out any differences that may arise between them</li> <li>emphasize the importance of coordinating marketing and logistics activities</li> </ul> <p>Goals that recognize the importance of coordinating marketing and logistics activities are</p> <ul style="list-style-type: none"> <li>communicated through the firm</li> <li>reviewed on a regular basis to ensure their relevance</li> </ul> <p>Marketing and logistics people in this firm</p> <ul style="list-style-type: none"> <li>feel their goals are inline with each other</li> </ul> <p><b>Cooperative Attitudes</b></p> <p>In this firm, middle managers</p> <ul style="list-style-type: none"> <li>encourage a feeling of unity among marketing and logistics people</li> <li>encourage marketing and logistics people to work together</li> <li>foster a positive attitude between marketing and logistics people</li> </ul> <p><b>Liaison Activities</b></p> <p>In this firm, middle managers</p> <ul style="list-style-type: none"> <li>designated a person (or persons) to deal promptly with problems/issues as they arise between marketing and logistics people</li> <li>liaise between marketing and logistics when necessary</li> <li>assist in the development of procedures that help marketing and logistics people work together on a daily basis</li> <li>have opportunities made available to them for education in each other's area of expertise</li> </ul>

**Cross Education and Training**

Marketing and logistics people in this firm

are made aware in their everyday work of the importance of maintaining a customer focus throughout the firm

are educated formally by the firm on the importance of maintaining a customer focus throughout the firm

**Conflict**

Marketing and logistics people in this firm

experience tension when they work together

are quite protective of their information

**Connectivity**

Marketing and logistics people in this firm

get along well with each other

have regular contact with each other

have opportunities for informal discussion with each other

do not have opportunities for working out problem solutions with each other

are comfortable calling each other when the need arises

**Formalization**

In this firm

people can make their own decisions without checking with anyone else

how things are done is left up to the person doing the work

most people make their own rules on the job

people are allowed to do almost as they please

**Centralization**

In this firm

there can be little action taken until someone higher up approves a decision

even small matters must be referred to superiors for a final answer

employees are constantly being monitored for rule violations

**Reward System**

In this firm

marketing and logistics people are rewarded (for example pay increases, promotion) for working together to meet customers' needs

incentives for working with other areas of the firm are made available to people (including marketing and logistics people)

people are rewarded for acting in the customers' best interest

people are recognized for being sensitive to competitive moves

performance evaluation is partly based on customer feedback

pay for marketing and logistics managers is based in part on integration objectives for marketing and logistics (for example, greater customer service levels) being met

## Appendix 3 Questionnaire Used by Ellinger *et al.* (2000) (Adapted)

### Adapted Questionnaire (Performance Related Questions Omitted)

#### Information Exchange

*During the past six months, how often did the Logistics Department interact with the Marketing Department in regard to the following activities?*

*5-point scale, Never (1) to Extremely Often (5)*

- Exchange of reports
- Exchange of memorandums
- Exchange of FAX materials

#### Consultation

*During the past six months, how often did the Logistics Department interact with the Marketing Department in regard to the following activities?*

*5-point scale, Never (1) to Extremely Often (5)*

- Committees/task forces
- Phone conversations
- Phone mail
- Electronic mail

#### Collaboration

*During the past six months, how often did the Logistics Department engage in the following activities with the Marketing Department?*

*5-point scale, Never (1) to Extremely Often (5)*

- Achieving goals collectively
- Developing a mutual understanding of responsibilities
- Informally working together
- Sharing ideas, information, and/or resources
- Working together as a team
- Conducting joint planning to anticipate and resolve operational problems
- Making joint decisions about ways to improve overall cost efficiency

#### Perceived Effectiveness of Interdepartmental Relations

*During the past six months, to what extent*

*5-point scale, Not at all (1) to To a Great Extent (5)*

- has marketing carried out its responsibilities and commitments in regards to logistics
- has the relationship between logistics and marketing been productive
- has the time and efforts spent in developing and maintaining the relationship with marketing been worthwhile
- have you been satisfied with the overall relationship between logistics and marketing

## Appendix 4 Questionnaire Used by Parente *et al.* (2002)

### Interdepartmental Connectedness

*The extent to which the informants are networked between the two organizations*

*Salespersons were asked to respond regarding each production manager dyad in which they participated (1 strongly disagree; 7 strongly agree).*

*Questions were reworded for the production manager to respond regarding the sales-production dyads in which they participated.*

- 1 In this business unit, it is easy to talk with virtually anyone you need to, regardless of rank or position.
- 2 In this business unit, I feel comfortable calling people in the manufacturing unit when the need arises.
- 3 Managers here discourage employees from discussing work-related matter with those who are not their immediate superiors or subordinates.
- 4 People in our sales department are quite accessible to those in the manufacturing units.
- 5 Managers in manufacturing can easily schedule meetings with sales personnel.
- 6 Salespeople can easily schedule meetings with manufacturing.

(Adapted from Jaworski and Kohli, 1993)

### Interdepartmental Conflict

*The extent to which the goals of each department are incompatible and tension prevails in the interactions*

*Salespersons were asked to respond to this set of questions on a seven-point scale (1 strongly disagree; strongly agree) regarding each product or production manager dyad in which they participated*

*Questions were reworded for the production manager to respond regarding the sales-production dyads in which they participated.*

- 1 Most departments in this business get along well with each other.
- 2 When members of sales and the production units get together, tensions frequently run high.
- 3 Employees from sales and the manufacturing units feel that the goals of their respective departments are in harmony with each other.
- 4 The objectives pursued by the sales department are incompatible with those of the manufacturing departments,
- 5 There is little or no sales/production conflict in this business unit.

(Adapted from Jaworski and Kohli, 1993)

### Interdepartmental Coordination

*Salespersons were asked to what extent does each of the following actors exist between sales and manufacturing for each of the products listed? (1 to no extent; 7 to a great extent)*

*Production managers were asked the same questions.*

- 1 Both functions share information
- 2 Both functions integrate strategy
- 3 Both functions contribute to customer value.

(Adapted from Narver and Slater, 1990)

## Appendix 5 Starting Point of Operationalization

Integration Element	Scale/Question	Author
<b>FORMAL AND INFORMAL INFORMATION SHARING</b>		
<b>Overall status of inf. sharing</b>	Both functions share information	Parente et al. (2002)
	Information is communicated between marketing and logistics	Mollenkopf et al. (2000)
	Share <b>ideas, information</b> (, and resources) between them	Basnet (2013)
	My firm effectively shares operational information between departments	Stank et al. (2001b)
	Open cross-functional communication of problems and opportunities	PageII (2004); PageII & Wu (2006)
	My firm has adequate ability to share both standardized and customized information internally	Stank et al. (2001b)
	Share information regarding own department with other departments	Basnet (2013)
	Marketing and logistics people do not discuss with each other the issues affecting marketing and logistics	Mollenkopf et al. (2000)
	Marketing and logistics people in this firm are quite protective of their information	Mollenkopf et al. (2000)
<b>Formal/informal</b>	Established teamwork	Gimenez & Ventura (2003, 2005)
	Informal teamwork	Gimenez & Ventura (2003, 2005)
	Informal, real time cross-functional communication of problems and opportunities	PageII (2004); PageII & Wu (2006)
<b>Regularity</b>	<b>Frequent</b> informal/real time communication across functions	PageII (2004); PageII & Wu (2006)
	Marketing and logistics people in this firm have <b>regular</b> contact with each other	Mollenkopf et al. (2000)
	Marketing and logistics people in this firm have <b>opportunities</b> for informal discussion with each other	Mollenkopf et al. (2000)
<b>Inf. sharing climate</b>	Open environment/communication	PageII (2004); PageII & Wu (2006)
	Managers here discourage employees from discussing work-related matters with those who are not their immediate superiors or subordinates	Parente et al. (2002)
	In this business unit, it is easy to talk virtually with anyone you need to, regardless of rank or position	Parente et al. (2002)
	Management easily approachable	PageII (2004); PageII & Wu (2006)
	Exclusive one way/top down communication, from management to subordinates	PageII (2004); PageII & Wu (2006)
	Top down, authoritative culture	PageII (2004); PageII & Wu (2006)
	In this business unit, I feel comfortable calling people in the manufacturing unit when the need arises	Parente et al. (2002)
	Marketing and logistics people in this firm are comfortable calling each other when the need arises	Mollenkopf et al. (2000)
	People in our sales department are quite accessible to those in the manufacturing units	Parente et al. (2002)
	Are quite accessible to each other	Basnet (2013)
	Managers in manufacturing can easily schedule meeting with sales personnel	Parente et al. (2002)
	Salespeople can easily schedule meeting with manufacturing	Parente et al. (2002)

Integration Element	Scale/Question	Author
<b>COLLABORATION</b>		
Teamwork/cross-functional teams	Usage of cross-functional teams (operational/managerial)	Pagell (2004); Pagell & Wu (2006)
	Working together as a team	Ellinger et al. (2000)
	Informal teamwork	Gimenez & Ventura (2003, 2005)
	Work frequently in informal cross-departmental teams	Basnet (2013)
	Informally working together	Ellinger et al. (2000)
	Marketing and logistics people in this firm do not have opportunities for working out problem solutions with each other	Mollenkopf et al. (2000)
	My firm extensively utilizes cross-functional work teams for managing day-to-day operations	Chen et al. (2007)
	Conducting joint planning to anticipate and resolve operational problems	Ellinger et al. (2000)
	Making joint decisions about ways to improve overall cost efficiency	Ellinger et al. (2000)
	Is this integration mostly aimed at solving problems or preventing problems?	Pagell (2004); Pagell & Wu (2006)
<b>Mutual understanding &amp; synchronizing of activities</b>	Developing a <b>mutual understanding</b> of responsibilities	Chen et al. (2007), Ellinger (2000), Ellinger et al. (2000), Gimenez & Ventura (2003, 2005), Kahn & Mentzer (1998)
	Spend time developing a mutual understanding of responsibilities	Basnet (2013)
	Understand the pressures and concerns of each other	Basnet (2013)
	Usage of job rotation for management	Pagell (2004); Pagell & Wu (2006)
	Usage of job rotation for other employees	Pagell (2004); Pagell & Wu (2006)
	In this firm, middle managers have opportunities made available to them for education in each other's area of expertise	Mollenkopf et al. (2000)
	Consideration of the effect of own actions on other functions	Gimenez (20004); Pagell (2004); Pagell & Wu (2006)
	When you make decisions in your function, how much do you consider the impact of these decisions on other functions?	Pagell (2004); Pagell & Wu (2006)
	When they make decision in other functions, how often do they consider the impact of these decision on your function?	Pagell (2004); Pagell & Wu (2006)
	Consult with each other before making decisions affecting other departments	Basnet (2013)
	Marketing consults operations before accepting early delivery requests	Sawhney & Piper (2002)
	Marketing consults operations before accepting special feature requests	Sawhney & Piper (2002)
	Marketing and logistics do not coordinate their work activities	Mollenkopf et al. (2000)
	Synchronise their activities with each other	Basnet (2013)
	Silo/functional orientation	Pagell (2004); Pagell & Wu (2006)
	The orientation of my firm has shifted from managing functions to managing processes	Chen et al. (2007)
	Share (ideas, information, and) <b>resources</b> between them	Ellinger et al. (2000); Basnet (2013)

Integration Element	Scale/Question	Author
<b>COLLABORATION (continues)</b>		
<b>Mutual relationships and climate</b>	Your department strives to maintain a good working relationship with manufacturing/each other	Kahn & Mentzer (1994); Basnet (2013)
	Most departments in this business unit get along well with each other	Parente et al. (2002)
	Get along well with each other	Basnet (2013)
	Marketing and logistics people in this firm get along well with each other	Mollenkopf et al. (2000)
	There is little/no sales/production conflict in this business unit	Parente et al. (2002)
	When members from sales and the production units get together, tension frequently runs high	Parente et al. (2002)
	Marketing and logistics people in this firm experience tension when they work together	Mollenkopf et al. (2000)
	Placing blame/blame games instead of trying to find solutions to problems	Pagell (2004); Pagell & Wu (2006)
<b>Overall satisfaction of collaboration</b>	To what extent have you been satisfied with the overall relationship between logistics and marketing	Ellinger et al. (2000)
<b>COORDINATION</b>		
<b>Integration Element</b>	<b>Scale/Question</b>	<b>Author</b>
<b>Top/middle-management support</b>	Top managers in this firm communicate to marketing and logistics people that working together is essential to meet customers' needs	Mollenkopf et al. (2000)
<b>Organizational culture /mentality</b>	Top managers in this firm encourage marketing and logistics people to sort out any differences that may arise between them	Mollenkopf et al. (2000)
	Top managers in this firm emphasize the importance of coordinating marketing and logistics activities	Mollenkopf et al. (2000)
	Encouraging teamwork	Pagell (2004); Pagell & Wu (2006)
	In this firm, middle managers encourage a feeling of unity among marketing and logistics people	Mollenkopf et al. (2000)
	In this firm, middle managers encourage marketing and logistics people to work together	Mollenkopf et al. (2000)
	In this firm, middle managers foster a positive attitude between marketing and logistics people	Mollenkopf et al. (2000)
	Managers here discourage employees from discussing work-related matters with those who are not their immediate superiors or subordinates	Parente et al. (2002)

Integration Element	Scale/Question	Author
<b>COORDINATION (continues)</b>		
<b>Goals/objectives</b>		
	Functional goals based on corporate goals	Pagell (2004); Pagell & Wu (2006)
	Formal goal setting; functional goals, measures, and rewards based on corporate goals and their achievement	Pagell (2004); Pagell & Wu (2006)
	Open communication of goals and needs	Pagell (2004); Pagell & Wu (2006)
	Company goals communicated to functions	Pagell (2004); Pagell & Wu (2006)
	Goals that recognize the importance of coordinating marketing and logistics activities communicated through the firm	Mollenkopf et al. (2000)
	Functional goal setting and measurement and reward system; no linkage to other/corporate goals	Pagell (2004); Pagell & Wu (2006)
	Joint establishment of objectives	Gimenez & Ventura (2003, 2005); Basnet (2013)
	Overall knowledge of other functions' goals, measures, and performance	Pagell (2004); Pagell & Wu (2006)
	The objectives pursued by the sales department are incompatible with those of the manufacturing departments	Parente et al. (2002)
	Employees from sales and the manufacturing units feel that the goals in their respective departments are in harmony with each other	Parente et al. (2002)
	Marketing and logistics people in this firm feel their goals are inline with each other	Mollenkopf et al. (2000)
<b>Evaluation and reward system</b>		
	How is your function's performance evaluated?	Pagell (2004); Pagell & Wu (2006)
	How are you (as an individual) assessed and rewarded? In other words what percentage of your rewards are dependent on individual performance/functional performance (including teams within the function)/the performance of the entire plant (including cross-functional teams/the company's performance (for multiplant system)?	Pagell (2004); Pagell & Wu (2006)
	Bonus system based on corporate profits	Pagell (2004); Pagell & Wu (2006)
	My firm's compensation, incentive, and reward systems encourage integration	Stank et al. (2001b)

## Appendix 6 Final Operationalization and Survey Scales (in English)

<b>FORMAL AND INFORMAL INFORMATION SHARING</b>			
<b>Overall Status of Information Sharing between the Different Departments</b>			
1	Mill's production planning, production, and warehousing and dispatch departments share their internal information, relevant to the other departments, with one another	Basnet (2013); Mollenkopf et al. (2000); Pagell (2004); Pagell & Wu (2006); Parente et al. (2002)	Fully disagree, Somewhat disagree, Do not agree or disagree, Somewhat agree, Fully agree, Can not state my mind
2	The different departments keep information which is relevant to the other departments consciously to themselves	Mollenkopf et al. (2000)	
3	The interdepartmental information sharing is effective, information is shared regularly	Stank et al. (2001b)	
4	The interdepartmental information sharing is adequate in order to manage the mill's operations productively	Stank et al. (2001b)	
<b>Form and Regularity of Information Sharing in Work Duties</b>			
5	How often do you attend <u>organized meetings</u> in which the matters of at least two or all three concerned departments are jointly discussed	Ellinger et al. (2000); Gimenez & Ventura (2003, 2005)	Daily, Weekly, Once or twice per month, More sparsely, Never, Can not state my mind
6	How often do you have <u>formal discussions</u> with the representatives of the concerned departments in which you handle matters of at least two or all three departments (e.g. personal discussions, consultations, e-mails)	Ellinger et al. (2000); Gimenez & Ventura (2003, 2005)	
7	How often do you have <u>informal discussions</u> with the representatives of the concerned departments in which you handle matters of at least two or all three departments	Ellinger et al. (2000); Gimenez & Ventura (2003, 2005); Mollenkopf et al. (2000); Pagell (2004); Pagell & Wu (2006)	
<b>Information Sharing Climate, Approachability and Usability of Other Members of the Organization</b>			
8	The mill's climate is open towards information sharing executed between the concerned departments	Pagell (2004); Pagell & Wu (2006); Parente et al. (2002)	Fully disagree, Somewhat disagree, Do not agree or disagree, Somewhat agree, Fully agree, Can not state my mind
9	The mill's climate encourages information sharing between the concerned departments	Parente et al. (2002)	
10	The mill's employees are easy to approach despite their department or organizational status (generally, including top management)	Parente et al. (2002)	
11	The mill's director and manager level is easy to approach (generally)	Pagell (2004); Pagell & Wu (2006)	
12	I feel comfortable contacting the representatives of the other concerned departments when the need arises	Mollenkopf et al. (2000); Parente et al. (2002)	
13	If needed, it is easy for me to get time of the representatives of the other concerned departments, to go through joint issues	Basnet (2013); Parente et al. (2002)	

<b>COLLABORATION</b>		
<b>Membership in Formal and Informal Cross-Departmental Team, Purpose of Teamwork</b>		
14	Do you belong/are you named to some cross-departmental team which has representatives from production planning, production, and/or warehousing and dispatch (for example, development team of the new manufacturing execution system)?	PageII (2004); PageII & Wu (2006)
15	Do you work voluntarily in some informal, cross-departmental team that has representatives from production planning, production, and/or warehousing and dispatch?	Basnet (2013); Ellinger et al. (2000); Gimenez & Ventura (2003, 2005); Mollenkopf et al. (2000)
16	Teamwork is used to solve operative situations and/or problems	Chen et al. (2007); Ellinger et al. (2000)
17	Teamwork is used to solve operational problems proactively	Ellinger et al. (2000); PageII (2004); PageII & Wu (2006)
18	Teamwork is used to find common means to improve cost effectiveness	Ellinger et al. (2000)
19	Teamwork is used for some other purpose	Added by the researcher
		Fully disagree, Somewhat disagree, Do not agree or disagree, Fully agree, Can not state my mind
		Fully disagree, Somewhat disagree, Do not agree or disagree, Fully agree, Can not state my mind; For which?
<b>Overall Supply Chain Understanding, Cross-Departmental Consideration and Consultation, Synchronizing of Activities, Common Vision and Goals</b>		
20	I understand what supply chain management means as a general term	Fawcett et al. (2010); Sunday Business Post (2013)
21	I understand the role and duties of my own department as a part of the Diamond Mill's supply chain	Basnet (2013); Chen et al. (2007); Ellinger (2000); Ellinger et al. (2000); Fawcett et al. (2000); Gimenez & Ventura (2003, 2005); Kahn & Mentzer (1998); Sunday Business Post (2013); Trunick (1998)
22	I understand the role and duties of the other concerned departments as a part of the Diamond Mill's supply chain	Basnet (2013); Chen et al. (2007); Ellinger (2000); Ellinger et al. (2000); Fawcett et al. (2000); Gimenez & Ventura (2003, 2005); Kahn & Mentzer (1998); Sunday Business Post (2013); Trunick (1998)
		Fully disagree, Somewhat disagree, Do not agree or disagree, Fully agree, Can not state my mind; What does supply chain management mean to you?
		Fully disagree, Somewhat disagree, Do not agree or disagree, Fully agree, Can not state my mind

32	I have work experience of duties of more than one of the concerned departments (production planning, production, warehousing and dispatch)?	Fawcett et al. (2010); Pagell (2004); Pagell & Wu (2006)	Yes, No; if yes, in which positions have you operated and for how long?
33	I have taken part in job rotation organized by the employer between the different duties of the concerned departments	Fawcett et al. (2010); Pagell (2004); Pagell & Wu (2006)	Yes, No; if yes, in which kind, where, and when?
34	I have been offered a possibility to job rotation between the concerned departments and duties	Fawcett et al. (2010); Pagell (2004); Pagell & Wu (2006)	Yes, No
35	I am interested in taking part in job rotation between the concerned departments and duties, if offered	Oma lisäys edelläviin kysymyksiin	Yes, No
36	I have received training and/or education of the operations and basic principles of the other concerned departments and/or overall supply chain management related training/education	Green (2010); Mollenkopf et al. (2000); van Hoek & Wagner (2013)	Yes, No; if yes, which?
37	I have been offered training and/or education of the operations and basic principles of the other concerned departments and/or overall supply chain management related training/education	Green (2010); Mollenkopf et al. (2000); van Hoek & Wagner (2013)	Yes, No
38	I am interested in taking part in such training/education, if offered		Yes, No; if yes, in which training/education are you interested in participating?
23	When I make decisions in my own work, I consider how they affect the operations of the other two departments	Pagell (2004); Pagell & Wu (2006)	Fully disagree, Somewhat disagree, Do not agree or disagree, Somewhat agree, Fully agree, Can not state my mind
24	When the representatives of the other two departments make decisions in their work, they consider how they affect the operations of my own department	Pagell (2004); Pagell & Wu (2006)	
25	Production planning consults production and/or warehousing and dispatch before making decisions that affect the operations of production and/or warehousing and dispatch	Sawhney & Pi per (2002)	Fully disagree, Somewhat disagree, Do not agree or disagree, Somewhat agree, Fully agree, Can not state my mind
26	Production consults production planning and/or warehousing and dispatch before making decisions that affect the operations of production planning and/or warehousing and dispatch	Sawhney & Pi per (2002)	
27	Warehousing and dispatch consults production planning and/or production before making decisions that affect the operations of production planning and/or production	Sawhney & Pi per (2002)	

28	The mill's production planning, production, and warehousing and dispatch work as one entity	Basnet (2013); Chen et al. (2007); Mollenkopf et al. (2000)	Fully disagree, Somewhat disagree, Do not agree or disagree, Somewhat agree, Fully agree, Can not state my mind
29	The mill's production planning, production, and warehousing and dispatch concentrate each on optimizing their own operations	Pageil (2004); Pageil & Wu (2006)	
30	The mill's production planning, production, and warehousing and dispatch work towards a common goal and vision	Basnet (2013); Chen et al. (2007); Ellinger (2000); Ellinger et al. (2000); Kahn and Mentzer (1998)	
31	It is important that the concerned departments work together in order to guarantee the mill's operability and continuity	E.g. Chen et al. (2007); Childerhouse & Towill (2011); Ellinger et al. (2000); Stank et al. (2001a); Stank et al. (2001b); Kahn & Mentzer (1998); Pageil (2004); Schoenherr & Swink (2014); Wong (2013)	
<b>Collaboration Atmosphere &amp; Overall Satisfaction with Cross-Departmental Collaboration</b>			
39	The mill's production planning, production, and warehousing and dispatch departments get along well with each other	Basnet (2013); Kahn & Mentzer (1994); Mollenkopf et al. (2000); Parente et al. (2002)	Fully disagree, Somewhat disagree, Do not agree or disagree, Somewhat agree, Fully agree, Can not state my mind
40	The mill's production planning, production, and warehousing and dispatch departments have reciprocal tension/conflicts/conflicts of interest	Mollenkopf et al. (2000); Parente et al. (2002)	
41	The representatives of mill's production planning, production, and warehousing and dispatch departments have reciprocal tension/conflicts/conflicts of interest	Mollenkopf et al. (2000); Parente et al. (2002)	
42	If something goes wrong, the departments rather concentrate on placing blame/finding the guilty party than on finding common solutions to the problem	Pageil (2004); Pageil & Wu (2006)	
43	On a general level I am satisfied with the cross-departmental collaboration occurring between the concerned departments	Ellinger et al. (2000)	

<b>COORDINATION</b>			
<b>Top and Middle Management Support</b>			
44	The mill's top management (management team) encourages the different departments to operate and work together	Mollenkopf et al. (2000); Pageil (2004); Pageil & Wu (2006)	Fully disagree, Somewhat disagree, Do not agree or disagree, Somewhat agree, Fully agree, Can not state my mind
45	The mill's manager level (other than management team) encourages the different departments to operate and work together	Mollenkopf et al. (2000); Pageil (2004); Pageil & Wu (2006); Parente et al. (2002)	
<b>Departmental Goals, Evaluation and Incentive System</b>			
46	I know the goals of my own department	Mollenkopf et al. (2000); Pageil (2004); Pageil & Wu (2006)	Yes, No; if yes, what are they?
47	I know the goals of the other departments	Mollenkopf et al. (2000); Pageil (2004); Pageil & Wu (2006)	Yes, No
48	I know the mill level goals	Mollenkopf et al. (2000); Pageil (2004); Pageil & Wu (2006)	Yes, No; if yes, what are they?
49	I am rewarded based on an evaluation and incentive system	Pageil (2004); Pageil & Wu (2006); Stank et al. (2001b)	Yes, No, Can not state my mind
50	I know the criteria behind my incentives/bonuses	Pageil (2004); Pageil & Wu (2006); Stank et al. (2001b)	Yes, No; if yes, what are they?

## Appendix 7 Final Operationalization and Survey Scales (in Finnish)

<p><b>MUODOLLINEN JA EPÄMUODOLLINEN INFORMAATION VAIHTO</b>  <b>Informaation vaihto yleisellä tasolla</b></p>	<p>1. Tehtaan tuotannosuunnittelu, tuotanto ja varasto/lähetys jakavat omaa osastoaan koskevaa, muille osastoille tärkeää tietoa keskenään.</p> <p>2. Tehtaan tuotannosuunnittelu, tuotanto ja/tai varasto/lähetys pitävät muille osastoille tärkeää tietoa tietoisesti itsellään.</p> <p>3. Kyseisten osastojen välillä tapahtuva tiedonvaihto on tehokasta, tietoa vaihdetaan säännöllisesti.</p> <p>4. Kyseisten osastojen välillä tapahtuva tiedonvaihto on riittävää tehtaan toimintojen toteuttamiseksi tuloksekkaasti.</p>	<p>Basnet (2013); Mollenkopf et al. (2000); Pagell (2004); Pagell &amp; Wu (2006); Parente et al. (2002)</p> <p>Mollenkopf et al. (2000)</p> <p>Stank et al. (2001b)</p> <p>Stank et al. (2001b)</p>	<p>5-portainen asteikko arviointiin: täysin samaa mieltä, jokseenkin samaa mieltä, ei samaa eikä eri mieltä, jokseenkin eri mieltä, täysin eri mieltä, plus en osaa sanoa</p>
<p><b>Informaation vaihdon tapa ja taajuus työtehtävissä</b></p>	<p>5. Kuinka usein keskimäärin osallistut <b>järjestettyihin palaverihin</b>, joissa keskustellaan yhdessä ko. osastojen edustajien kanssa vähintään kahta tai kaikkia kolmea kyseistä osastoa koskevia asioita?</p> <p>6. Kuinka usein keskimäärin käyt <b>muodollista keskustelua</b> ko. osastojen edustajien kanssa, joissa käsitellään vähintään kahta tai kaikkia kolmea kyseistä osastoa koskevia asioita (esim. henk.koht. keskustelut/konsultointi, sähköpostikirjeenvaihto)?</p> <p>7. Kuinka usein keskimäärin osallistut <b>vapaamuotoisiin keskusteluihin</b> ko. osastojen edustajien kanssa, joissa käsitellään vähintään kahta tai kaikkia kolmea kyseistä osastoa koskevia asioita?</p>	<p>Ellinger et al. (2000); Gimenez &amp; Ventura (2003, 2005)</p> <p>Ellinger et al. (2000); Gimenez &amp; Ventura (2003, 2005)</p> <p>Ellinger et al. (2000); Gimenez &amp; Ventura (2003, 2005); Mollenkopf et al. (2000); Pagell (2004); Pagell &amp; Wu (2006)</p>	<p>Päivittäin, viikoittain, 1-2 kertaa kuussa, harvemmin, en koskaan, en osaa sanoa</p>
<p><b>Informaation vaihdon ilmapiiri, ihmisten lähestyttävyyttä &amp; käytettävyyttä</b></p>	<p>8. Tehtaan ilmapiiri on avoin informaation vaihtoon ko. osastojen välillä.</p> <p>9. Tehtaan ilmapiiri on kannustava informaation vaihtoon ko. osastojen välillä.</p> <p>10. Tehtaan ihmiset ovat helposti lähestyttäviä, huolimatta edustamastaan osastosta tai asemastaan (yleisesti, mukaan lukien ylin johto).</p> <p>11. Tehtaan johto ja päälliköt ovat helposti lähestyttäviä (yleisesti).</p> <p>12. Koen, että minun on tarvittaessa helppo ottaa yhteyttä muiden osastojen edustajiin (tuotannosuunnittelu, tuotannon ja/tai varaston/lähteyksen välillä).</p> <p>13. Minun on tarvittaessa helppo saada muiden osastojen ihmisten aikaa yhteisten asioiden läpikäymiseen (tuotannosuunnittelu, tuotannon ja/tai varaston/lähteyksen välillä)?</p>	<p>Pagell (2004); Pagell &amp; Wu (2006)</p> <p>Mollenkopf et al. (2000); Parente et al. (2002)</p> <p>Basnet (2013); Parente et al. (2002)</p> <p>Parente et al. (2002)</p> <p>Parente et al. (2002)</p> <p>Pagell (2004); Pagell &amp; Wu (2006)</p> <p>Mollenkopf et al. (2000); Parente et al. (2002)</p> <p>Basnet (2013); Parente et al. (2002)</p>	<p>5-portainen asteikko arviointiin: täysin samaa mieltä, jokseenkin samaa mieltä, ei samaa eikä eri mieltä, jokseenkin eri mieltä, täysin eri mieltä, plus en osaa sanoa</p>

<b>YHTEISTYÖ</b>			
<b>Työskentely yhdessä</b>			
	14. Kuulutko/onko sinut <b>nimitetty</b> johonkin <b>osastorajat ylittävään tiimiin</b> , jossa on edustajia tuotannosuunnittelusta, tuotannosta ja/tai varastosta/lähetyksestä (esim. uuden tehdasjärjestelmän kehittämistimi)?	Pagell (2004); Pagell & Wu (2006)	Kyllä, ei, en osaa sanoa; tarkennuskysymys/tilaa vapaamuotoiselle vastaukselle: Jos kyllä, mihin, kuinka usein kokoonnutte?
	15. Työskenteletkö <b>omaehtoisesti</b> jossakin <b>vapaamuotoisessa, osastorajat ylittävässä tiimissä</b> , jossa on edustajia tuotannosuunnittelusta, tuotannosta ja/tai varastosta/lähetyksestä?	Basnet (2013); Ellinger et al. (2000); Gimenez & Ventura (2003, 2005); Mollenkopf et al. (2000)	Kyllä, ei, en osaa sanoa; tarkennuskysymys/tilaa vapaamuotoiselle vastaukselle: Jos kyllä, minkälaisessa, kuinka usein kokoonnutte?
	16. Tiimityöskentelyllä pyritään ratkomaan operatiivisia tilanteita ja /tai ongelmia.	Chen et al. (2007); Ellinger et al. (2000)	5-portainen asteikko arviointiin: täysin samaa mieltä, joksinkin samaa mieltä, ei samaa eikä eri mieltä, joksinkin eri mieltä, täysin eri mieltä, plus en osaa sanoa
	17. Tiimityöskentelyllä pyritään estämään operatiivisia ongelmia ennakolta.	Ellinger et al. (2000); Pagell (2004); Pagell & Wu (2006)	
	18. Tiimityöskentelyllä pyritään löytämään yhteisiä keinoja kustannustehokkuuden parantamiseen.	Ellinger et al. (2000)	
	19. Tiimityöskentelyllä pyritään johonkin muuhun tavoitteeseen.	Oma lisäys edeltäviin kysymyksiin	Tarkennuskysymys/tilaa vapaamuotoiselle vastaukselle: Mihin?
<b>Kokonaisuuden ymmärrys ja toimiminen "yhteen", Yhteinen visio &amp; tavoitteet</b>			
	20. Ymmärrän, mitä toimitusketjun hallinta tarkoittaa yleisenä käsitteenä.	Fawcett et al. (2010); Sunday Business Post (2013)	5-portainen asteikko arviointiin: täysin samaa mieltä, joksinkin samaa mieltä, ei samaa eikä eri mieltä, joksinkin eri mieltä, täysin eri mieltä, plus en osaa sanoa. Täydennyskysymys/tilaa vapaamuotoiselle vastaukselle: Mitä toimitusketjun hallinta tarkoittaa sinulle?
	21. Ymmärrän oman osaston roolin ja tehtävät osana "Timanttii" tehtaan toimitusketjua.	Basnet (2013); Chen et al. (2007); Ellinger (2000); Ellinger et al. (2000); Fawcett et al. (2000); Gimenez & Ventura (2003, 2005); Kahn & Mentzer (1998); Sunday Business Post (2013); Trunick (1998)	5-portainen asteikko arviointiin: täysin samaa mieltä, joksinkin samaa mieltä, ei samaa eikä eri mieltä, joksinkin eri mieltä, täysin eri mieltä, plus en osaa sanoa.
	22. Ymmärrän muiden osastojen roolit ja tehtävät osana "Timanttii" tehtaan toimitusketjua (käsiteltävät osastot tuotannosuunnittelu, tuotanto, varasto/lähetys).	Basnet (2013); Chen et al. (2007); Ellinger (2000); Ellinger et al. (2000); Fawcett et al. (2000); Gimenez & Ventura (2003, 2005); Kahn & Mentzer (1998); Sunday Business Post (2013); Trunick (1998)	5-portainen asteikko arviointiin: täysin samaa mieltä, joksinkin samaa mieltä, ei samaa eikä eri mieltä, joksinkin eri mieltä, täysin eri mieltä, plus en osaa sanoa.

32. Minulla on työkokemusta useamman kuin yhden käsiteltävän osaston työtehtävistä (tuotannonsuunnittelu, tuotanto, varasto/lähetys)?	Fawcett et al. (2010); Pagell (2004); Pagell & Wu (2006)	Kyllä, ei; Jos kyllä, missä tehtävissä olet toiminut ja kuinka kauan?
33. Olen osallistunut työnantajan organisoimaan työnkiertoon tuotannonsuunnittelu-, tuotanto- ja/tai varasto/lähetystehtävien välillä.	Fawcett et al. (2010); Pagell (2004); Pagell & Wu (2006)	Kyllä, ei; Jos kyllä, millalaiseen, missä ja milloin?
34. Minulle on tarjottu mahdollisuutta työnkiertoon ko. tehtävien välillä.	Fawcett et al. (2010); Pagell (2004); Pagell & Wu (2006)	Kyllä, ei
35. Olen kiinnostunut osallistumaan työnkiertoon ko. tehtävien välillä, mikäli mahdollisuutta sellaiseen tarjotaan.	Oma lisäys edeltävään kysymykseen	Kyllä, ei
36. Olen saanut perehdytystä ja/tai muodollista koulutusta muiden käsiteltävien osastojen toiminnasta ja peruseriänteistä ja/tai yleistä toimitusketjun hallintaan liittyvää koulutusta.	Green (2010); Mollenkopf et al. (2000); van Hoek & Wagner (2013)	Kyllä, ei; Jos kyllä, millaista?
37. Minulle on tarjottu perehdytystä/koulutusta muiden käsiteltävien osastojen toiminnasta ja peruseriänteistä ja/tai yleistä toimitusketjun hallintaan liittyvää koulutusta.	Green (2010); Mollenkopf et al. (2000); van Hoek & Wagner (2013)	Kyllä, ei
38. Olen kiinnostunut osallistumaan kyseisenlaiseen perehdytykseen/koulutukseen, mikäli sellaista tarjotaan.		Kyllä, ei; Jos kyllä, mistä aihepiireistä olet kiinnostunut?
23. Kun teen työssäni päätöksiä, mietin niiden vaikutusta kahden muun käsiteltävän osaston toimintaan.	Pagell (2004); Pagell & Wu (2006)	5-portainen asteikko a:nfointiin: täysin samaa mieltä, jokseenkin samaa mieltä, ei samaa eikä eri mieltä, jokseenkin eri mieltä, täysin eri mieltä, plus en osaa sanoa
24. Kun kahden muun käsiteltävän osaston edustajat tekevät työssään päätöksiä, he miettivät niiden vaikutusta oman osastoni toimintaan.	Pagell (2004); Pagell & Wu (2006)	
25. Tuotannonsuunnittelu konsultoi tuotantoa ja/tai varastoa ennen kuin tekee päätöksiä, jotka vaikuttavat tuotannon ja/tai varaston toimintaan.	Sawhney & Piper (2002)	
26. Tuotanto konsultoi tuotannonsuunnittelua ja/tai varastoa ennen kuin tekee päätöksiä, jotka vaikuttavat tuotannonsuunnitteluun ja/tai varaston toimintaan.	Sawhney & Piper (2002)	
27. Varasto/lähetys konsultoi tuotannonsuunnittelua ja/tai tuotantoa ennen kuin tekee päätöksiä, jotka vaikuttavat tuotannonsuunnitteluun ja/tai tuotannon toimintaan.	Sawhney & Piper (2002)	

	28. Tehtaan tuotannonsuunnittelu, tuotanto ja varasto/lähetys toimivat yhtenä kokonaisuutena.	Basnet (2013); Chen et al. (2007); Mollenkopf et al. (2000)	
	29. Tehtaan tuotannonsuunnittelu, tuotanto ja varasto/lähetys keskittyvät kukin oman toimintansa optimointiin.	Page II (2004); Page I & Wu (2006)	
	30. Tehtaan tuotannonsuunnittelu, tuotanto ja varasto/lähetys työskentelevät kohti yhteistä tavoitetta ja visiota.	Basnet (2013); Chen et al. (2007); Ellinger (2000); Ellinger et al. (2000); Kahn and Mentzer (1998)	
	31. Ko. osastojen toiminen yhdessä on tärkeää Varkauden tehtaan toiminnan ja toiminnan jatkuvuuden kannalta.	E.g. Chen et al. (2007); Childerhouse & Towill (2011); Ellinger et al. (2000); Stank et al. (2001a); Stank et al. (2001b); Kahn & Mentzer (1998); Page II (2004); Schoenherr & Swink (2014); Wong (2013)	
	<b>Yhteistyön ilmapiiri</b>		
	39. Tehtaan tuotannonsuunnittelu-, tuotanto- ja varasto/lähetysosastot tulevat hyvin toimeen keskenään.	Basnet (2013); Kahn & Mentzer (1994); Mollenkopf et al. (2000); Parente et al. (2002)	5-portainen asteikko arvioitiin: täysin samaa mieltä, joksseenkin samaa mieltä, ei samaa eikä eri mieltä, joksseenkin eri mieltä, täysin eri mieltä, plus en osaa sanoa
	40. Tehtaan tuotannonsuunnittelu-, tuotanto- ja varasto/lähetysosastojen välillä on jännitteitä/konflikteja/eturistiriitoja.	Mollenkopf et al. (2000); Parente et al. (2002)	
	41. Tehtaan tuotannonsuunnittelu-, tuotanto- ja varasto/lähetysosastojen edustajien välillä on jännitteitä.	Mollenkopf et al. (2000); Parente et al. (2002)	
	42. Jos jokin asia menee pieleen, ko. osastojen välillä pyritään ennemmin löytämään syyllinen kuin yhteisiä ratkaisuja ongelmaan.	Page II (2004); Page I & Wu (2006)	
	43. Yleisellä tasolla olen tyytyväinen ko. osastojen väliseen yhteistyöhön.	Ellinger et al. (2000)	

<b>KOORDINOINTI</b>			
<b>Johdon asennoituminen yhteistyön tekemiseen</b>			
44. Tehtaan ylin johto (johtoryhmä) kannustaa eri osastoja toimimaan ja työskentelemään yhdessä.	44. Tehtaan ylin johto (johtoryhmä) kannustaa eri osastoja toimimaan ja työskentelemään yhdessä.	Mollenkopf et al. (2000); Pageil (2004); Pageil & Wu (2006)	5-portainen asteikko arvioitiin: täysin samaa mieltä, jokseenkin samaa mieltä, ei samaa eikä eri mieltä, jokseenkin eri mieltä, täysin eri mieltä, plus en osaa sanoa
45. Tehtaan päällikkötaso (muu kuin johtoryhmä) kannustaa eri osastoja toimimaan ja työskentelemään yhdessä.	45. Tehtaan päällikkötaso (muu kuin johtoryhmä) kannustaa eri osastoja toimimaan ja työskentelemään yhdessä.	Mollenkopf et al. (2000); Pageil (2004); Pageil & Wu (2006); Parente et al. (2002)	
<b>Toiminnan arviointi ja palkitseminen</b>			
46. Tunnen oman osastoni tavoitteet.	46. Tunnen oman osastoni tavoitteet.	Mollenkopf et al. (2000); Pageil (2004); Pageil & Wu (2006)	Kyllä, ei, tarkennuskysymys/tilaa vapaaamuotoiselle vastaukselle: Jos kyllä, mitä ne ovat?
47. Tunnen muiden osastojen tavoitteet.	47. Tunnen muiden osastojen tavoitteet.	Mollenkopf et al. (2000); Pageil (2004); Pageil & Wu (2006)	Kyllä, ei
48. Tunnen koko tehtaan tavoitteet.	48. Tunnen koko tehtaan tavoitteet.	Mollenkopf et al. (2000); Pageil (2004); Pageil & Wu (2006)	Kyllä, ei, tarkennuskysymys/tilaa vapaaamuotoiselle vastaukselle: Jos kyllä, mitä ne ovat?
49. Olen tulospalkkauksen piirissä.	49. Olen tulospalkkauksen piirissä.	Pageil (2004); Pageil & Wu (2006); Stank et al. (2001b)	Kyllä, ei, en osaa sanoa
50. Tunnen tulospalkkion määrätymisen perusteet.	50. Tunnen tulospalkkion määrätymisen perusteet.	Pageil (2004); Pageil & Wu (2006); Stank et al. (2001b)	Kyllä, ei, tarkennuskysymys/tilaa vapaaamuotoiselle vastaukselle: Jos kyllä, millä perusteilla tulospalkkiosi määrätty?

## Appendix 8 List of Introduction Discussions Conducted (2013)

	Date	Introduction Held by, Position/Title	White/ Blue Collar	Topic/Area	Duration of the introduction/h	Recorded (Y/N)	Notes (Y/N)
1	3.5.2013	Mill Director	W	Overall mill introduction	1,5	Y	Y
2	16.5.2013	Representatives from Pearl Logistics, Customer Service Center, Sister Mill	W	Sales office training; future changes of duties/division of work (order handling, production planning, logistics)	3,25	N	Y
3	16.5.2013	Senior Manager, Master Planning; Director, Product Segment	W	Sales	2,25	Y	Y
4	17.5.2013	Representatives from Pearl Logistics, Customer Service Center, Sister Mill	W	Sales office training; future changes of duties/division of work (order handling, production planning, logistics)	7,5	N	Y
5	5.6.2013	Senior Manager, Master Planning; Director, Product Segment	W	Sales, future division of various sales and order handling related tasks	2,5	Y	Y
6	7.6.2013	E.g. Contoller, Senior Manager, Master Planning, Production Manager etc.	W	Financial status and current situation review - meeting	1,75	N	Y
7	19.6.2013	Senior Manager, Master Planning; Director, Product Segment	W	Sales; going briefly through the already written description and the flow chart; pointing out needed corrections and additional information.	1,25	N	Y
8	26.6.2013	Production Planner	W	Production planning	3	Y	Y
9	27.6.2013	Senior Manager, Master Planning, Market Supervisors, Production Planners, Invoicers, Quality Manager	W	Current status of production, orders, quotas, inventories, quality and complaints; separate special cases (enquiries, test runs, etc.)	0,75	N	Y
10	27.6.2013	Production Planner	W	Production planning	1,5	Y	Y
11	3.7.2013	Senior Manager, Master Planning; Director, Product Segment	W	Sales; going through the whole sales related description. Discussing the contents and the progression of the research.	1,5	N	Y
12	6.8.2013	Senior Manager, Master Planning; Production Planner	W	Production planning; going through the production planning related description and differerent flowcharts.	1,5	N	Y
13	12.8.2013	Production Manager	W	Production	2	Y	Y
14	19.8.2013	Production Manager	W	Production	1,75	Y	Y
15	21.8.2013	Production Engineer/Assistant Superintendent	W	Production	2,5	Y	Y
16	28.8.2013	Production Engineer/Assistant Superintendent	W	Production	1,25	N	Y
17	29.8.2013	Shift Supervisor	W	Production	2	N	Y
18	3.9.2013	Superintendent	W	Production	1,25	N	Y
19	16.9.2013	Superintendent	W	Production	0,75	N	Y
20	18.9.2013	Shift Supervisor	W	Production	1,25	N	Y
21	18.9.2013	Transport Manager	W	Warehousing and dispatch	1,25	Y	Y
22	24.9.2013	Warehouse and Dispatch Foreman	W	Warehousing and dispatch	2,25	N	Y
23	3.10.2013	Warehouse and Dispatch Foremen	W	Warehousing and dispatch	1	N	Y
24	4.10.2013	Warehouse and Dispatch Foremen	W	Warehousing and dispatch	1,5	N	Y
25	14.10.2013	Transport Manager	W	Warehousing and dispatch	1,5	N	Y
26	15.10.2013	Warehouse and Dispatch Foreman	W	Warehousing and dispatch	1	N	Y

## Appendix 9 List of Introduction Discussions Conducted (2015)

Year 2015							
	Date	Introduction Held by, Position/Title	White/ Blue Collar	Topic/Area	Duration of the introduction/h	Recorded (Y/N)	Notes (Y/N)
27	29.4.2015	Senior Manager, Master Planning; Production Planner	W	Production planning; going through the production planning related description and different flowcharts written in 2013; marking changes happened during 2014-2015.	1	N	Y
28	29.4.2015	Production Manager	W	Production; going through the production operations related description and different flowcharts written in 2013; marking changes happened during 2014-2015.	1	N	Y
29	4.5.2015	Operational Supply Chain Director	W	Future production planning and warehousing/dispatch operations.	1	N	Y
30	5.5.2015	Production Manager	W	Basic data of investment decision; future production operations (carton board).	2,25	N	Y
31	12.5.2015	Transport Manager	W	Warehousing/dispatch; going through the warehousing/dispatch related description and different flowcharts written in 2013; marking changes happened during 2014-2015.	1,25	N	Y
32	12.5.2015	Transport Manager	W	Future warehousing/dispatch operations.	0,75	N	Y
33	17.6.2015	Production Manager	W	Basic data of investment decision; future production operations (carton board).	0,5	N	Y
34	18.6.2015	Sales Director	W	Future sales related matters.	1	N	y
35	24.6.2015	Sales Product Owner	W	Demand forecasting of future sales.	0,75	N	Y
36	25.6.2015	Operational Supply Chain Director	W	Future production planning and warehousing/dispatch operations.	0,25	N	Y
<b>Total (2013 &amp; 2015)</b>					<b>59,25</b>	<b>hours</b>	

## Appendix 10 Survey in Webropol –Form

Hyvä vastaaja,

Ohjeisen kyselyn tarkoituksena on selvittää **tehtaan tuotannosuunnittelun, tuotannon sekä varaston/lähetystoimintojen välillä** informaation kulkua ja yhteistyötä. Tutkimus toteutetaan osana KTM Minna Porasmaan väitöskirjatutkimusta (Turun kaupakorkeakoulu).

Kyselyn tavoitteena on selvittää eri osastojen ja eri organisaatiotasojen näkökulmia samoista asioista. Siksi on ensiarvoisen tärkeää, että kaikki kyselyn vastaajat vastaavat kyselyyn mahdollisimman monipuolisen kuvan luomiseksi. Kerrothahan oman mielipiteenne yhteisistä tehtaan asioista!

Kyselyssä on kolme osiota, koskien kyselyiden osastojen välistä informaation vaihtoa (13 yksittäistä väittämää/kysymystä), yhteistyötä (30) ja niiden koordinoitua (7). Kysymykset ovat "raksi ruutuun" -tyyppisiä, muutamassa kohdassa pyydetään sanallista tarkennusta annettuun vastaukseen. Vastaamiseen menee n. 20-30 minuuttia.

Kyselyn vastaukset käsitellään luottamuksellisesti ja anonyymisti. Yksittäiset vastaukset jäävät vain tutkijan käyttöön ja niitä ei esitetä analyysissä tunnistettavassa muodossa.

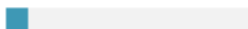
Kyselyyn pääsette ohjeesta linkistä. Linkki on henkilökohtainen, eikä näin ollen välitäkös sitä eteenpäin muille mahdollisesti tutkimuksesta kiinnostuneille. Vastatthän kyselyyn 20.5.2016 mennessä.

Mahdollisiin kysymyksiin koskien kyselyä tai sen sisältöä vastaa tutkimuksen tekijä Minna Porasmaa ([mlkkoor@utu.fi](mailto:mlkkoor@utu.fi) tai 040-502 8612).

Suuret kiitokset mielipiteistänne ja avustanne asiassa!

Tutkimusterveisin,  
Minna Porasmaa

Keskeytä



### Taustatiedot \*

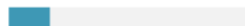
#### Osastonne:

- Tuotannosuunnittelu
- Tuotanto
- Varasto/Lähetys
- Yleisjohto

#### Organisaatiotaso: \*

- Yiempi toimihenkilö
- Toimihenkilö
- Työntekijä

Keskeytä

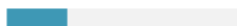


## MUODOLLINEN JA EPÄMUODOLLINEN INFORMAATION VAIHTO

## Informaation vaihto yleisellä tasolla

	Täysin eri mieltä	Jokseenkin eri mieltä	Ei samaa eikä eri mieltä	Jokseenkin samaa mieltä	Täysin samaa mieltä	En osaa sanoa
1) Tehtaan tuotannosuunnittelu, tuotanto ja varasto/lähetys jakavat omaa osastoaan koskevaa, muille osastoille tärkeää tietoa keskenään.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2) Tehtaan tuotannosuunnittelu, tuotanto ja/tai varasto/lähetys pitävät muille osastoille tärkeää tietoa tietoisesti itsellään.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3) Kyseisten osastojen välillä tapahtuva tiedonvaihto on tehokasta, tietoa vaihdetaan säännöllisesti.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4) Kyseisten osastojen välillä tapahtuva tiedonvaihto on riittävää tehtaan toimintojen toteuttamiseksi tuloksekkaasti.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

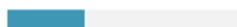
Keskeytä



## Informaation vaihdon tapa ja taajuus työtehtävissä

	Palvittain	Viikottain	1-2 kertaa kuussa	Harvemmin	En koskaan	En osaa sanoa
5) Kuinka usein keskimäärin osallistut järjestettyihin palavereihin, joissa keskustellaan yhdessä ko. osastojen edustajien kanssa vähintään kahta tai kaikkia kolmea kyseistä osastoa koskevia asioita?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6) Kuinka usein keskimäärin käyt muodollista keskustelua ko. osastojen edustajien kanssa, joissa käsitellään vähintään kahta tai kaikkia kolmea kyseistä osastoa koskevia asioita (esim. henk.koht. keskustelut/konsultointi, sähköpostikirjeenvaihto)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7) Kuinka usein keskimäärin osallistut vapaamuotoisiin keskusteluihin ko. osastojen edustajien kanssa, joissa käsitellään vähintään kahta tai kaikkia kolmea kyseistä osastoa koskevia asioita?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Keskeytä



**Informaation vaihdon ilmapiiri, ihmisten lähestyttävyyden ja käytettävyys**

	Täysin eri mieltä	Jokseenkin eri mieltä	Ei samaa eikä eri mieltä	Jokseenkin samaa mieltä	Täysin samaa mieltä	En osaa sanoa
8) Tehtaan ilmapiiri on avoin informaation vaihtoon ko. osastojen välillä.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9) Tehtaan ilmapiiri on kannustava informaation vaihtoon ko. osastojen välillä.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10) Tehtaan ihmiset ovat helposti lähestyttäviä, huolimatta edustamastaan osastosta tai asemastaan (yleisesti, mukaan lukien ylin johto).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11) Tehtaan johto ja päälliköt ovat helposti lähestyttäviä (yleisesti).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12) Koen, että minun on tarvittaessa helppo ottaa yhteyttä muiden osastojen edustajiin (tuotannosuunnitteluun, tuotannon ja/tai varaston/lähetysten välillä).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13) Minun on tarvittaessa helppo saada muiden osastojen ihmisten aikaa yhteisten asioiden läpikäymiseen (tuotannosuunnitteluun, tuotannon ja/tai varaston/lähetysten välillä)?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Keskeytä



## YHTEISTYÖ

## Työskentely yhdessä

- 14) Kuulutko/onko sinut nimitetty johonkin osastorajat ylittävään tiimiin, jossa on edustajia tuotannosuunnittelusta, tuotannosta ja/tai varastosta/lähetuksesta (esim. uuden tehdasjärjestelmän kehittämistiimi)?
- Kyllä  Ei  En osaa sanoa

Jos kyllä, mihin, kuinka usein kokoonnutte?

- 15) Työskenteletkö omaehtoisesti jossakin vapaamuotoisessa, osastorajat ylittävässä tiimissä, jossa on edustajia tuotannosuunnittelusta, tuotannosta ja/tai varastosta/lähetuksesta?
- Kyllä  Ei  En osaa sanoa

Jos kyllä, minkälaisessa, kuinka usein kokoonnutte?

Keskeytä



## Työskentely yhdessä

	Täysin eri mieltä	Jokseenkin eri mieltä	Ei samaa eikä eri mieltä	Jokseenkin samaa mieltä	Täysin samaa mieltä	En osaa sanoa
16) Tiimityöskentelyllä pyritään ratkomaan operatiivisia tilanteita ja /tai ongelmia.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17) Tiimityöskentelyllä pyritään estämään operatiivisia ongelmia ennakolta.	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
18) Tiimityöskentelyllä pyritään löytämään yhteisiä keinoja kustannustehokkuuden parantamiseen.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
19) Tiimityöskentelyllä pyritään johonkin muuhun tavoitteeseen.	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>

## Mihin?

Keskeytä



## Kokonaisuuden ymmärrys ja toimiminen "yhteen", Yhteinen visio &amp; tavoitteet

	Täysin eri mieltä	Jokseenkin eri mieltä	Ei samaa eikä eri mieltä	Jokseenkin samaa mieltä	Täysin samaa mieltä	En osaa sanoa
20) Ymmärrän, mitä toimitusketjun hallinta tarkoittaa yleisenä käsitteenä.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

## Mitä toimitusketjun hallinta tarkoittaa sinulle?

	Täysin eri mieltä	Jokseenkin eri mieltä	Ei samaa eikä eri mieltä	Jokseenkin samaa mieltä	Täysin samaa mieltä	En osaa sanoa
21) Ymmärrän oman osastoni roolin ja tehtävät osana tehtaan toimitusketjua.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
22) Ymmärrän muiden osastojen roolit ja tehtävät osana tehtaan toimitusketjua (käsiteltävät osastot tuotannonsuunnittelu, tuotanto, varasto/lähetys).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
23) Kun teen työssäni päätöksiä, mietin niiden vaikutusta kahden muun käsiteltävän osaston toimintaan.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
24) Kun kahden muun käsiteltävän osaston edustajat tekevät työssään päätöksiä, he miettivät niiden vaikutusta oman osastoni toimintaan.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
25) Tuotannonsuunnittelu konsultoi tuotantoa ja/tai varastoa ennen kuin tekee päätöksiä, jotka vaikuttavat tuotannon ja/tai varaston toimintaan.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
26) Tuotanto konsultoi tuotannonsuunnittelua ja/tai varastoa ennen kuin tekee päätöksiä, jotka vaikuttavat tuotannonsuunnittelun ja/tai varaston toimintaan.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
27) Varasto/lähetys konsultoi tuotannonsuunnittelua ja/tai tuotantoa ennen kuin tekee päätöksiä, jotka vaikuttavat tuotannonsuunnittelun ja/tai tuotannon toimintaan.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
28) Tehtaan tuotannonsuunnittelu, tuotanto ja varasto/lähetys toimivat yhtenä kokonaisuutena.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
29) Tehtaan tuotannonsuunnittelu, tuotanto ja varasto/lähetys keskittyvät kukin oman toimintansa optimointiin.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
30) Tehtaan tuotannonsuunnittelu, tuotanto ja varasto/lähetys työskentelevät kohti yhteistä tavoitetta ja visiota.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
31) Ko. osastojen toiminen yhdessä on tärkeää Varkauden tehtaan toiminnan ja toiminnan jatkuvuuden kannalta.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Keskeytä



## Työkokemus, koulutus ja työkierto

Kyllä Ei

32) Minulla on työkokemusta useamman kuin yhden käsiteltävän osaston työtehtävistä (tuotannonsuunnittelu, tuotanto, varasto/lähetys)?

Jos kyllä, missä tehtävissä olet toiminut ja kuinka kauan?

Kyllä Ei

33) Olen osallistunut työnantajan organisoimaan työkiertoon tuotannonsuunnittelu-, tuotanto- ja/tai varasto/lähetystehtävien välillä.

Jos kyllä, millaiseen, missä ja milloin?

Kyllä Ei

34) Minulle on tarjottu mahdollisuutta työkiertoon ko. tehtävien välillä.

Kyllä Ei

35) Olen kiinnostunut osallistumaan työkiertoon ko. tehtävien välillä, mikäli mahdollisuutta sellaiseen tarjotaan.

36) Olen saanut perehdytystä ja/tai muodollista koulutusta muiden käsiteltävien osastojen toiminnasta ja peruseriaatteista ja/tai yleistä toimitusketjun hallintaan liittyvää koulutusta.

Jos kyllä, millaista?

Kyllä Ei

37) Minulle on tarjottu perehdytystä/koulutusta muiden käsiteltävien osastojen toiminnasta ja peruseriaatteista ja/tai yleistä toimitusketjun hallintaan liittyvää koulutusta.

Kyllä Ei

38) Olen kiinnostunut osallistumaan kyseisenlaiseen perehdytykseen/koulutukseen, mikäli sellaista tarjotaan.

Jos kyllä, mistä aihepiireistä olet kiinnostunut?

Keskeytä

#### Yhteistyön ilmapilvi

	Täysin eri mieltä	Jokseenkin eri mieltä	Ei samaa eikä eri mieltä	Jokseenkin samaa mieltä	Täysin samaa mieltä	En osaa sanoa
39) Tehtaan tuotannosuunnittelu-, tuotanto- ja varasto/lähetysosastot tulevat hyvin toimeen keskenään.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
40) Tehtaan tuotannosuunnittelu-, tuotanto- ja varasto/lähetysosastojen välillä on jännitteitä/konflikteja/eturistiriitoja.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
41) Tehtaan tuotannosuunnittelu-, tuotanto- ja varasto/lähetysosastojen edustajien välillä on jännitteitä.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
42) Jos jokin asia menee pieleen, ko.osastojen välillä pyritään enemmän löytämään syyllinen kuin yhteisiä ratkaisuja ongelmaan.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
43) Yleisellä tasolla olen tyytyväinen ko. osastojen osastojen väliseen yhteistyöhön.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Keskeytä

## KOORDINOINTI

## Johdon asennoituminen yhteistyön tekemiseen

	Täysin eri mieltä	Jokseenkin eri mieltä	Ei samaa eikä eri mieltä	Jokseenkin samaa mieltä	Täysin samaa mieltä	En osaa sanoa
44) Tehtaan ylin johto (johtoryhmä) kannustaa eri osastoja toimimaan ja työskentelemään yhdessä.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
45) Tehtaan päällikkötaso (muu kuin johtoryhmä) kannustaa eri osastoja toimimaan ja työskentelemään yhdessä.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Keskeytä

## Toiminnan arviointi ja palkitseminen

	Kyllä	Ei
46) Tunnen oman osastoni tavoitteet.	<input type="radio"/>	<input type="radio"/>

Jos kyllä, mitä ne ovat?

	Kyllä	Ei
47) Tunnen muiden osastojen tavoitteet.	<input type="radio"/>	<input type="radio"/>

48) Tunnen koko tehtaan tavoitteet.

Kyllä	Ei
<input type="radio"/>	<input type="radio"/>

Jos kyllä, mitä ne ovat?

49) Olen tulospalkkauksen piirissä

Kyllä

Ei

En osaa sanoa

50) Tunnen tulospalkkioni määrätymisen periaatteet

Kyllä

Ei

Jos kyllä, millä perusteilla tulospalkkiosi määräytyy?

Keskeytä



## Appendix 11 Interview Questions

### **INTERVIEW QUESTIONS – RESEARCH CONCERNING INFORMATION SHARING AND COLLABORATION ACTIVITIES EXECUTED BETWEEN DIAMOND MILL’S PRODUCTION PLANNING, PRODUCTION, AND WAREHOUSING AND DISPATCH DEPARTMENTS**

The questions have been chosen and designed based on answers received to the survey executed in May 2015. The following themes showed dispersion of opinions either between or within the two respondent groups.

1. In your opinion, is information shared between the concerned three departments? Is the information sharing effective and adequate? Why do you feel so? (S1, S3, S4)
2. In your opinion, do the concerned departments keep relevant information consciously within themselves? Why do you feel so? Example situations? (S2)
3. In your opinion, is the mill’s climate open and encouraging towards information sharing executed between the concerned departments? Why do you feel so? (S8, S9)
4. In your opinion, is it easy to get time of the representatives of the different, concerned departments to go through common matters, if needed? Why do you feel so? (S13)
5. In your opinion, do the representatives of the other two concerned departments consider how their decisions affect the operations of your department while making them? Why do you feel so? Example situations? (S24)
6. In your opinion, do the concerned departments consult one another before making decisions that affect the operations of the other departments? Why do you feel so? Example situations? (S25-S27)
7. In your opinion, do the concerned departments work as one entity or do they rather concentrate on executing and optimizing own, functional operations? Why do you feel so? (S28-S29)
8. In your opinion, in problem situation involving several, concerned departments, is the concentration rather on placing blame or finding common solutions to problems? Why do you feel so? Example situations? (S42)
9. Are you personally satisfied with the collaboration occurring between the concerned departments? Why? (S43)
10. In your opinion, does the mill’s top management (management board) encourage the different departments to work together? Why do you feel so? (S44)