11. Conference theme track: Global business and the digital economy

Competitive session

DIGITALIZATION CAPABILITIES IN GLOBAL MARITIME TRANSPORTATION INDUSTRY

Abstract

Digitalization is anticipated to transform the global maritime transportation industry profoundly, however there is little understanding about what it constitutes of within the specific context. This phenomenon-based research illustrates the three-dimensional and multileveled nature of digitalization in global maritime transportation industry in order to identify the requisite firm level digitalization capabilities necessary in addressing the anticipated industry level changes. The findings drawn from qualitative interventionist research show that the digitalization related organizational capabilities consist of exploitative skills requisite in realizing the technological enablers, exploitative and explorative skills in monetizing those enablers, ambidextrous skills in telling the two different types of technology driven opportunities apart, and most importantly dynamic capabilities essential for organizational transformation required within the industry undergoing a shift from relative stability to notable turbulence.

Keywords

Digitalization, global maritime industry, organizational capabilities, interventionist research

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Introduction

As long as human beings have expanded the reach of their trading activities beyond the next village, the transport of goods by sea has characterized the cross border trade in several corners of the globe, giving birth to for example the very first European multinationals like East India Company (Carlos and Nicholas, 1988). With the advances of the industrial era and mass production, global maritime transportation became a vital thread of connectivity enabling the flows of cargo from a one corner of the world to another. The game changing impact of containerization (McKinsey and British Transport Docks Board, 1967) as one of the key accelerators of globalization (Bernhofen, El-Sahli & Kneller, 2016) continues to underpin the activities throughout the industry.

Today, another game changer is waiting around the corner: digitalization is expected to have at least as profound an impact on transporting goods around the globe, as did the containerization (McKinsey, Saxon & Stone, 2017). However, there's surprisingly little knowledge about what does digitalization actually mean within the context of heavy containers, ships and cranes. Even though digital solutions and automatization have been penetrating vessels, ports and logistics solutions for some decades, the extant literature is atomistic, focusing on specific solutions within distinct parts of value chain (Heilig and Voß, 2016, 2017), or general, discussing digitalization as a general construct (Geels, 2004, 2010, Tilson, Lyytinen & Sørensen, 2010) or addressing industries further along the digital transformation (Barnett, 2016, Brettel *et al.*, 2014, Bughin, LaBerge & Mellbye, 2017, Schwab, 2016). Furthermore, there is even less knowledge about the firm level capabilities that would enable the players within this specific industry to reap the benefits – and respond to the threats – emerging from these technological advances and potential disruptions.

The aim of this research is to explore these firm level digital transformation capabilities within the global maritime industry. As such, this research is phenomenon-based (Doh, 2017), heeding the recent discussion within the international business research concerned about the relevance of our research (Buckley, Doh & Benischke, 2017). It is essential to understand digitalization within diverse contexts – especially considering the sociotechnical nature of digitalization (Tilson *et al.*, 2010): the institutional forces converging within any industry (Pazzaglia *et al.*, 2017) impact the humans and their perceptions resulting in different developmental paths in exploiting technological systems across diverse industries. What we know of digitalization

in the contexts of media, high tech or retail, may not travel well to explain digitalization in maritime logistics.

This research explores the requisite firm level capabilities that enable both sides of digital transformation: the development of technological enablers and the monetizing of those enablers. The core focus are especially the underpinning organizational capabilities that empower firms to come up with new business models utilizing the digital opportunities to address the contemporary challenges of the industry. This translates into the research question of this article: **what are the organizational capabilities needed in executing firm level digitalization within the global maritime transportation industry?** Drawing from an interventionist single case study (Lukka and Suomala, 2014) within the global maritime transportation industry, this article explicates the organizational capabilities that are required not only in executing the technological maneuvers to develop digital enablers, but reaping the business benefits created by those enablers.

The adopted theoretical framework is grounded on the extant insights about exploitative, explorative, ambidextrous and dynamic capabilities (Augier and Teece, 2009, Birkinshaw and Gupta, 2013, Gibson and Birkinshaw, 2004, Jansen, Van Den Bosch, Frans AJ & Volberda, 2006, March, 1991, O'Reilly and Tushman, 2008, Teece, 2007, Teece, Pisano & Shuen, 1997). For reasons of parsimoniousness, the rich research on each stream is in the next chapter condensed into a simplified typology through which the empirical insights are analyzed.

Insights from literature: organizational capabilities

As digitalization is a sociotechnical phenomenon (Tilson *et al.*, 2010), developing technological systems constitutes only one third of a digital transformation (Geels, 2004, 2010). The other two components, humans and their perceptions – especially as they are represented in organizational capabilities – are the core focus of this article. Organizational capabilities are essential firm specific advantages (Buckley and Casson, 1976, Buckley, 2016, Dunning, 1991, Dunning and Lundan, 2008, Kogut and Zander, 1992, 2003). The organizational capabilities address a set of paradoxical needs (Gibson and Birkinshaw, 2004): to survive and prosper, the firm needs to balance change and stability (Farjoun, 2010), exploration and exploitation (March, 1991) and efficiency and innovation (Smith and Tushman, 2005). These ambidextrous capabilities are essential for creating dynamic capabilities, which in turn are critical when firms face continuous change (O'Reilly and Tushman, 2008).

Prior research in the evolutionary approaches to firm have revealed that organizational capabilities are embedded in the routines (Nelson and Winter, 1982, 2002, 2009, Winter, 2003).

Operational level routines are what account for the everyday performance of the firm and as such constitute the "genes" of the organization (Nelson, Winter 1982, 2002). Dynamic capabilities are specific strategic level routines of the firm, accounting for the routinized ability to change the operational action (Augier and Teece, 2009, Barreto, 2010, Eisenhardt and Martin, 2000, Salvato and Rerup, 2010, Teece, 2007, Teece *et al.*, 1997, Winter, 2003, Zollo and Winter, 2002), in contrast with the ability to react "ad hoc" to the demands of change.

The concept of dynamic capabilities emerged from insights in industries undergoing rapid technology driven changes in the 1990's (Teece *et al.*, 1997). Grounded on the resource-based view of strategy (Barney, 1991, Penrose, 1959), the key insight of the dynamic capabilities stemmed from understanding that in high velocity business environments, the actual assets and capabilities of the firm are less important firm specific advantages than the ability to change and shape those assets and capabilities to better address the changes in the environment – the flexibility of the organization (Volberda, 1996). This notion was crystallized into the expression of "sensing, seizing and transforming/reconfiguring", essentially meaning that the dynamic capabilities consist of routines that sensitize the organization to environmental changes, enable rapid utilization of such assets and capabilities as are required to seize the appearing opportunities, and facilitate organizational transformation to better fit the changed circumstances (Teece, 2007, Teece *et al.*, 1997).

In his seminal article, March (1991) discusses the two types of learning capabilities he names exploitation and exploration. The exploitative capabilities refer to making the most of existing assets and abilities, seeking refinement, efficiency and excellence in execution. The explorative capabilities relate to innovation, flexibility, adaptability – in essence to seeking new opportunities. These capabilities constitute a paradox (Gibson and Birkinshaw, 2004, Smith and Lewis, 2011), as while allocating resources to the development of one set of capabilities leaves less resources to developing the other set, both sets of capabilities are essential in ensuring the long term survival of the organization. Upholding this duality requires upholding paradoxical aims: cost-efficiency requires the removal of waste (i.e. anything not essential to the core process), whereas innovation requires both organizational slack (Nohria and Gulati, 1996) and redundancies, as from the present it is impossible to see which of the alternative new options will be relevant in the future (Weick, 1979).

March also points out that as exploitative approaches yield faster results, it is tempting for organizations to focus on honing their exploitative practices on the expense of the more uncertain explorative practices – further emphasized by the group behavioral tendencies in organizations (Weick, 1979) and industries (Pazzaglia *et al.*, 2017), resulting in shared understandings

of reality, which may or may not correspond with the external reality. In sum, the basic assumptions of the organizations reinforce and are reinforced by such practices that are perceived to yield desirable outcomes with speed and certainty: myopic exploitation trumps risky exploration. Additionally, the centralization of firm activities, necessary to an extent when the organization grows in size, supports exploitation while impacting negatively the explorative innovation capabilities (Jansen *et al.*, 2006).

To synthesize the discussion in this chapter, the explored digitalization capabilities are categorized into dynamic capabilities, which enforce adaptability and enable organizational change, exploitative capabilities responsible for current profitability, explorative capabilities ensuring future survival and ambidextrous capabilities essential in balancing the responses to the paradoxical needs emerging from the environment. In the empirical part, these black boxed types of abstract sets of capabilities are opened up in order to understand what these capabilities constitute of in the context of digitalization within the global maritime transportation industry.

Methodology nutshell

The empirical findings of this article are grounded on an interventionist single case study within the solutions supplier sector of the global maritime transportation industry. Having identified the criticality of the industry changes ongoing and ahead, the MNE embarked on a strategic digital transformation process in early 2016. I gained entry to study the process in fall 2016, with the explicit agreement of both observing and participating in the digital transformation process in the form of for example facilitating workshops and producing written memos of the emerging insights – in essence I was expected to not only be a silent observer but to actually help in moderating the unfolding of the digitalization. Therefore the chosen research approach was interventionist as it is a specific qualitative methodology, which has two aims: to contribute to the accumulation of scientific knowledge, and to yield case specific insights to accommodate the problem solving needs of the practitioners.

Research approach. Essentially interventionist research transforms the researcher participation, immersion in the case study, from a weakness, in terms of objectivity, to strength, in terms of in-depth understanding (Jönsson and Lukka, 2006). In essence, the interventionist researcher is driven by the scientific aspiration of seeking justifiable claims (rational arguments for truth claims), and by the contribution she can make to the quest of the practitioners pursuing the next course of action in terms of both how to do things and what should be done. As such, interventionist research is an offspring of action research (Lewin, 1946), and expands the aims of case studies beyond producing only scientific knowledge (Lukka and Suomala, 2014, Suomala,

Lyly-Yrjänäinen & Lukka, 2014). Lukka and Jönsson (2006) define this as a journey "there and back again", meaning that the researcher enters the situation from a theoretically grounded research question, engages in the unfolding of the events with the practitioners, and emerges from the experience with knowledge then analytically reflected against existing scientific knowledge to make a theoretical contribution. The process is abductive (Welch *et al.*, 2011), alternating between the emic (insider view, seeing things from the practitioner perspective) and etic (outsider view, seeing things from the observer, researcher perspective) vantages (Pike, 1967), and between the extant theoretical knowledge and the emergent empirical understandings.

The philosophical underpinnings of this approach are pragmatist, grounded in moderate realism and moderate constructionism (Alvesson and Kärreman, 2007, Kakkuri-Knuuttila, Lukka & Kuorikoski, 2008, Lukka and Modell, 2010). In essence, social reality is perceived as constructed, however the constructions gain a real existence and are further underpinned by ontologically real structures in which they are embedded. The aim of this type of research is not to predict but to trace causal linkages through in-depth understandings – zooming in to the process of how the emic interpretations and assumptions of the individuals and collectives (ie. the building blocks of social constructs) effect both the emergence of new social constructs and the enveloping ontologically real representations (Welch and Piekkari, 2017), and as such emphasize the relevance of science in addressing real contemporary phenomena (Doh, 2017). Due to the different philosophical underpinnings, the more familiar case study methodologies of Eisenhardt, Yin and Gioia are not compatible with the empirical approach of this research.

The case company. Research took place in a global cargo handling solutions provider in the maritime logistics industry. With a turnover of over 3,5 billion €, headcount of around 12 000, and operations in more than 100 countries, the company is divided into three business areas: maritime and offshore solutions, terminal and port solutions, and landside solutions. For reasons of confidentiality, the mother company is in this research referred to as A, and the three sister companies to as M (maritime solutions), T (terminal solutions) and L (landside solutions).

These business areas are independent sister companies embedded in the mother company. Each sister company has their own offerings, R&D, brands, markets and customers, and some of the administrative tasks (HR, finance) are carried within the business areas, and some centrally. There is an enduring discussion about what activities should be shared between the sister businesses, what should be executed at the level of the mother company, and what should be kept within the independent firms, and even deeper within the different divisions each business area consists of. At some points in the history of the firm the top management has driven integration, whereas in other times the relative independence of sister businesses has been cherished.

Each firm has their own strategic level activities, however they are embedded in the wider strategic architecture created by the mother company. The digital transformation is acknowledged and driven by the top management as one of the three "must win battles", the other two related to service excellence and leadership quality – naturally the three "battles" are highly intertwined as essentially these "battles" are seen to develop the capabilities needed in dealing with the looming industry transformation.

The offerings consist of both equipment and software, ranging from fully automated terminal solutions and huge cranes to individual pieces of equipment, such as forklifts, hatches and crane spreaders. As all business areas are within cyclical markets, some areas perform better than others in any given time point. Currently, the landside business is highly profitable due to having been able to reap the benefits of the booming market, whereas the maritime business is struggling due to the serious structural problems in both shipping and ship building industries. The port and terminal business area is currently the biggest business area and a major player in their markets and has been providing steady revenues. However, it is anticipated that the global maritime industry turmoil will reach also their business, albeit with a delay compared to the actualized struggles evident in the maritime business.

As the customers of the company are spread over the whole global maritime logistics value chain, the industry level transformation has an acute impact on the future business of the firm – and additionally makes the firm a unique vantage point from which to view the whole industry transformation.

Data collection. I was working in close contact with the CIO (Chief Information Officer) office and Digi PMO (Digitalization Project Management Organization) responsible for the digital transformation throughout the whole company. The CIO office is a mother company level function, whereas the members of the Digi PMO come in addition from all business areas. As such I gained entry to observe and participate in the process from several internal vantages within the firm, both on the level of the mother company, and from within diverse divisions within the business areas.

The data of this article comes from in-depth interviews (15), informal discussions, meeting, seminar and workshop participation (10), workshop planning and facilitation (2) within three countries, and secondary firm specific written material like internal reports and memos. Additional industry specific insights emerged from participation in an ongoing research collaboration project aimed at exploring autonomous shipping: this research project constitutes of several research institutes and firms, one of which is the maritime solution oriented business area of the focal firm.

In sum, I spent altogether 23 days (including four trips with evening socialization) in the focal firm during the research process (fall 2016 - fall 2017), and additional ten days being involved in the other ongoing research project which contributed towards increasing the understanding of the industry situation. Due to confidentiality reasons taping the interviews, meetings or workshops was not allowed, so the data consists of notes taken in each occasion, soon after transferred into a research diary.

Data analysis. Data analysis unfolded highly abductively throughout the process, with going back and forth between the research diary and the extant literature during the whole time span of the project. The notes and emerging insights written out in a research diary were during the process gathered into bi-monthly sensemaking memos distributed in and discussed with the individuals in the CIO office responsible for the digitalization process in the case company. These discussions further deepened the understandings of both the industry and the firm, and allowed for some level of validation for my insights and interpretations, and as such contributed to both the scholarly and practitioner value of my research. Essentially the analysis unfolded as a hermeneutic circle pivoting around the emic and etic empirical insights and the existing scholarly literature (Alvesson and Kärreman, 2007, Alvesson and Sköldberg, 2009).

Before embarking on the firm specific empirical journey, the context of this research, global maritime industry needs taking a look at. The next chapter summarizes some of the key development trajectories of the industry and highlights some of the critical issues digitalization is expected and wished to solve.

Backdrop: global maritime transportation industry

Global maritime transportation is essentially an ancient industry, encompassing several closely intertwined subindustries: shipping, logistics, ship building, terminals and ports, and cargo handling to name a few most notable. With the advances of the industrial era and mass production, global maritime transportation became an essential thread of connectivity in the globalizing world. In the wake of the Second World War the containers, before used mainly in rail transportation, began to emerge as important means to increasing the efficiency of global maritime transportation. From the first standardization efforts pertaining to containers in the early 1930's, it took additional three decades before the cargo containerization really took off. The 1967 McKinsey report (McKinsey and British Transport Docks Board, 1967) was one of the first to acknowledge the potential of this innovation, which has subsequently been recognized as one of the key drivers in the acceleration of global trade (Bernhofen *et al.*, 2016). The containerization led the development towards reaching the economies of scale in maritime transportation,

the fundamental economic logic still prevailing in the industry. This is represented in the continuous growth of the cargo vessels, the biggest ships now reaching the capacity of 22 thousand TEU (twenty-foot equivalent unit), anticipated to grow further even up to 50 thousand TEU vessels (McKinsey *et al.*, 2017).

The economic logic of economies of scale has driven the developments in the industry thus far: the bigger the ships, the less costs per container, as the technological advances have been geared towards reducing the fixed costs (e.g. fuel consumption) of shipping while increasing the capacity of the ships. This has led to the commodification of maritime transportation, where the key advantage of the firms is the cost-efficiency – even to the extent where the cost competition within some parts of the value chain cannibalize the overall efficiency and effectiveness of the whole industry (McKinsey *et al.*, 2017).

The heritage of the global maritime industry has resulted also in the complexity of the overall value chain. At the one end, there are the cargo owners dealing in both consumer goods and within industrial and intra-firm markets, the latter constituting the majority of overseas trade: due to the offsourcing and offshoring trends, production of goods has been dispersed to global production networks (Kobrin, 2015), where the location of each node results from the attempts to reap the location advantages available to the international firms (Dunning, 1998). The emergence of the offsourcing phenomenon was evident in the growth of the maritime transportation sector, peaking in the early years of the millennia when the container trade grew at triple the speed of global GDP growth (McKinsey *et al.*, 2017). While the container trade continues to grow, since the 2008 financial crises, additionally impacted by the recent trend of backshoring and -sourcing, the multiplier between the TEU trade and global GDP has diminished – the trade seems to grow at a more or less similar rate as the global GDP.

The cargo owners can deal with asset owning parties or non-asset owning actors in the shipping industry. The latter constitute of for example freight forwarders who take care of the paperwork and organize both maritime and landbound routes for the cargo, often responsible for dealing with the actual carrier lines and terminals, which are the asset owning players in the industry. The carrier field used to consist of several smaller independent vessel owners and route operators, but due to the increasing criticality of economies of scale, the field has undergone several consolidation waves, and is currently dominated by few big alliances. The benefits of the alliances emerge from their ability to order and fill even larger ships – however, in the wake of the financial crisis slowing down the growth of trade, currently there is a serious issue of overcapacity within this sector. Additionally, with the technological developments, the ships

that were ten years ago being anticipated to have a lifetime of 25 years have now become obsolete, further contributing to the issue of current overcapacity and serious losses in the anticipated revenues.

The other major asset owners are the terminal and port operators, which differ in size and sophistication. The hub and spoke model seems to be the driving trend, meaning that most cargo travels with large vessels in between vast hub ports (e.g. Singapore, Los Angeles, Rotterdam), from and to which it sails on smaller vessels responsible for the feeder and distribution traffic between the smaller ports, spokes, and the hubs. The few largest terminals are highly automated and sophisticated, striving for the capability to on- and offload even the largest vessels efficiently, whereas many of the smaller ports, still rely predominantly on manual labor and actual paper trail (the telefax is not dead yet).

The shipping and logistics industry is highly intertwined and interdependent with the ship building industry. A lot of the revenue potential for the carrier lines actually emerges from the decisions made in the design and building phase of the vessels, especially as the environmental regulation increases and new technological solutions keep emerging. The shipyards in turn rely on a notable number of diverse equipment and solution providers, many of whom also compete to equip the terminals and ports, providing for example on-shore and off-shore cranes, stowage solutions and increasingly also automatization and software. The equipment providers are further divided into engineering dominated firms responsible for designing increasingly better machinery and solutions, and the actual manufacturers of that equipment. Additionally, there are several newcomers within and in between the shipping and ship building industries, interested in providing specific solutions to increase the efficiency of diverse parts of the logistics chain. Within the shipyards, the battle between traditionally dominating Western shipbuilders, and the more recently grown Eastern shipbuilders is getting more serious, as the issues of overcapacity, radical technological advances, pursuit of even larger vessels and increased environmental issue recognition shape the demand of new ships.

The relative stability prevalent in the industry has emerged from few, long taken-for-granted drivers: the economies of scale has been the predominant economic logic; containerization is perceived to be here to stay; and the growth of global trade, due to globalization, has been seen as continuous trend. However, these trajectories have created problems for the players over the whole value chain: as the cost competition has been fierce, the ship owners have wanted their ships as cheap as possible, which in turn is reflected on both the ship builders reaping diminishing returns and on the cargo owners who miss out on the potential of getting better service provided by new ship building innovations. Due to the focus on the economies of scale driven

cost-efficiency seek realized mainly in the growing ship size, little attention has been paid to the other parts of customer value.

The cargo owner has little possibilities of comparing the potential routes of their cargo and little visibility to the exact location of the cargo at any given time – the container data is dispersed between diverse modes of communication at use in any point of the trip, ranging from emails and faxes to sophisticated local cloud platforms. The ship schedules are far from accurate, resulting in underutilization of terminal capacity as quays wait empty for the late arrival, resulting in long waits for the vessels next in line – and traffic congestion spanning the whole terminal area. Containers can be quite empty, and stacked in less than ideal ways – for reaching the ideal sailing state the containers should be stacked based on their weight, however for speedy loading and offloading, the containers should be stacked based on their destination.

To sum, the value chain is riddled with inefficiencies, and the key candidates for battling those inefficiencies are ecosystems and digitalization. Ecosystemization would enable avoiding double (or triple, quadruple…) marginalization, as the whole value and logistics chain could be optimized as an entity. Simultaneously, industry level digitalization would provide the technological enablers for creating these entities. However, due to the heritage of the maritime industry, there are little capabilities geared towards forming, operating or strategizing in ecosystems, and the industry lags behind also in digitalization (Bughin *et al.*, 2017), lacking the requisite capabilities of reaping its business potential. The gaze is turned towards the poster children industries of digitalization, media, retail and high tech, for insights, however due to the impact of industry level differences, it remains to be seen, how directly can the learnings from one context travel to another.

Insights from the field: digitalization in global maritime industry

"*Digitalization? Do you mean the Google transformation?*" (Interviewee 1)

"*I don't know what it means for the whole firm, or even to T, but I know some initiatives in our mobile equipment division, like project xxx, where we are retrofitting the old equipment with data transmitting gateways... but I don't know what this big digital transformation means – I mean we have a lot of digital systems, processes and offerings, a lot of automatization already."*(Interviewee 2)

"*We're creating the company cloud, aren't we? Isn't that it?*" (Interviewee 3)

"*It's like this project zzz where the operator of the loader cranes doesn't need to leave the driver's pit – when it's unsafe, or, well like just raining – but he has instead a 360˚ virtual reality visibility of the operating environment in his helmet visor*" (Interviewee 4)

"*Do you know that we haven't kept track of the equipment we have sold – our archives are a mess, systems atop systems. We are now rolling out this SAP ERP system throughout M to increase the visibility and efficiency of our data management in our operations*" (Interviewee 5)

The concept of digitalization is highly opaque, as evidenced in the interview snippets above. The very first discussions within the case company revealed a plethora of understandings of both the concept of digitalization in general, and the actual events and activities bundled under the "digital transformation" process of the firm. Therefore, opening the black box of digitalization as a bundle of opportunities and challenges is the next necessary issue of this article.

Digitalization is underpinned by digitization, meaning the transformation of diverse analogue signals into digits, ie. from different types of data to one type of data, which allows for processing all types of data with the same technology. As such, digitization refers to the technological solution that enables connectivity between diverse objects and processes, but is not yet as such digitalization. Digitalization is a wider "*sociotechnical process of applying digitizing techniques to broader social and institutional contexts that render digital technologies infrastructural*."(Tilson *et al.*, 2010, p.2).

Ultimately digitalization refers to the blurring of physical and virtual space (Hermann, Pentek & Otto, 2016, Kagermann, 2015). It is the process through which the tangible entities are given a non-tangible, data-form representation, which enables analyzing and processing that data in ways that may feed back to the tangible objects or provide such services within the non-tangible realm that cannot be provided within the tangible realm. The digitalization of services industry highlights this well: in the cases of for example Über or Airbnb, digital platforms constitute a digital representation of diverse demands and offerings enabling connecting them within the physical realm. The technological solution of digitizing enables processing diverse types of data together (accomodation needs, free houses), however it is the wider sociotechnical embeddedness of those enablers in the daily activities of a critical mass of individuals that constitutes digitalization in the said spheres of action.

In essence, as a sociotechnical system, digitalization consists of three diverse components: the technological systems, the humans using and creating them, and the mindsets and perceptions that guide the humans in using and creating them (Geels, 2004, 2010). Digital technologies do not yet constitute digitalization, but they need to be so widely interconnected and diffused as to penetrate the alternative ways of doing and perceiving in the human realm (Dequech, 2004, Dosi, 1982, Geels, 2004, 2010, Nelson and Winter, 1982, Tilson *et al.*, 2010).

So, while there are several digital solutions within the focal firm, digitalization requires connecting those diverse systems into an infrastructural sociotechnical entity. The first dimension

of digitalization, in itself insufficient, is the technological system, which is, in the industry dealing in large physical objects, more layered than within an industry dealing primarily with data. In addition, considering the size and structure of the organization, the people involved in the overarching digitalization process come from various places in the organization, both in terms of hierarchical levels and functional positions – in addition to being equipped with diverse perceptions of the industry, firm and digitalization. These are characterized in the following table.

Table 1: Layers in digitalization

Layers	Technological systems	Humans	Perceptions
Firm/environment interface	Interorganizational platforms and solutions	Top management in both A and M, T, L levels, Digi PMO	Profitability, industry transformation vs BAU, diverse
Business models/ offerings	Digital platforms, digital service enablers	M, T, L management, marketing, sales	Highly diverse: cost-efficiency and immediate profits vs innovation and industry awareness
Data analysis/ processing	Data analytics tools, software	Mainly officers in A, some individuals in business levels	Task specific, some highly transformative, some routinized
Data storage/ sharing	Cloud platforms, Internet-of-things, data centres, competing solutions in businesses	Specific team in A, cells in M, T, L	Task specific
Data transfer	Telecommunications solutions	Officers in A	Task specific
Data collection/ emission	Sensors, gateways	Officers in A, engineers in M, T, L	Task specific
Physical equipment	Equipment, local digital solutions, documentation	Divisions in M, T and L	Product and offering specific

At the core is the actual physical equipment, cranes, hatches, forklifts, construction machinery, containers – essentially the dumb lumps of metal shaped by mechanical means. The first technological enabler of digitalization is equipping these mechanical parts or entities with sensors that collect and emit the data from the equipment and potentially also its environment – in essence, digitizing the data gleanable from the physical entities as discussed by the interviewee 2. In addition, the data sources include also extant documentation on paper materials or in local digital storages, referred to by the interviewee 5.

The next requirement is connectivity – the data needs to be transmitted. The transmitted data needs to be stored in ways that enable secure sharing of the data, the chosen solutions being the

creation of the company wide cloud, internal internet-of-things (interviewee 3), and the company wide adoption of Google services to facilitate administrative collaboration (interviewee 1).

Up to this point, the phenomenon is limited to the so-called back-end side of the operations: these solutions serve to create possibilities and increase efficiency of the existing processes (as illustrated by the interviewee 5), but do not as such yet contribute to the firm offerings. The level of data analysis and processing is the first level with ambidextrous aims: on the other hand, increased visibility to the equipment drawn from data analysis enables improving operational efficiency within the firm, but on the other hand, the data analysis may also yield such information that could potentially be transformed to new value offerings to the customers – by for example enabling designing diverse software offerings.

The next level is the level of business models, the actual value offerings: how do we process the gathered data in ways that enable us to deliver more customer value? One realized opportunity was described by the interviewee 4. This in turn requires insights from the customer interface, expanding not only to the customer, but to their customers and the potential industry level changes influencing them. The solutions derived from the customer interface insights may further require penetrating the inner layers of the customer's digital representation, as some solutions may require access to the levels of data analysis or storage of the customer. This is especially the case with ecosystemization, which aims at optimizing the value within larger entities (eg. overarching the whole value chain, or targeting a specific shared need spanning over the whole value chain) instead of firm specific value optimization.

Digitalization can both increase the efficiency of extant processes and create new opportunities. At the same time, effecting transformation also in the social parts in the sociotechnical entity of digitalization, the humans and their perceptions, requires attention. The challenges can be roughly divided into two categories: the problems in creating the back-end enablers, and the front-end problems in utilizing data in creating novel customer value offerings. The highly siloed structure of the firm has resulted in several individual cells working with specific parts of the whole, rendering it quite difficult to reach the infrastructural connectedness between diverse technological and business opportunities required in full-fledged digitalization. This is further highlighted by the diversity in perceptions: the industry transformation is acknowledged to a varying degree, and the connection between one's own task, the firm level digital transformation and the industry change is likewise perceived in various ways, ranging from acute awareness to pure task specific focus.

Insights from the field: digitalization capabilities

"*It was astonishing to hear how much there is going on in the whole company! I had no idea what the others were doing – we really are quite siloed here. I don't even know what other divisions in T are doing, and even less about what is going on in other parts. And I have no idea how to find out.*" (A new recruit at a cross organizational event)

On the level of product engineering, the problems emerge from the structure of the case company: the activities are spread across the three business areas, each of which houses several siloed divisions pursuing individual aims. This creates overlaps and inefficiencies as learnings do not travel, impacting also the digitalization aims. Digitalization would therefore require and include increased information flow resulting in more efficient exploitation of the accumulated knowledge of the whole firm, potentially leading to new product offerings and collaborative solutions.

Ensuring the quality of existing products requires high level exploitative capabilities essentially responsible of the imminent cash flow of the firm (March, 1991). Additionally, coming up with new products that utilize the potential of digital technology requires explorative innovation skills to an extent hindered by the silo-based structure of the firm (Jansen *et al.*, 2006), albeit quite developed in specific R&D cells regarding the traditional offerings. Therefore, developing further these capabilities requires also the skills to transcend the current organisational structures (O'Reilly and Tushman, 2008).

"*How difficult can it be to source these gateways? We have now been at it for a year – can't we just go ahead and buy them?*

- *... but we have to ensure the quality of the design – we're known for high quality products…*

- *Who cares about the quality of some black box!? It's not like our customers are buying them but what those boxes makes possible!*" (discussion between three informants at a Digi PMO meeting)

Due to the volume and scope of the product offerings of the firm, equipping the hundreds of thousands of diverse pieces of equipment with data collecting sensors and data transmitting gateways is a huge undertaking. Additionally the scope and volume of existing equipment, including also spare parts, is also a major documentation issue. Not only does the sensor problem pertain to the diversity of the new equipment design, but also to the retrofitting process of the legacy equipment – and equally, creating efficient documentation practises for new equipment pales in comparison with the need of digitalizing the manual documentation of extant pieces of equipment, and accessing the existing digital information in diverse sources. Additionally, the different operating environments (marine, rough terrain, military use, climate and temperature)

of the equipment poses technological issues. Solving these issues requires exploitative technological expertise, not only in designing and sourcing the multipurpose technology, but also ensuring both its implementation in new product development processes, and the retrofitting processes.

Another question is, where do the sensors gather the information? Only from the actual pieces of equipment, or also from their environments? What kind of data: error log, activities, location, visual? Each type of data is accompanied by different business opportunities accessible through explorative approaches.

Additionally, the quote above illustrates aptly also the impact of two diverse types of mindsets underlying the sourcing decision, and prevalent throughout the organization: there is the "engineering mindset" interested in perfecting the equipment, focusing on the development of the actual products, and the "marketing mindset" interested in customer value, focusing on the customer interface. These mindsets constitute a paradox and are a source of tension within the organization.

"*We have to be really careful in figuring out what data, where and when actually needs online connectivity.*" (Informant at a seminar)

Connectivity is an issue due to the volume of transmitted data, and especially concerning the maritime operating environment: on the open sea, the connectivity is dependent on the satellites. The satellite connectivity is very expensive due to the increasing demands of open sea connectivity, the scarcity of satellites, and the costs of launching new satellites. This requires asking the question of what data will be transferred from the sea, what can wait until the cheaper landside connectivity, and how to define the criteria to be adhered to.

Also the global scope of the operations creates challenges as the telecommunication solutions, both in terms of used standards and protocols, and the fees, vary greatly in the diverse areas. An issue increasing in importance is also cybersecurity – how secure does the data transmission need to be in different occasions and how to ensure the optimal level of security for each sensitivity level of the data? On the level of connectivity the exploitative technological expertise to evaluate, source and implement functional solutions is essential, but explorative approach to scouting coopetition possibilities might be quite fruitful.

"*We are now making this company cloud, and it makes things possible. But we cannot tell the businesses what they should be doing with it.*" (Presentator from mother company in a seminar)

On the level of data storing and sharing, three sets of capabilities emerge as equally important. First, solving the storage issues, including security, third party information, and sharing policies requires advanced exploitative technological expertise leading towards cloud-based,

internet-of-things firm level network. Equally important is the organisational transformation capability that would ensure data flow to and from the infrastructural solutions (Dosi, 1982, Nelson and Winter, 1982). Yet another set of exploratory capabilities is related to the ability of the offerings creators to understand the business potential emerging from the connectedness of tens of thousands of pieces of machinery.

"*There is this massive amount of data, but only me working on it. I'm trying my best to understand what it is that I should be getting out of it, what it is that the business need… I try to talk to people, there are some I can talk to, but…*" (Data analyst at an evening hangout on a workshop trip)

The data analysis is dependent on the processes on both the back and front end sides. Some of the data is essential for ensuring operational excellence and efficiency (eg. automatization of existing processes), some of the data provides building blocks for new offerings and underlying business models, and some of the data can provide invaluable insights of the industry transformation and future opportunities. In addition, complementing the physical equipment based offerings (ie. the equipment itself, the servitization of them, and maintenance), sophisticated software solutions based on data constitute an additional set of offerings. Within this realm the expertise must be ambidextrous, as the diverse aims cannot be pursued in isolation.

The business potential of opportunities on the previous levels is implicit until monetized through the insights on the following levels: how should the data be analysed and processed in order to create new business value, what are the business models underpinning the new offerings, and what are the industry transformation driven customer needs, both apparent and implicit? The questions are not limited to only what kinds of new solutions does the digitalization enable and how can they be monetized, but also include which of the new possibilities will soon be mere parity advantages taken for granted by competitors and customers alike, and which possibilities can be transformed into competitive advantages (Barney, 1991)?

"*I don't believe in the statement that in order to be leader we need to re-invent ourselves. I don't see it as a critical need that in the next five years we need to come up with revolutionary changes. We just have to do what we're doing now well.*

- But we must understand that maybe the products that we're making are no longer needed by the customers!

- We're making money in forklift trucks. Many of our competitors are not. So we're doing something right." (A debate at a seminar)

"*I don't think that the business lines would have ever started thinking about digitalization unless there would have been this clear dictate from above about eg connectivity that just get*

it done, we'll figure out how to make business out of it then." (A presentator a bit later in the same seminar)

"*Someone will need to make the equipment in any case*" (Interviewee 6)

The so far identified business models based on digitalization are predictive maintenance, servitization (Vargo and Lusch, 2004, 2009) and increased visibility to customer operations and fleet enabling diverse analytics that may yield profitable operational insights to the customers. Digital platforms are acknowledged, but the problems solvable with them in the operational context of the firm, and the monetizing mechanism are puzzling. Most likely digitalization will also create other business model opportunities, however so far identifying them has been difficult as it requires explorative capabilities, previously not nurtured emphatically in the organization on the business model level. One undertaken initiative within the firm is a business development acceleration project, which follows agile methodology (Holmström *et al.*, 2006, Ilieva, Ivanov & Stefanova, 2004). However, while the results are promising, these business initiatives remain atomistic, not contributing to the overall digitalization potential of the whole firm. Additionally, the servitization of offerings (Lusch and Vargo, 2009) requires value-based sales skills, so far not honed systematically in the organization.

The exploitative capabilities within the offerings level consist of perfecting the current offering production and management, including the traditional cost-based sales skills. In addition, turning new innovations into operational processes requires exploitative skills. As this level is in most part responsible for the current revenue, the exploitative excellence is vital.

"*I'm not afraid of Maersk or other traditional competitors. It's AliBaba and Amazon that keep me up at night.*" (Designer of terminal logistics documentation automation software presenting at a seminar)

"*Every company like us is having exactly the same strategy - it's just about the execution!*" (Speech at a seminar)

"*The others are just being more vocal about what they are doing, when they actually can do less than we. We have been lousy at telling what we can do.*" (Discussion at a seminar)

"*We've seen consolidation of carrier lines. What do we think about consolidation in terminals?*" (Discussion at a workshop)

In terms of future survival and prosperity, especially in an era of industry level transformation, the foresight capabilities of the firm are essential. These explorative, dynamic capabilities are required to scout and sense future changes, threats and opportunities, and they require the complementary set of capabilities that enable seizing the opportunities – and impacting organisational transformations when those are needed for responding to either threats or opportunities (Augier and Teece, 2009, Teece, 2007). However, in addition to capabilities ensuring

distant opportunity identification (Gavetti, 2012), also the low hanging fruits should be picked. Customer intimacy enables value maximisation from the current customers and are the foundation of today's operational excellence, while simultaneously it may provide deep insights invaluable in assessing the opportunities and needs of tomorrow. Customer intimacy is therefore an ambidextrous capability.

Also on the level of the industry transformation, the potential emergence and ensuing battle among ecosystems (Iansiti and Levien, 2004, Moore, 1993) entails different approaches to reaping the benefits: one alternative is to try to identify the potential winner ecosystem and become an integral part of it, another is to try to drive an own ecosystem, and the third is to find a way to multihome in several ecosystems (Hyrynsalmi, Suominen & Mäntymäki, 2016). However, the capabilities required for ecosystem level strategizing are difficult to create as all examples of ecosystems have emerged from traditionally high velocity industries further along in digitalization, rendering the applicability of insights questionable.

The identified requisite digitalization capabilities were dynamic, exploitative, explorative and ambidextrous. Depending on the organizational position in regards to digitalization, some of the identified practical capabilities are more essential than others, however one capability does emerge as critical: the organizational transformation, returned to in the following discussion chapter. The next table (Table 2) summarizes the insights from previous chapters and highlights the requisite organizational capabilities in diverse positions.

Table 2: Synthesis of digitalization issues and capabilities

	Layer	Problems	Opportunities	Requisite capabilities	
Front end	Customer interface	Industry level transformation, the future of value chains?	Ecosystemization = optimizing value creation and harvesting over the whole value chain, value co-creation, flexibility enhancing coopetition	Foresight, distant opportunity sensing	Explorative, dynamic
				Opportunity seizing, organizational transformation	Dynamic
				Close opportunity sensing and seizing, operational efficiency ensuring	Exploitative
				Customer intimacy, ecosystem level strategizing	Ambidextrous
	Business models/ offerings	Coming up with new business models to monetize the digital opportunities	Service-dominant logic, platform economy, increased operational visibility and information flow	Entrepreneurial business model creation, organizational transformation, value-based selling	Explorative, dynamic
				Extant offering finetuning, operational efficiency ensuring, innovation monetizing, cost-based selling	Exploitative
Both	Data analysis/ processing	What should be analysed? Prioritizing, data analysis capabilities, software design capabilities	External and internal contributions, software design	Identifying relevant data, software design and development	Ambidextrous
Back end	Data storage/ sharing	Internal or sourced data centres, cloud-based or local solutions, cybersecurity	Firm wide integration of diverse data, company level Internet-of-Things/cloud	Organizational transformation	Dynamic
				Technological expertise	Exploitative
	Data transmission	Connectivity on sea, regional connectivity differences, cybersecurity	Coopetitive potential	Emergent technology scouting	Explorative
				Technological expertise	Exploitative
	Data collection/ emission	Sensor design, sourcing, retrofitting, item document management, data typologizing	Sensor technology, sensor range, data type, item data management	Sensor potential scouting	Explorative
				Technological expertise, documentation expertise	Exploitative
	Physical equipment	Siloed nature of R&D across the firm: redundancies, overlaps	New product offerings, improved current offerings	New product innovation, organizational transformation	Explorative, dynamic
				Extant product development, production and maintenance	Exploitative, explorative

As the previous table shows, it is not enough to isolate developing explorative or dynamic capabilities only on one level of digitalization (ie. on the level of business models). In order to fully realize the potential of digitalization as a sociotechnical infrastructure, the exploratory and ambidextrous capabilities need to be developed across different levels of actions. This in turn needs developing dynamic capabilities, the routinized higher order abilities that enable upholding ambidextrous strategic aims – and the requisite organizational transformation.

The next chapter discusses the particular dynamic capabilities necessary in realizing digital transformation within the global maritime transportation industry.

Discussion: digitalization capabilities in global maritime industry

While the exploitative, explorative and ambidextrous capabilities are needed to address specific emerging needs, the dynamic capabilities are vital in order to realize the organizational transformation critical in creating and diffusing such capabilities. Therefore the discussion explores these capabilities in more detail.

Previous research enables categorizing dynamic capabilities into four dimensions. The first set of capabilities is directed outwards: "*to identify and shape opportunities, enterprises must constantly scan, search, and explore across technologies and markets, both 'local' and 'distant'* (Teece 2007, p. 1322). This can include for example collaboration with research facilities, specific foresight oriented activities, or coopetitive relationships with select competitors. In essence, the sensitivity to scout for new openings must be underpinned by such individual mindsets that would encourage individuals to not only focus on executing the task at hand, but to identify novel opportunities and further disseminate those identified opportunities (or threats). The processing of the identified signals should be systematically approached and managed, however sourcing them should be diffused throughout the whole organization from the top management to the engineering floors. In practice, these types of activities would constitute the explorative capabilities on the data collection, transmission and analysis levels, which could reveal new openings through identifying new technological opportunities. Additionally, creating a strategic foresight unit on the top levels would enable the systematic, exploitative processing of these signals in ways that would link the individual identified signals to the wider vista of the industry transformation.

The second set of dynamic capabilities is internal and addresses the learning and knowledge flow within the organization (Kogut and Zander, 1992, Nonaka and Takeuchi, 1995, Zollo and Winter, 2002). How fast can environmental signals or internal learnings be diffused throughout the organization in ways that result in requisite changes and developments? Here a relative

organizational flatness of the firm would be an advantage, and many of the organizational innovations emerging within the highly digitalized industries highlight the essentiality of a specific kind of organizational culture – even concerning the sizeable players. Examples include the distinctive organizational efforts of Google and Facebook (Martin and Stanger, 2015), the holacracy endeavor by Zappos (Van De Kamp, 2014) or celebrating failure with champagne at Supercell (Murphy, 2013) – all created to contribute to a specific type of work setting more adaptable to the high velocity environment through lowering the costs of internal communication by emphasizing organizational culture. However, returning to the focal firm, the siloed structure is a notable problem in this regard, in addition to the individual level mindsets geared towards task specific exploitation. Ultimately, it is not only a question of structure, but of organizational culture: the requisite organizational transformation in the case company would require actions that would develop collaborative and communicative culture (Thong and Lotta, 2015).

These issues pertain also to the third set of dynamic capabilities, the organizational structure and its malleability: for example modularity, and the ability to bundle and unbundle the resources facilitate deploying requisite internal resources to address new demands (Den Hertog, Van der Aa & de Jong, 2010). Currently, sourcing requisite resources from another division in the firm is nigh impossible, even though the current overlapping capabilities could provide excellent building blocks for creating this type of dynamic capability. There are a lot of Lego blocks in the firm – however they are all glued together into different fixed constellations. This would require empowerment and mandate from the very top of the mother company – essentially requiring the strategic decision as to what extent this type of flexibility would be more desirable than the strategic flexibility to engage not only in new mergers and acquisitions but also in dis-mergers and sales of some businesses.

The fourth type of dynamic capabilities is a distinct driver in the network economy, the emergence of business ecosystems (Basole *et al.*, 2015, Iansiti and Levien, 2004). The type four dynamic capabilities refer to the ability of the firm to utilize external assets and resources without committing to ownership liabilities (Shivakumar, 2014). A good example are the digital platforms (Kenney and Zysman, 2016) within the telecommunications industry: both Apple and Android provide both a distribution channel (App Store, Google Play), and a set of resources (application developer interface), which have enabled the booming growth of for example game developers. Especially multihoming in diverse ecosystems (Hyrynsalmi *et al.*, 2016) enables the firm to exploit external resources with minimal investment risk in those resources, which in turn increases the adaptability of the firm as it can rapidly move between such sources of external resources it deems most beneficial at a given time.

For a firm dealing in huge tangible objects and their design (ship owners, shipyards, terminals and their suppliers) a good ecosystem strategy could be a means to the requisite paradoxical organizational capability on the level of firm strategy to balance the long lifecycles and cost-efficiency of current offerings with the adaptability with which to sense, seize and transform the rapidly emerging industry level changes into realized opportunities. However, ecosystem level strategizing is its own game, and due to the industry transformation, it seems to be one many are attempting to learn, each from their own perspective. In the long run, ecosystematization born out of digitalization would enable optimizing the whole maritime transportation value chain, however in the next ensuing interim era, these emergent ecosystem battles mesh with the learning pains shared by all in the industry being ripped away from the comfort of relative stability and predictability.

On the level of firm strategy, the exogenous turbulence caused by the technological advances (Linturi, Kuusi & Ahlqvist, 2014, 2016), geopolitical turmoil (Kobrin, 2015, 2017) and environmental issues (Wilenius and Casti, 2015, Worldwatch Institute, 2015) must be dealt with endogenous strengths (Rumelt, 2011) combining past fortes in exploitation and new explorative capabilities, underpinned by different thinking than was necessary in times of predictability. On the level of organizational capabilities, developing industry specific ambidextrous dynamic capabilities enables seizing the efficiency enabling facets of digitalization with exploitative skills, and the innovation inducing dimensions with explorative abilities – in addition to sensitizing the individuals in recognising which types of the goals they are at any given moment pursuing

Conclusion

This research set out to explore digitalization capabilities in the context of global maritime transportation industry. Unlike in industries dealing primarily with data (like media and services), digitalization in an industry dealing with heavy tangible objects encompasses also the hurdles in trying to create a digital representation of myriad equipment, in essence the engineering issues related to creating the internet-of-things. However, realizing these technological enablers doesn't yet create economic value. An additional set of digitalization capabilities is necessary.

The multileveled and -dimensional nature of digitalization creates difficulties in developing such organizational capabilities that enable creating and harvesting economic value, as digitalization contributes to both efficiency and innovation aspirations of the firm. The research showed that as the past development paths of the industry (long offering life cycles, relative

predictability, cost competition based on the economic logic of economies of scale) have resulted in honing exploitative organizational capabilities, the firm struggles both in identifying the explorative opportunities essential for future survival and success and in developing such explorative capabilities that would enable monetizing the opportunities emerging from technological enablers. In essence, identifying correctly the type of opportunity a specific digitalization related opening reveals, and seizing that opportunity with the type of capability best suited for realizing that particular opportunity is difficult. Explorative openings are often addressed with exploitative skills.

The contributions of this research are both practical and theoretical: as the research was interventionist, carried out in close cooperation with the practitioners, the insights about the critical issues in the case firm contribute to the development of the requisite firm specific organizational capabilities. Illustrating the multileveled and -dimensional nature of digital transformation in the case company enables the practitioners to see a wider picture and to link the diverse digitalization related efforts throughout the siloed organization together. In addition, presenting an overview of the industry level transformation may be quite useful to other firms captured in similar throes.

The first theoretical contribution of this research stems for the research gap on digitalization in the context of global maritime transportation industry. Most previous digitalization literature is either abstract, specifically focused on a certain part of the value chain or deals with insights from industries further along the digital transformation. The three dimensional multilevel model depicted in table 1 (p. 13), while case specific in content, captures the essential elements of digitalization in this context, thus providing a useful stepping stone for future research exploring the unfolding of digitalization within the industry.

The second contribution emerged from highlighting the struggles of the firm in developing digitalization capabilities. By illustrating what exploitative, explorative, ambidextrous and dynamic capabilities constitute of in this context, the black box of the abstract types of capabilities was opened, contributing to the increasingly nuanced understanding of organizational capabilities. In addition, the findings enforced the notion that in dealing with complex organizational transformation needs, such as digitalization, isolating different types of capabilities into specific slots within the entity is not enough: in order to realize digital transformation, the distribution of requisite capabilities cannot follow the demarcation between diverse task levels, but needs to be more fine-grained.

For example, isolating explorative demands onto the level of business offerings, and exploitative demands onto the level of sensor technology is not ideal, as the emerging insights from the sensor technology potential may well provide explorative opportunities if sensed and seized

with fitting skills. In addition, business offering development requires also a detailed understanding of the efficiency increasing facet of digitalization, best seized with exploitative abilities. To sum, while digitalization presents different types of problems and opportunities that require suitable types of sensing and seizing capabilities, the ambidextrous capabilities that enable recognizing and addressing correctly the type of need should prevail throughout the organization. There are no levels, divisions or tasks in which only one type of capability would suffice. This insight contributes to the extant literature on ambidexterity, dominantly preoccupied with exploring the firm or managerial level ambidextrous capabilities.

As this research was interventionist and as such aimed at in-depth understanding of the perceived reality of the case company, the findings regarding the specific types of practical problems and requisite capabilities are not immediately generalizable to other firms. However, emphasizing the industry level convergence of institutional forces, it may be assumed that while the practical problems of dealing with digitalization are highly contingent on the firm, the nature of digitalization within the industry is the same throughout – when abstracted, the problems are similar.

This research points towards several new research avenues. For example, further observations of the looming battle of ecosystems in the industry, or the changes in the value chain would provide highly interesting new and relevant knowledge. As the poster children of digitalization, Amazon and Alibaba to name two, are beginning to venture into global maritime transportation, it is highly interesting to see which set of capabilities prevails: the deep industry specific understanding born out of decades of experience, or the new insights honed together with the emerging technological advances.

In addition, from a purely theoretical perspective, the ability of established, hierarchical multinationals used to operating in relative predictability, to initiate, develop and internally diffuse novel types of mindsets, capabilities and strategies is a fascinating endeavor to scrutinize. Especially considering the structure of a multinational enterprise, traditionally grounded on the notion of distribution of tasks and skills managed by some level of matrixed centralization, an interesting avenue to explore would be to further discuss the organizational structure that could best meet the increasing demand on ambidextrous skills due to the radical technological advances. Yet another question is, whether it even is a question of structure, but more a question of something more elusive like organizational culture, schemata or identity – all rich streams of research that would have a lot to contribute in increasing our understanding of the social dimension of the sociotechnical phenomenon of digitalization.

In conclusion, organizational capabilities do not emerge from, nor reside in a vacuum. Due to the developmental paths of the industry, the economies of scale driven logic has resulted in

strategies pursuing cost-efficiency. The organizational structures, practices and isomorphic tendencies reflect the aim, and are further reflected in the individual perceptions of desirability guiding actions. The success in these past pursuits has further created shared understandings of what is important in the context of this firm and industry – becoming a loop of self-reinforcing cycle, beneficial in predictable environments.

However, with the industry transformation underway, the environment is no longer predictable: somehow this loop needs dramatic realignment. The future winners in the global maritime industry digitalization are the firms that manage to penetrate their loops in such places that enable changing the direction of the whole cycle to better fit the demands of the new era.

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