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SUCCESS FACTORS IN INFORMATION TECHNOLOGY PROJECTS

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in Global IT managment

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Abstract

Failure of IT projects has been a major problem over decades. The previous study have found that big IT projects overran 45% of cost, 7% of schedule and produced 56% less profit than expected (Mckinsey 2012). Today, the situation has not been changed significantly. It is crucial to explore critical success factors to enable software companies avoid risks in project development across various industries. These factors should cover more organizational aspects among different customer businesses as IT projects are more challenging and diverse with high level of novelty. The main aim of this thesis is to research organizational aspects in different software firms which can moderately impact on IT project success and how these factors influence in total project performance as IT projects have failed with many reasons over years. The study was analyzed on empirical data from the IT barometer 2014 data set of Finnish Data Processing Association. All senior managers were asked whether they agree or disagree that specified critical factors can impact on IT project success by selecting the respective scale. The study results found three the most important factors which moderately impact on the IT project success. IT architecture, enterprise architecture and selection of IT solution can enable software firms gain business objectives and expected IT project outcomes during implementation phase to meet market demands and customer satisfaction. In addition, only IT architecture and enterprise architecture can help project team run development project on time to gain product leadersip and competitive advantages. There are other critical factors can enable IT projects gain success of expected project outcomes during the implementation phase. In total project performance aspect, the study findings show that IT architecture can improve project timeliness better than achievement of business objective to gain good market share. Further, enterprise architecture has a moderate correlation with project time-to-market and achievement of business objective to enhance project success against fierce rivalry among competitors within the software industry. The study found that selection of IT solution can only enable project team to increase project competency in order to gain business objectives during development time. Hence, senior managers should consider importance of these success factors during development phases to gain project success as expection and improve total project performance for surpassing competitors on the market for profits and competitive advantages.

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1 INTRODUCTION

A project has starting and finish time, and is characterized by time, budget and quality constraints. “Project management is the application of knowledge, skills, tools and techniques to project activities to meet project requirements” (PMI 2008, 6). Once a project is managed properly, it is likely to achieve success with these constraints. Failure of IT projects has been a major problem for over decades. The reasons have been in various forms such as technology difficulties, organizational and functional issues, financial problems, and many other reasons. There have been many researches about IT project failures over years. 52.7% of projects ran over cost 189% of the initial plan and 31.1% was cancelled (Clancy 2008, 1). According to Mckinsey (2012), big IT projects overran 45% of cost, 7% of schedule and produced 56% less profit than expected. According to Standish Group International (1995, 3-6), only 16% of the projects they have analyzed were finished within specified deadlines and budgets, 32% were terminated prematurely, and 52% were exceeded estimated deadline and budget. Consequently, this report revealed that on average, the projects ran over cost approximately 189%, and over time was 222%. Another study by Oxford University and Computer Weekly in 2003 revealed that only 16% of 421 IT projects they studied were successful as planned in term of schedule, budget and functionalities, only 55% of projects ran on schedule, and 41% ran on the planned budget (Sauer C 2003, 41). The survey of the Royal Academy of Engineering and British Computer Society (2004) revealed that only 3 out of 500 surveyed projects satisfied all success criteria. The PIPC survey in 2005 found that 31% of IS projects overran on schedule and other 31% did not run on budget. The survey conducted by Ernst & Young in 2009 revealed that more than 50% of information system projects ran over time or budget, 5% of the studied projects were stopped prematurely.

Today, the situation has not been changed significantly. Software projects are still runs over budget and schedule (Gray and Larson 2008, 97). Although the success has been enhanced every year, IT projects are considered as being difficult to manage. Simons et al. (2003, 346) stated in their study that problems in software engineering found in the past have been still unsolved absolutely. Hence, failing in IT projects becomes a tendency in software engineering. As previously mentioned, IT projects have experienced common failure in meeting timeliness, planned budget and business requirements. Thus, it is essential to follow common critical success factors to improve the success rate of completing project in timely, within budget manner in order to satisfy the stakeholders. Management of IT project is always challenging as the volatility environment of product development and the rapid advancement of technology. In addition,

IT projects are more risky than other engineering because the high level of novelty. Innovation development is always more complexity, risky and high capital requirement. This requires more efforts and resources in management than any other industries, and some of them fail even the best measures in project management were applied. Therefore, it is crucial to explore critical success factors for IT projects to help companies avoid risks in product development across various industries.

Currently, there are not many research articles on success factors of IT projects, even though these projects are rapidly developing in many organizations. Existing researches only focused on identifying success factors in IT projects through case study analysis, some of them studied about success factors in specific domains, and others identified IT risk factors and focused on taxonomy of failures to provide a better landscape (Richard Berntsson-Svensson 2006; Craig Standing et al 2006; Debbie tesch et al. 2007; Henrik Brocke et al. 2009; Rukshan C. Jayawardena 2010; Mohd Hairul Nizam Nasir et al 2011). However, these researches have not given a comprehensive view of success factors in IT projects because they were analyzed in some certain domains to discover specific aspects of success. As earlier mentioned, IT projects are characterized as abstract constraints, frequent change of user requirements, hidden complexity, uncertainty and dependent on IT practitioner's expertise and knowledge of business process on certain system. It implies that challenges of IT project management are different. Hence, it is essential to discover common success factors from various IT projects in different organizations in order to make it a useful guideline for IT project success on a general view in aspects of meeting timeliness, within budget and business objectives. This study will focus on organizational aspects and other factors external with project management domain because there are many reasons which IT project failed (RQ1). In addition, certain processes of IT project development are usually involved in many different stakeholders, disciplines, resources and processes. Thus, this requires great efforts in project planning, management, and coordination to ensure that IT projects would be developed efficiently on time, budget and business objectives. The Standish research states that project success should meet budget, delivery time, and business goal. Kerzner (1995), Lewis (2001), K. Schwalbe (2006) and many other authors agree that a successful project running within budget, and time and meeting scope, performance and customer satisfaction can be regarded as success.

In addition, software projects gain moderate success level of project performance (7.1/10) and customer satisfaction (7.6/10) in the analysis of project planning processes by Zwikael (2009). It means that software firms greatly focus on customer orientation to meet customer demand as it is considered as unique way to gain the most acceptable project success. Deephouse et al (1995, 193) stated that users and the development

teams determined realistic time and budget. The customers tend to minimize project cost and time for intensive competition while the development teams try to obtain customer agreement to the project performance. Thus, they usually set poor project targets for the development. This leads to negative impacts on the overall project success. Hence, it is essential to investigate how IT project success factors could impact on project success in aspects of time, cost and business objectives (RQ2). Consequently, this could give audiences a comprehensive picture of critical factors significance on IT project success. This overview could help project managers and stakeholders enhance total performance and avoid potential risks which could negatively impact on project success. In summary, this thesis would review critical success factors in different IT projects, and discover important factors that influence success of project in schedule, budget and business objectives to answer the first research question (RQ1): What are critical success factors in IT projects? Furthermore, this study would research relationship between project success factors and total performance of IT projects through prior studies to clarify the second research question (RQ2): How IT project success factors influence in total performance of IT project?

2 LITERATURE REVIEW

2.1 Project success

The Standish group's chaos report 2004 concluded that only 28 % of software projects succeeded on schedule and on budget and 18 percent were canceled prematurely, and the remaining 51 percent overran on budget, ran behind schedule, or did not meet planned requirements. Currently, IT projects overrun on cost and time (Gray & Larson 2008, 97). Most common reasons stem from management, social and organizational factors (D. Cooke et al. 2001, 22-25). A classic definition of software project success defines that a project stays within budget and schedule. Other researchers stated that project success is defined according to different perspective of partner. The most popular definition from the Standish research states that project success should meet budget, delivery time, and business goal. Ghattas et al. (2008) stated that project can be assessed with time, cost and scope. Kerzner (1995), Lewis (2001), K. Schwalbe (2006) and many other authors agree that a successful project running within budget, and time and meeting scope, performance and customer satisfaction can be regarded as success. Baccarini (1999, 25-32) reasoned that project success necessitates a compound of project management success and product success. The project management success mentions about project efficiency while product success describes the effectiveness which handles with business goals. The study by Richard Berntsson-svensson (2006, 149) indicates that customer satisfaction is the most significant factor for product success, which is followed by great quality, satisfactory top management, and the product works. K. Schwalbe (2006) added that customer satisfaction should be also obtained in the close-out phase to assure project successfully complete. On the other hand, J.M. Nicholas (2005) defined failure criteria that user requirement is not satisfied, or project does not meet cost, schedule, performance and quality. Kerzner (1995) agreed this point in his definition of criteria of project failure. However, the author mentioned that failed project can stem from unsatisfied management requirement. Shenhar et al. (1997) found that there are four dimensions of project success. The first dimension is related to project efficiency which indicates whether the project was finished on time and within budget. The second dimension mentions about the impact on customers and end-users. The third dimension is related to direct impacts the projects can cause on the organization benefits such as increased profit and market share. The final dimension is related to preparing infrastructure for new opportunities, market and innovation.

2.2 Success factors

2.2.1 Perceived importance of IT

IT is usually considered as a strategic resource to support companies in order to achieve competitive advantages (Wade & Hulland, 2004, 135-140). Valuable, rare, unique and inimitable IT resources can create IT capabilities for business strategies. Thus, firms can improve performance through strategic alignment and IT support (Yang Yun Tao 2010, 437). According to Nolan & McFarlan (2005), IT plays an important role in business agility which can support companies to achieve competitive advantages through corporate innovation to meet customer needs and to improve daily operation. Thus, many companies make great investment in enterprise platforms to facilitate innovation. In addition, IT can back business strategies and processes through strategic alignment (Ritu Agarwal & V. Sambamurthy 2002, 4-6). According to McKinsey (2009), IT can support firms to improve their supply chain in order to generate new value-added services and advance daily operation. Enterprises tending to use IT as value driver usually reduce operation and maintenance cost through harmonizing application and standardizing infrastructure (Dirk Buchta et al 2007, 13). Feeny and Willcocks (1998) stated that IT capability can support the organizations to deploy IS systems effectively to achieve business advantages. Kohli & Grover (2008) found that IT can produce different competitive value such as innovativeness, efficiency, productiveness, profitability, and increased customer satisfaction. Carr (2003) stated that IT can help the organizations to standardize buisness processes and quickly respond to organizational changes for productivity. The prior research found that the organizational performance is one of the key measure of IT project success (Shenhar et al. 2001, 11). Thus, I hypothesize that if importance of IT to business is perceived well, IT will positively impact on project success .

2.2.2 IT architecture

According to the Opengroup (2001), IT architecture is a key to project success by developing IT systems to interact to dynamic business demands. A good IT architecture can support organizations to gain a harmony between IT efficiency and innovativess. In addition, companies can achieve business benefits through IT architecture such as better operation, better return on investment, time-to-market and business flexibility. Tiwana

and Konsynski (2010, 299-302) stated that IT architecture has a comprehensive concentration on components of architecture which can develop new capabilities for competition and business growth. According to Tanriverdi et al (2010, 829) and Tiwana et al (2010), modular IT architecture can quickly adjust important resources to interact to new issues, and create a continuous source of new capabilities for firm activities. IT infrastructure can produce business value to firm strategy (Weill & Broadbent 1996, 180-192). These values can be including time and cost, return on assets. Kayworth and Chatterjee et al. (2001, 8-11) found out IT infrastructure can create strategic business value through its responsiveness, innovative capabilities, and economies of scope. Dos Santos et al. (1993) stated that investing IT for innovative purpose can boost market value. Thus, IT infrastructure can well support for innovation. Byrd and Turner (2000, 170-173) stated that value of IT infrastructure is determined by its flexibility in which resource can be shared and reused, and IT organization can adapt to dynamic needs timely and effectively. Byrd (2001) added that flexibility is capability of infrastructure to provide various IT assets to share information company-wide in order to facilitate any project activities. On the bassis of the literatures, I hypothesize that well-organizaed IT architecture positively impact on IT project success.

2.2.3 Strategic alignment

The research of IT-business alignment from Henderson and Venkatraman (1993, 477-480) stated that IT strategy and project outcome should be tightly linked with business strategy and process to enable good support to strategic business needs. Company performance can be enhanced through the strategic alignment (Kearns & Lederer 2003; Chan et al. 2006). Companies with high alignment can gain better return on investment and their goals in effective way. Maes (2000, 19) stated that strategic alignment is considered as a repeated process, which enables linking process between business processes and IT, components to ensure better performance all the time. Chan and Huff (1997, 138-143) stated that strategic alignment is a conformation between business strategy and IT strategy. In strategic alignment, IT can support business strategy and develop new strategy to ensure enterprise goals and plans achieved properly (J. N. Luftman et al. 1993, 205-207). High strategic alignment can boost IT effect on business strategy through effective IT project planning and risk mitigation (Grover s. kearns & Rajiv sabherwal 2007). Knowledge integration in the strategic alignment can support companies to discover differences between current situation and future trend in order to maintain strategic fit in organization aspect (Grover s. kearns & Rajiv sabherwal 2007, 138).

Based on organizational benefits from strategic alignment, I hypothesize that if IT and business strategy is well aligned, this would positively impact on IT project success .

2.2.4 IT management

Raquel Flodström (2006, 49) stated that the strategic management of information technology assists organizations to achieve business objectives by planning and developing utilization of IT to exploit competitive advantages. This implies that IT management analyzes market competitions and manages IT as a competitive factor. IT management can transform IT assets into strategic resources to contribute to the IT company's market performance (Nevo & Wade, 2011). Dirk Buchta et al (2007, 5) supports this view by stressing that strategic IT management can increase company sales through standardized IT systems and IT-supported business processes. In addition, the IT management assists these organizations to generate business value through IT utilization such as revenue increase and cost saving. The strategic IT management creates new aspects of IT usage relying on critical factors: enhancing value, controlling performance and reducing cost (Dirk Buchta et al. 2007, 9). IT plays a role as a value driver which shape company strategy to reduce business process cost, increase revenue, and create business value. Enterprises tending to use IT as value driver usually reduce operation and maintenance cost through harmonizing application and standardizing infrastructure. Raquel Flodström (2006, 140) added that IT management is an important factor to enable IT investment to bring strategic value to the organization. According to Dirk Buchta et al. (2007, 87-94), companies use IT governance to implement value-oriented IT management. This organizational framework can improve linkage between IT department and business units to ensure company strategy achievement. This governing mechanism establishes responsibility areas and control structure to ensure management duties and decision making taken timely and properly. Raquel Flodström (2006, 141) stated that aim of IT management is to achieve strategic alignment with business strategies in order to achieve competitive advantages. This alignment becomes an important factor when it ensures synergies between strategies, organize and control project outcomes, and coordinate business strategies. IT management is responsible for IT planning, design, software delivery, project management (Zhang & Sarker, 2008; Kim et al., 2011). IT management can help the IT firms gain business objectives and quickly respond to market changes (DeLone 1988, 56). IT project planning and management assure that innovations are developed and coordinated company-wide to avoid any overlapping in development efforts. IT controlling will focus on cost and performance to guarantee that

budget is properly planned and allocated in business units. According to the cited studies, IT management creates a great deal of business benefits and improved organizational performance. Shenhar et al. (2001, 11) stated that organizational performance is one of the key measures of IT project success. Hence, I hypothesize that good IT management would positively impact on IT project success.

2.2.5 Enterprise architecture

EA can improve IT alignment with business goals as it integrates IT systems and maintains interpretation of business processes which they partner with (Ross 2003; Gregor et al. 2007). The business analysis is conducted on EA planning done within different departments. This can bring positive impacts on business-IT alignment and organizational alignment. Thus, it can help in detecting interdependencies between different units in the enterprise (Segars & Grover 1996, 390). Organization alignment can result in enhanced organizational performance (Miller 1986; Porter 1996; Kearns and Lederer 2003; Chan et al. 2006; Sabherwal and Chan 2001). Particularly, organizational alignment can help companies gain better ROI and strategic goals by eliminating effort wastes. According to Bernard (2005), the EA planning including enterprise analysis reveals not only valuable information about processes but also interdependencies or inefficiencies. This information will help enterprises improve their organizational performance and decision-making processes. Bernard (2005) stated that EA planning implemented enterprise-widely can bring in improved resource information. This would help the organizations gain better decision making, shortened release time, enhanced IT performance and lowered IT cost through common understanding between stakeholders and reduction of effort overlapping and reworks.

EA can standardize IT platform to gain process simplification, better reliability and reduced costs (Richardson et al. 1990; Spewak and Hill 1992; Boh & Yellin 2006; Ross et al. 2006; Venkatesh et al. 2007). EA can support system componentization which facilitate resource reuse and reconfiguration (Ross et al. 2006; Janssen & Hjort-Madsen 2007). This will help organizations optimize resource portfolio for project efficiency, reduced cost, meeting business needs and better ROI by removing resource redundancy and overlaps. An EA- supported operating platform can reduce complexity and component redundancy to enhance the system reliability (Pereira & Sousa 2004; Ross et al. 2006) for better information access. Furthermore, EA can help organizations enhance resource complementarity through discovery of potential synergies. The resource complementarity can promote resource synergies and gather resource to improve perfor-

mance for competitive advantages. According to Brynjolfsson & Saunders (2010), the resource complementarity can help the organizations gain competitive innovative ideas.

The main objective of EA is to build an enhanced operating platform in order to back company's key capabilities (Ross et al. 2006, 4). EA-supported operating platform is highly standardized and integrated (Spewak and Hill 1992; Ross & Westerman 2004; Bernard 2005; Boh & Yellin 2006). EA can help organizations gain enhanced information flows and low IT cost through harmony and standardized architecture (Richardson et al. 1990, 400-402). In addition, EA can build well-planned and highly integrated systems which can help organizations gain high responsiveness, better decisions, service enhancement, and low cost (Spewak and Hill 1992). EA can promote resource reuse and componentization through standardization (Ross and Westerman 2004, 13-15). These benefits would result in reduced IT cost, shortened time-to-market, and facilitate business objective achievement by concentrating on main activities. However, EA can help enterprises enhance their innovation capability, customer relationship, operation excellence and business agility (Ross et al. 2006). The cited literatures show that EA can greatly contribute to the organizational performance and business goals through the highly integrated and standardized operating platform and the comprehensive planning. Thus, I hypothesize that EA can positively impact on IT project success.

2.2.6 IT development methodology

SDLC becomes important in the software engineering as it supports in defining software requirement, designing software component, reducing development cost and delivering manageable software. Thus, it becomes a baseline for software development (Unnati S. Shah 2016, 5). The software development models can help the development with systematic and organized manners (Schach 2007, 4-6). Modern software practitioners select development models to create good quality applications, to meet customer requirements, and to assure timely delivery with cost effectiveness (Schach 2007,4-6). Each development model creates different values to various software projects (Li Jiang & Armin Eberlein 2008, 2). Traditional methodologies are exhaustive planning, predictive approach and process-oriented (Gurpreet Singh Matharu et al. 2015, 2). Currently, Software companies tend to release products more frequently, which is more suitable with agile methodologies than the traditional development models (Nachiappan Nagappan et al. 2013, 75). Agile methodologies are increasingly selected by software firms to meet feature complication and dynamic customer demands. (Gurpreet Singh Matharu et

al. 2015, 2). The manifesto 2001 stated that agile development mainly focuses on people and interactions, working product, collaboration, and adaptivity.

Agile based methods can help the software project gain better productivity and customer collaboration, flexibility, and quick adaption (Gurpreet Singh Matharu et al. 2015, 2). The Chaos report 2011 stated that Agile methodologies are more effective than the traditional software development methodologies. The Agile model can produce business value iteratively. Particularly, it employs the lean practice to cut waste and prioritize activities which quickly increase business value (Ashley Aitken & Vishnu Ilango 2012, 4). The Agile method can deliver working software incrementally to adapt to changing customer needs (Rashmi Popli et al. 2013, 57). The Agile applies user story to make requirements more realistic (Ani Liza Asnawi et al. 2012, 37). Thus, this model can produce high quality software to improve customer satisfaction. Parrish (2004) stated that the Agile model can help software projects gain greater customer satisfaction. Pilar Rodriquez et al. (2012, 145) stated that the objective of selecting the Agile methods is to improve productivity, product quality and to shorten time-to-market. The findings of the 8th Annual State of Agile Development Survey conducted by Versionone.com in 2013 conclude that most of people state that agile approach can help the project teams adapt to changing customer requirements; 87% claim that agile method can enhance the team productivity and 70% agree that agile method can shorten the software development time.

According to the Shine Technologies survey in 2003, 93% of software companies stated that Agile method can improve the productivity (Steve Easterbrook 2001), 49% claimed that costs could be decreased and 88% stated that quality was much better (Hue et al. 2004, 523), and 83% stated that customer satisfaction was highly improved. Agile methodology is an iterative and incremental development which mainly focuses on flexibility, light and quick development cycles, customer collaboration, and frequent delivery. The main priority is to finish the customer demands quickly and frequently deliver software (Preeti Rai & Saru Dhir 2014, 1114). The agile methods promise higher customer satisfaction, and timely delivery (Rashmi Popli et al., 2013, 54). The Agile methodology can help the organizations gain the saving of time and budget as it focuses more on software than documentations. During the iterations, frequent customer feedbacks can be gathered to progress the software development early as possible. In addition, lightweight processes can help the development teams with fast delivery of business values. The teams can easily adapt to dynamic requirements during the project phases and deliver software in short time through regular feedbacks and fast development (Radha Shankarmani et ak. 2012, 32). The impact of agile methodology on software development is reducing project costs. The teams do software testing

frequently against customer requirements (Fergis, 2012). This helps them detect the defects early in each iteration in order to reduce the implementation cost and maximize profits. The Agile methodology greatly focus on the business values. The development teams can apply the lean methodology to eliminate wastes as it focus on important features and short releases. This can reduce the develoment time and budget (Raoul Vallon et al. 2018, 172). Pawanpreet Kaur et al. (2014, 41) stated that problems are detected and solved early through daily meetings which can lead to quick software development.

The most applied Agile methodologies in software projects are scrum, Lean Software Development, Dynamic Systems Development Method (DSDM), and Extreme Programming (XP) (Waters, 2014). The XP methodology can speed up the process through iterations and it enables the development teams to do the testing before forwarding to the next sprint to ensure the conformation to customer needs (Raoul Vallon et al. 2018, 170). Scrum is a methodology which manages the software development in different sprints (Gurpreet Singh Matharu et al. 2015, 2). Scrum has dominant characteristics: collaboration, daily meeting, product backlog, and sprint backlog. Gurpreet Singh Matharu et al. (2015, 5) found that Scrum was selected higher than other Agile methods. The survey conducted by the French Scrum User Group in 2009 found that 86% IT firms supported Scrum methodology in software development. Ashley Aitken & Vishnu Ilango (2012, 7) stated that Scrum methodology is the project management which focus on quick responsiveness to dynamic requirements, customer engagement, and improved engineering practices. Mohd Sadiq & Tanveer Hassan (2014, 553) found that Scrum is characterized by adaptivity, flexibility and productivity. Gurpreet Singh Matharu et al. (2015, 2) stated that Scrum meetings allow the development team communicate and assess the project status to improve the team productivity. The scrum can manage chaos through iteration plans where the development team can identify what product feature can be carried out within time and cost constraints (Rafael E. Landaeta 2011, 653). The short iterations can manage the uncertainty of environment. The working software can be released in each iteration for transparency and adaptivity (Rafael E. Landaeta 2011, 653). Scrum is a light project management framework which can be integrated with different projects (M. Slinger 2008). Scrum can make adaptive responsiveness to fit with project environment. In addition, Scrum can help the projects overcome increasing environment complexity through cross-functional, self-managed teams and daily meeting to meet the sprint goals (Rafael E. Landaeta 2011, 652). The prior studies have mentioned Agile methodology benefits to the IT projects such as project performance, business objectives and organizational performance. Hence, I hypothesize that Agile methodology has a positive impact on IT project success.

2.2.7 Make or buy of IT solution

There are many factors influencing the adoption of software system acquisition. Companies maintain their strategy and competitive advantages by buying less strategic applications and building more strategic softwares (L.E. Canez et al. 2000, 1318). The package cost is usually cheaper than in-house development (R. Kelley et al. 1992. 30) which is including the implementing, support and maintenance cost. Straightforward applications are built (S. Ulfeder 2003, 39-40) while complex system can be bought that the organizations gain advantges from expertise and economies of scale. K. Fowler (2004, 70) stated that applications with unique requirements should be buildt because customizing the package would be expensive. R. Whiting (2003, 38) stated that in-house development is realized to be more time consuming process than the package. S. Kurokawa (1997) claimed that longevity of information system can influence make or buy decisions. G.H. Anthes (2004, 129) stated that companies with deep expertise can build their system less expensive and more benefits. They can shift skilled teams to core system development while leaving less important systems to the vendors. G.B. Davis (1988, 102) found that organizations can avoid risks by buying the package. These risks involve the completion, cost, control and performance. Companies usually select the build decision to guard their intellectual property (T. Rands 1992, 221) because the packaged solution can result in licensing costs and other issues (P Hung et al. 2007, 11). Bruce S. Buchowicz (1991, 28) stated that some companies make build-buy decisions on strategic aspects. Many organizations adopt the build option to achieve competitive advantages over their rivals on the market. The others select the buy option if a software package is available because they only consider the option as a mean for technical adequacy or the current situation. The companies focusing on the strategic goals usually consider the build or buy as a strategic adption to gain competitive advantages while the others view the option as chosing the best choice for the status quo. Winkleman et al. (1993, 57) stated that main objectives of the outsourcing adoption is to lower cost and make a strategic shift of business management. In addition, cost, capital, knowledge and capacity are main motives for the outsourcing (Gupta 1992, 48). The outsourcing enables enhanced quality and efficiency, increasing access to additional expertise, and strategic business cooperation. The companies can produce business values from their core skills by adopting the outsourcing which enables them to focus more on their organizations (Quinn et al. 1990, 46). By limiting activities which provides non-strategic advantages, the companies can increase values it delivers to customers and shareholders and lower cost and capital investment (Chris Fill 2000, 47). The previous studies found that the make or buy decisions can result in improved product

quality,better efficiency, and competitive advantages. Thus, I hypothesize that the make or buy decisions can impact positively on IT project success.

Table 1. Success factors in IT projects

Success factor	**Author**	**Classification**
Importance of IT	Feeny &Willcocks (1998), Ritu Agarwal & V. Sambamurthy (2002), Carr (2003), Wade & Hulland (2004), Nolan & McFarlan (2005), Dirk Buchta et al (2007), Kohli & Grover (2008), McKinsey (2009),Yang Yun Tao (2010)	Technology
Make or buy of IT solution	Quinn et al. (1990), Bruce S. Buchowicz (1991), R. Kelley et al. (1992), Gupta (1992), T. Rands (1992), Winkleman et al. (1993), S. Kurokawa (1997), G.B. Davis (1988), Chris Fill (2000), L.E. Canez et al. (2000), S. Ulfeder (2003), R. Whiting (2003), K. Fowler (2004), G.H. Anthes (2004), P Hung et al. (2007)	process
IT architecture	Dos Santos et al. (1993), Weill and Broadbent (1998), Byrd and Turner (2000), The opengroup (2001), Kay-worth and Chatterjee et al. (2001), Byrd (2001), Tiwana and Konsynski (2010), Tanriverdi et al (2010)	Technology
IT development methodol-ogy	Steve Easterbrook (2001), Shine Technologies (2003), Hue et al. (2004), Schach (2007), M. Slinger (2008), Li Jiang & Armin Eberlein (2008), French Scrum User Group (2009), Rafael E. Landaeta (2011), Standish Group's 2011 report, Ashley Aitken & Vishnu Ilango (2012), Ani Liza Asnawi et al. (2012), Pilar Ro-driquez et al (2012), Radha Shankarmani et al. (2012), Fergis (2012), Nachiappan Nagappan et al. (2013), Rashmi Popli et al. (2013), Versionone (2013), Preeti Rai & Saru	Process

	Dhir (2014), Pawanpreet Kaur et al. (2014), Waters (2014), Mohd Sadiq & Tanveer Hassan (2014), Gurpreet Singh Matharu et al. (2015), Unnati S. Shah (2016), Raoul Vallon et al. (2018)	
Strategic alignment	Henderson and Venkatraman (1993), J. N. Luftman et al. (1993), Chan and Huff (1997), Maes (2000), Kearns and Lederer (2003), Chan et al. (2006), grover s. kearns & rajiv sabherwal (2007)	Process
IT management	DeLone (1988), Karimi et al. (2001), Raquel Flodström (2006), Dirk Buchta et al (2007), Zhang & Sarker (2008), Kim et al. (2011), Nevo & Wade (2011)	Process
Enterprise architecture	Gregor et al. (2007),Ross (2003), Segars and Grover (1996), Bernard (2005), Chan et al. (2006), Kearns and Lederer (2003), Miller (1986), Porter (1996), Sabherwal and Chan (2001), Boh and Yellin (2006) Richardson et al.(1990), Ross et al. (2006), Spewak and Hill (1992) Venkatesh et al. (2007), Janssen and Hjort-Madsen (2007), Pereira and Sousa (2004), Brynjolfsson & Saunders (2010)	Technology

3 RESEARCH METHOD

3.1 Literature search

We conducted the article search with a systematic scan through popular journal databases. The frequently visited databases for our academic journal scan are:

- Science Direct
- ACM Digital Library
- IEEE Xplore
- Google Scholar

The search usually began with search phrase like “IT project success factor”, “software project success factor”, and “IS success factor” to find relevant journals for our research. All the articles found from the search would be reviewed for relevance by reviewing the abstract, title, discussion and conclusion.

3.2 Data collection and measurement

Survey approach was applied to collect empirical data for answering the research questions. The primary data has been collected from the IT barometer 2014 data set, which consists of data gathered by Finnish Data Processing Association. The data was collected from business and IT executives working in corporates and public sector organizations during the survey. The data is including survey questions and answers with respective score. Particularly, each participant was asked the same close-ended questions and gave the response by choosing a certain score, which ranges from one to seven to express their respective evaluation. This way of organization can ensure uniformity and consistency of data. For answering the research questions, only a part of the accessible data set related to the previously mentioned hypotheses was applied. Hence, there are approximately 18 survey elements selected for the study. These features cover different aspects of general IT projects from infrastructure, IT management, systematic IT development practice, importance of IT, selection of IT solution, IT alignment and others to answer the first research question which is related to critical success factors of IT project. The survey elements are illustrated in the appendix. More than 200 people were invited to the survey. Particularly, the surveys were sent to all participants via email and the response would be sent back to the survey manager. The simple structure of the survey facilitated adequate data collection for the analysis. As a result, the survey response rate reached approximately 230 executives in which business executives were 138, CIO

and IT executives were 80 and senior business experts. Furthermore, measurement scales were developed by choosing a reflective scale from Bharadwaj et al. (1999). The applied Sevenpoint Likert-type scales range from one (poorer than most) to seven (exceptionally well). In the survey, all executives or senior managers were asked whether they agree or disagree that specified critical factors can impact on IT project success by selecting the respective scale. The scale 1-3 represents the disagreement viewpoint while the scale 4-7 stands for the agreement comment.

3.3 Research method

The main goal of the data analysis is to study mean difference between disagreement and agreement views on organizational aspects towards IT project success. In addition, it is important to consider whether there are correlations between management aspects and project success because mean difference usually indicates certain level of correla tion between two variables. We applied the survey method to collect data for hypothesis justification. The data was collected from business executives and IT managers in var ous organizations to investigate related hypotheses. First, it is essential to find a proper method in order to investigate whether there is mean difference between two groups which either agree or disagree the statements on certain organization views (indepen ent variables) towards respective project success (dependent variable). The Mann Whi ney U test is a non-parametric test to compare two sample means when the dependent variable is continuous or ordinal. In the data sample, the project success is a continuous variable which ranges from 0 to 7. The independent variables are ranked into two groups (categorical groups). Particularly, the disagreement viewpoints (group 1) range from 0 to 3 while the agreement ones (group 2) represent the rest scores. The sample data met the Mann-Whitney U test's requirements when this test requires some assump tions must be checked before conducting the analysis. First, the dependent variable should be ordinal or continuous type. Second, independent variable should include in two categorical groups. Third, there should be independent observations in each group. Observation is independent when each respondent with score from 0 to 3 was ranked to group 1 (disagree) and the answer with score from 4 to 7 was categorized to group 2 (agree). The sample is large enough with data population size of 215 to justify the method application. Therefore, it is reasonable to select the Mann-Whitney U test to find out the group difference in the project success.

Second, it is important to select a proper method in order to find correlations among these variables. Kendall's tau-b correlation is a nonparametric measure to assess

strength of correlation between two variables which are ordinal or continuous type. The sample data must be passed some assumptions to comply with the Kendall's tau-b for the best results. First, the variables should be ordinal or continuous type. Second, the Kendall'stau –b evaluate if monotonic relationship between the variables. The conducted variables are measured on ordinal scales, the independent variable is ranked as disagree (score from 0 to 3), neutral (score 4) and agree (score from 5 to 7) while the dependent one explains how successful the project outcomes are, being ranked as low success (score form 0-3), medium success (score 4) and high success (score from 5 to 7). Hence, the Kendall's tau-b is a proper method to evaluate the correlations between two ordinal variables.

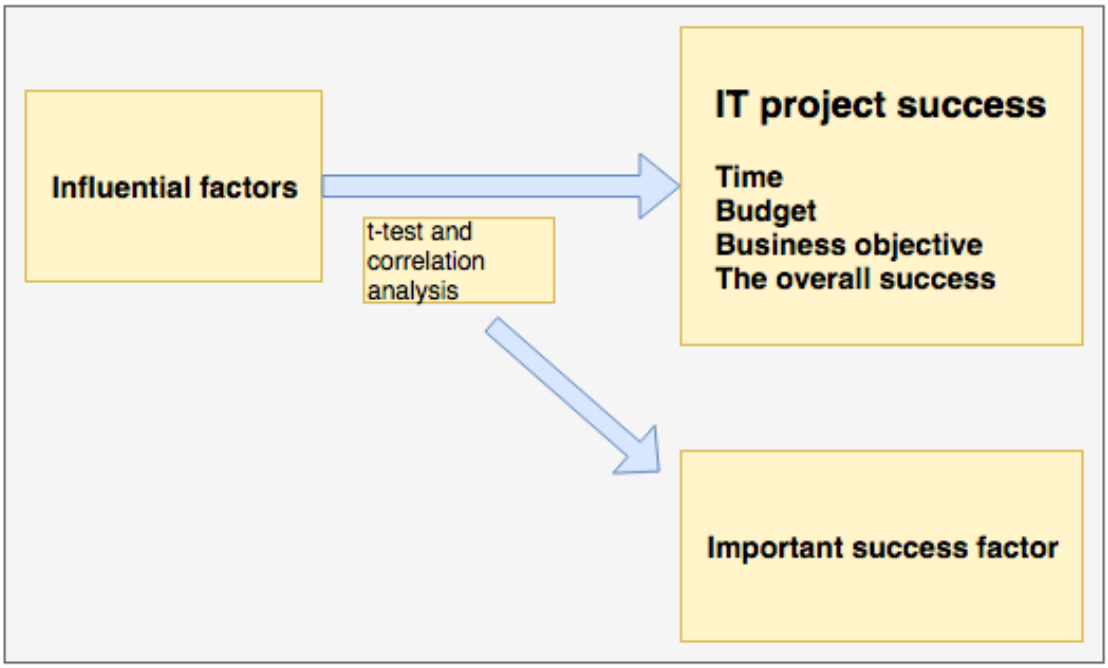

Figure 1. The research process of influential factors and IT project success

3.4 Research model

The main objective of the research is to explain IT project success in term of cost, time, business objective and the overall success based on influential factors asked in the sur-

vey. The study is including two sections which are related to the research questions. The first section focuses on what factors impact on the IT project success. The second one studies about how IT project success factors impacts on the project success. To answer the first research question, statistical analysis is done to find the significant correlation between influential factors and project success criteria through Pearson's correlation. In addition, it is important to investigate the mean difference in project success based on independent factors. The research model for the first research question is represented on the Figure1. The second research question is answered by explaining the relationship between IT project planning and project success through Pearson's correlation and and t-test analysis. The Figure1 illustrates the research process to answer the second research question.

4 DATA ANALYSIS AND RESULTS

Firstly, it is necessary to execute a proper method in order to investigate whether there is mean difference between two groups of statements on certain organization views towards respective project success. Particularly, The Mann-Whitney U test can compare two sample means when the dependent variable is continuous or ordinal. Thus, this method was used to conduct the data analysis. Practically, the mean difference of influential factors on a project success imply a potential relationship because this difference indicates that one of two data groups would support on the dependent variable better than the other. This can ensure the relationship between two variables would happen. Hence, it is important to select a proper method in order to find out correlations among these variables. Kendall's tau-b correlation can assess strength of correlation between two variables which are ordinal or continuous type. This correlation method was applied to investigate the potential correlation between observed variables.

Descriptive statistics

Variables	Mean	SD
1. IT serves our business as a partner	5.60	1.17
2. We have known well the impact of IT on our business	4.16	1.50
3. IT infrastructure, applications,data and process create an integrated whole	4.67	1.50
4. Business strategy, business models, operative model and IT architecture create an integrated whole	4.55	1.44
5. Developing systematically IT and IT management competencies needed in the execution of our business	4.48	1.49
6. IT provides value to our business by facilitating the development of new innovation and increasing the efficiency of our business process	4.97	1.42
7. Managing IT and develop its management as a strategic mean	4.41	1.66
8. Aligning the objectibes of IT activities with business objectives to evaluate how IT impacts the achievement of business objectives	4.19	1.56
9. Senior executives, business unit executives and IT executives share the accountabilities and responsibilities of IT management on the basis of clearly defined governance	4.13	1.81
10. Based on reliable metrics we know well the benefits of IT management and its development as a strategic means	3.61	1.55
11. Selection of IT solutions works smoothly so that business needs are well taken care of	4.98	1.46
12. Defining measurable objectives for IT solution purchases so that business needs are well taken care of	4.41	1.54
13. After the purchasing of IT solutions, we follow-up the achievement of the objectives defined for the purchases	3.99	1.65

Figure 2. Descriptive statistics of influential factors

In the next step, the obtained values from the Mann-Whitney U test and the Kendall's tau-b correlation analysis are analyzed and assessed for potential relationships. Consequently, only variables with moderate mean difference and correlation coefficients are taken into account. The analysis results of all project success are detailed in the appendix.

Table 2. Project time-efficiency

	Mann-Whitney U	P Value (2-tailed)	Std. Deviation	Kendall's Tau-b correlation	P Value (2-tailed)
1. In our organizations IT infrastructure, applications, data and processes create an integrated whole	2087	0.00	0.439	0.328	0.00
2. In our organizations business strategy, business models, operative model and IT architecture create an integrated whole	2522	0.00	0.449	0.303	0.000
3.We develop systematically IT and It management competencies needed in the execution of our business	2939	0.00	0.446	0.244	0.000
4. IT provides value to our business by facilating the development of new innovations and by increasing the efficiency of our business processes	2315	0.02	0.376	0.163	0.01
5. We manage IT and develop its management as a strategic means	3219	0.00	0.464	0.271	0.00
6. We align the objectives of our IT activities with our business	3640	0.00	0.477	0.255	0.000

objectives so that we are able to evaluete how IT impacts the achivement of our business objectives					
7. In our organization the selection of IT solutions works smoothly so that business needs are well taken care of	2435.500	0.002	0.40	0.160	0.012

The table 1 represents all success factors in accordance with different project success criteria to answer the first research question. This table shows that 8 independent variables have significant difference in project time-efficiency. Particularly, the agree groups are more successful at project time than the disagree groups. However, only some independent variables had moderate correlations with project timeliness. Infrastructure, applications, data and processes create an integrated whole had a moderate, positive correlation with the project timeliness, which was statistically significant (r=0.328, p=0.00). A well-managed IT architecture actually can help the team complete the projects within specified time through IT efficiency (Kayworth & Chatterjee et al. 2001). This would happen as the technology could improve the efficiency and effectiveness of the IT project team during the implementation (Wixom & Watson 2001). Business strategy, business models, operative model and IT architecture create an integrated whole had a moderate, positive correlation with the project timeliness, which was statistically significant (r=0.30, p=0.00). The EA can help IT projects with reduced cycle time, enhanced performance, and improved core capabilities for competitive advantages (Ross & Westerman 2004; Bernard 2005; Eetu Niemi 2006). The EA can help IT projects reduce complexity, remove resource overlapping and facilitate resource reproduction through standardization (Ross and Westerman 2004). Thus, the IT projects can gain improved efficiency to meet business needs.

Table 3. Project budget-efficience

	Mann-Whitney U	P Value (2-tailed)	Std. Deviation	Kendall's Tau-b correlation	P Value (2-tailed)
1. In our organizations IT infrastructure, applications, data and processes create an integrated whole	2658.500	0.00	0.439	0.296	0.000
2. In our organizations business strategy, business models, operative model and IT architecture create an integrated whole	3224	0.002	0.449	0.197	0.001
3.We develop systematically IT and It management competencies needed in the execution of our business	3564.500	0.03	0.446	0.108	0.079
4. IT provides value to our business by facilating the development of new innovations and by increasing the efficiency of our business processes	2240	0.01	0.376	0.179	0.004
5. We manage IT and develop its management as a strategic means	3965.500	0.045	0.464	0.103	0.095
6. We align the objectives of our IT activities with our business objectives so that we are able to evaluete how IT impacts the achivement of our business objectives	4603.500	0.26	0.477	0.134	0.028

7. In our organization the selection of IT solutions works smoothly so that business needs are well taken care of	2398	0.002	0.40	0.207	0.001

In project budget-efficiency, the data analysis results show that 7 independent variables had significant difference in budget-efficiency ($p < 0.05$). However, these variables only had weak, positive correlations with the project budget success, whose correlation efficients were les than 0.03. The study finding does not show that EA has a significant correlation with project completion within the specified budget. The difference between the study finding and prior literatures can stem from maturity level of the enterprise architecture within the organizations. The authors stated that decreased development costs and delivery time are caused by high level of EA maturity (Swink 2003; Aziz & Obitz 2007; TOGAF 2009).

Table 4. Business objective achievement

	Mann-Whitney U	P Value (2-tailed)	Std. Deviation	Kendall's Tau-b correlation	P Value (2-tailed)
1. In our organizations IT infrastructure, applications, data and processes create an integrated whole	2508.500	0.00	0.439	0.306	0.00
2. In our organizations business strategy, business models, operative model and IT architecture create an integrated whole	2583	0.00	0.449	0.317	0.00
3.We develop systematically	2992	0.00	0.446	0.233	0.00

IT and It management competencies needed in the execution of our business					
4. IT provides value to our business by facilating the development of new innovations and by increasing the efficiency of our business processes	1940.500	0.00	0.376	0.302	0.00
5. We manage IT and develop its management as a strategic means	3073.500	0.00	0.464	0.30	0.00
6. We align the objectives of our IT activities with our business objectives so that we are able to evaluete how IT impacts the achivement of our business objectives	3429	0.00	0.477	0.24	0.00
7. In our organization the selection of IT solutions works smoothly so that business needs are well taken care of	1762	0.00	0.40	0.389	0.00

In business objective achievement, all independent variables had significant difference with project achievement of business objective ($p <= 0.05$). There are only 5 independent variables which moderately correlated with business objective achievement. Particularly, selection of IT solution had a moderate, positive correlation with the project success of business objective, which was statistically significant ($r=0.389$, $p=0.00$). According to Bruce S. Buchowicz (1991), IT firms select the build option to achieve product leadership and business values. The others select the buy option to secure technical adequacy or the current situation in order to improve product quality and operational performance (Quinn et al. 1990). Chris Fill (2000) stated that proper buy-or-

build option can help software firms deliver increasing business values to their customers and shareholders.

The IT management had a moderate, positive correlation with the project success of business objective, which was statistically significant (r=0.30, p=0.00). IT management can provide strategic resources to strengthen IT company's performance (Nevo & Wade, 2011). According to Dirk Buchta et al (2007, 5), IT management can enhance the company's competitive advantages through standardized IT systems and IT-supported business processes. There was a moderate, positive correlation between IT value of business with the project success, which was statistically significant (r=0.30, p=0.00). IT is an important factor in business agility which can support companies in achieving competitive advantages through potential innovations to meet customer needs and to improve daily operation (Nolan & McFarlan, 2005). In addition, IT can back business strategies and processes through strategic alignment (Ritu Agarwal & V. Sambamurthy 2002, 4-6).

The business strategy, business models, operative model and IT architecture create an integrated whole had a moderate, positive correlation with the project success of business objective, which was statistically significant (r=0.32, p=0.00). The result shows that the EA can help the firms gain business objectives through enhanced IT-business alignment (Eetu Niemi 2006, 4) by improving organizational performance (Kearns and Lederer 2003; Chan et al. 2006). The infrastructure, applications, data and processes create an integrated whole had a moderate, positive correlation with the project success of business objective, which was statistically significant (r=0.31, p=0.00). The good IT architecture can help IT firms gain better business benefits through IT efficiency and differentiation capability (Kayworth & Chatterjee et al. 2001).

Table 5. The IT project outcomes corresponding with plans

	Mann-Whitney U	P Value (2-tailed)	Std. Deviation	Kendall's tau-b correlation	P value (2-tailed)
1. In our organizations IT infrastructure, applications, data and processes create an integrated whole	2121	0.00	0.439	0.389	0.00
2. In our organizations busi-	2294	0.00	0.449	0.380	0.00

ness strategy, business models, operative model and IT architecture create an integrated whole					
3.We develop systematically IT and It management competencies needed in the execution of our business	2797	0.00	0.446	0.318	0.00
4. IT provides value to our business by facilating the development of new innovations and by increasing the efficiency of our business processes	1853.500	0.00	0.376	0.344	0.00
5. We manage IT and develop its management as a strategic means	3025	0.00	0.464	0.289	0.00
6. We align the objectives of our IT activities with our business objectives so that we are able to evaluete how IT impacts the achivement of our business objectives	3432.500	0.00	0.477	0.280	0.00
7. In our organization the selection of IT solutions works smoothly so that business needs are well taken care of	1875	0.00	0.40	0.375	0.00

In the success of IT project outcome, all independent variables had significant difference with IT project outcome ($p<=0.05$). However, there are 6 independent variables which had moderate correlations with the project success. Particularly, IT infrastructure,

applications, data and processes create an integrated whole had a moderate, positive correlation with the success of project outcome, which was statistically significant (r=0.389, p=0.00). This finding is agreed with previous studies that the IT architecture can develop IT systems and new capabilities to help the organizations to quickly respond to increasing market demands and exploit competitive advantages through enhanced IT competency (the Opengroup 2001; Tiwana and Konsynski 2010). IT architecture can help the organizations adapt their development projects to dynamic demands on the market through its fast rearrangement of necessary resources (Tanriverdi et al 2010). The business strategy, business models, operative model and IT architecture create an integrated whole had a moderate, positive correlation with the success of project outcome, which was statistically significant (r=0.380, p=0.00). The result is supported by Tamm et al. (2011) that EA can help software firms to enhance ”operational excellence, customer intimacy, product leadership, and strategic agility”.

In addition, the systematic IT development had a moderate, positive correlation with the success of project outcome, which was statistically significant (r=0.32, p=0.00). This finding is supported by Schach (2007) that modern software practitioners usually select development models to create good product quality and meet customer requirements. Currently, Software firms tend to choose Agile methodologies to meet increasing customer demands, gain improved productivity, enhanced customer involvement and quick responsiveness to the market changes (Gurpreet Singh Matharu et al. 2015). Scrum’s flexibility can help the software projects overcome environment complexity through departmental collaboration, self-managed teams, and daily meeting to meet strategic goals (Rafael E. Landaeta 2011). Furthermore, business and IT manager involvement is an important factor to increase project success (The Chaos Manifesto 2013) because they can contribute to the project team with supports, critical resources, and direction during the project time.

The IT value of business had a moderate, positive correlation with the success of project outcome, which was statistically significant (r=0.344, p=0.00). The finding is supported by previous studies that IT can create new opportunities for the projects with innovation ideas through strategic resource (Earl 1994). In addition, software firms pursuing innovation or process transformation projects usually exploit IT capabilities to improve business processes and gain better positioning and product leadership (Nolan 2005). There was a moderate, positive correlation between IT management with the success of project outcome, which was statistically significant (r=0.31, p=0.00). IT management can assist IT firms to achieve business objectives through proper planning and utilization of IT resources (Raquel Flodström 2006, 49). The IT management can

generate business value through IT capability exploitation such as enhancing value, controlling performance and cost saving (Dirk Buchta et al. 2007, 9).

Finally, the selection of IT solution had a moderate, positive correlation with the success of project outcome, which was statistically significant (r=0.375, p=0.00). Software companies usually build their critical software more than buying to achieve their strategy and competitive advantages (L.E. Canez et al. 2000; G.H. Anthes 2004). The IT solution purchase can help IT firms gain customer satisfaction, new competency from additional expertise, and economy of scale when they have a lack of expertise and efforts for the development (Arats et al. 1995; S. Ulfeder 2003).

Table 6. The IT project performance

	Mann-Whitney U	P Value (2-tailed)	Std. Deviation	Kendall's tau-b correlation	P value (2-tailed)
1. In our organizations IT infrastructure, applications, data and processes create an integrated whole	2229.500	0.00	0.439	0.34	0.00
2. In our organizations business strategy, business models, operative model and IT architecture create an integrated whole	2391	0.00	0.449	0.33	0.00
3.We develop systematically IT and It management competencies needed in the execution of our business	2856.500	0.00	0.446	0.238	0.00
4. IT provides value to our business by facilating the development of new innovations and by increasing the efficiency of our business	2165.500	0.00	0.376	0.229	0.00

processes					
5. We manage IT and develop its management as a strategic means	3466	0.001	0.464	0.259	0.00
6. We align the objectives of our IT activities with our business objectives so that we are able to evaluete how IT impacts the achivement of our business objectives	3935.500	0.005	0.477	0.220	0.00
7. In our organization the selection of IT solutions works smoothly so that business needs are well taken care of	2302	0.000	0.400	0.352	0.00

In the success of IT project performance, all independent variables had significant difference with IT project outcome ($p<=0.05$). However, there are 3 independent variables which had moderate correlations with the project success. Particularly, the IT infrastructure, applications, data and processes create an integrated whole had a moderate, positive correlation with the success of IT project performance, which was statistically significant ($r=0.34$, $p=0.00$). There is a significant evidence to conclude that IT architecture has positive impacts on the total project performance. A well-managed IT architecture actually can help the team complete the projects within specified time and budget through IT efficiency (Kayworth & Chatterjee et al. 2001). This can happen because the technology can improve the efficiency and effectiveness of the team during the implementation (Wixom & Watson 2001). This architecture can improve IT system performance and develop new capabilities to increase IT project competency through componentization (Tiwana & Konsynski 2010) for market competition and business growth. Thus, this finding can conclude that more mature IT architecture becomes, the better success the IT projects can gain.

The factor “Business strategy, business models, operative model and IT architecture create an integrated whole” (EA) had a moderate, positive correlation with the success of IT project performance related to timeliness and business objectives, which was sta-

tistically significant (r=0.33, p=0.00). The EA can help IT projects with reduced cycle time, enhanced performance, and core capabilities for competitive advantages (Ross & Westerman 2004; Bernard 2005; Eetu Niemi 2006). The EA can help the projects reduce complexity, remove resource overlapping and facilitate resource reproduction through standardization (Ross and Westerman 2004). Thus, the IT projects can gain improved efficiency and meet business needs. This finding can conclude that the EA has a positive impact on the total project performance.

The factor "Selection of IT solutions works smoothly so that business needs are well taken care of" had a moderate, positive correlation with the success of IT project performance, which was statistically significant (r=0.34, p=0.00). There is an evidence to conclude that the selection of IT solution has positive impacts on the total project performance. R. Whiting (2003) stated that the outsourcing can reduce cycle time because the firms can focus more efforts on developing core systems and less important functions are shifted to the vendors (G.H. Anthes 2004). Chris Fill (2000) stated that proper buy-or-build option can help software firms deliver increasing business values to their customers and shareholders. Hence, this finding can conclude that the better selection of IT solution becomes, the better success the IT projects can gain.

5 DISCUSSION

The study found some critical factors which can positively impact on many different project success criteria. First, *IT infrastructure, applications, data and processes create an integrated whole* (IT architecture) has positive correlation with achievement of business objective, IT project outcomes corresponding with plans and total project performance. Particularly, IT architecture can contribute with a technical base to develop IT systems which can efficiently maintain and exploit strategic information to quickly respond to the business agility (the open group 2001). This system can improve information sharing across departments (Boh & Yellin 2006) to help project team make better decisions during project phases and gain better customer satisfaction (Bernard 2005; Ross et al. 2006). This integrated information can help the IT projects gain high flexibility for proper technical solutions. Thus, the IT project can better adapt to customer requirement and environment changes for the business growth. In addition, IT architecture can help software projects gain the business objectives through a harmony between IT efficiency and innovation (the open group 2001). This architecture can improve IT system performance and develop new capabilities to increase IT project competency through componentization (Tiwana & Konsynski 2010) as proper development technology will positively impact on the project team's effectiveness and efficiency. Hence, the enhanced IT competency can support business units to develop their new ideas effectively for market competition. Further, the study shows that IT architecture has positive correlation with project timeliness. Well- equipped IT infrastructure can help IT projects to deploy quickly the applications through high flexibility. This can enable the projects to improve its ability of time-to-market.

Secondly, the *Business strategy, business models, operative model and IT architecture create an integrated whole* (EA) has positive correlations with project timeliness, achievement of business objective, project outcomes corresponding with plans, and total project performance. Particularly, EA can enable an enhanced alignment between IT and business (Eetu Niemi 2006, 4). EA can identify interdependencies between different departments to facilitate manager synergies for this strategic alignment and process optimization. Thus, the IT managers can make timely adjustments to keep all project activities in line with the business objectives. Consequently, the business-IT alignment can lead to enhanced organizational performance (Kearns and Lederer 2003; Chan et al. 2006). In addition, Tamm et al. (2011) stated that EA can help IT firms to enhance "operational excellence, customer intimacy, product leadership, and strategic agility" through improved resource complementarity in which the EA enables the organization identify and leverage synergies between IT resources across the organization and

combine these resources in unique way to improve project performance for market competitions. In system development projects, resource availability is vital to the successful project implementation and outcomes. The allocation of adequate resource to the project phases can motivate the development teams to fully commit to the project. Resource availability becomes essential to IT system projects (Wixom & watson 2001). Hence, improved resource complementarity can help IT projects gain business benefits. Acording to Musuka (2006), a high level of operational efficiency can create new capabilities which directly enhance business performance. The strategic agility helps project teams quickly respond to market changes and new initiatives. In software industry, customer demands are increasingly changing due to intensive competition. This becomes a challenge for software firms to meet customer wish. The EA becomes an useful tool to improve customer satisfaction by leveraging synergies among functional departments and reinforcing resource configuration for good quality goal (Tamm et al., 2011). Furthermore, EA has a positive correlation with project timeliness. Particularly, Zachman (2001) stated that the time-to-market is one of the most important reasons for selecting enterprise architecture. Ross & Westerman (2004) stated that EA can build an operating platform which is highly standardized and integrated. The standardization can help the IT projects to gain reduced release time, and improved core capabilities for competitive advantages.

Thirdly, the factor "Selection of IT solutions works smoothly so that business needs are well taken care of" has positive impacts on three out of five project success criteria (business objective, IT project outcomes corresponding with plans and total project performance). L.E. Canez et al. (2000) stated that software companies usually build their strategic software more than buying to achieve their strategy and competitive advantages. Software companies must maintain their core capabilities to create a new product for extensive competition by developing core applications or systems in-house. However, complex systems are only bought if their IT project teams have a lack of expertise and efforts for the development. This helps the projects gain competitive advantages from additional expertise and economy of scale (S. Ulfeder 2003). According to Anthes (2004), companies with deep expertise can build their system with more benefits. They can shift skilled teams to core system development while leaving less important system features to the outsourcing. This solution enables the organizations to gain enhanced quality, and create new competencies for potential growth with an increasing access to additional expertise and strategic business cooperation. Bruce S. Buchowicz (1991) stated that some firms select the build option to achieve competitive advantages over their rivals such as product leadership, and business values. The others select the buy option to secure technical adequacy or the current situation in order to

improve product quality and operational performance. Chris Fill (2000) stated that proper buy-or-build option can help software firms deliver increasing business values to their customers and shareholders.

The factor “Developing systematically IT and IT management competencies needed in the execution of our business “ has a positively significant correlation with “IT project outcomes corresponding with plans”. Schach (2007) stated that software development models provide systematic and organized approaches. Modern software practitioners usually select development models to create good product quality and meet customer requirements. Agile methodologies can enable software companies to meet increasing customer demands, gain improved productivity, enhanced customer involvement and quick responsiveness (Gurpreet Singh Matharu et al., 2015). The Agile methodology can quickly adapt to customer demands through regular feedbacks and fast development (Radha Shankarmani et al. 2012), incremental delivery of working software (Rashmi Popli et al. 2013) and daily meetings to detect problems early as possible (Kaur et al. 2014). The Agile methodology can improve the project productivity by prioritizing activities which directly create values to the organizations (Ashley Aitken & Vishnu Ilango 2012) in each iteration. Currently, many software companies have selected Scrum methodology to manage the developments in different sprints (Gurpreet Singh Matharu et al. 2015, 2). This methodology can help the IT projects gain improved customer satisfaction, productivity, and quick responsiveness through daily meeting, product backlog and sprint backlog. In addition, Scrum’s flexibility can help the projects overcome environment complexity through departmental collaboration, self-managed teams, and daily meeting to meet strategic goals (Rafael E. Landaeta, 2011). Furthermore, the applicability and success of the development models depend largely on IT management competencies. Thus, it is essential to require executive and top manager involvement and good project management skills in order to gain IT management effectiveness and project success. J.M. Nicholas (2005) stated that top managers can provide necessary resources to project managers for better project coordination and performance measurement. Their support and commitment can help the organization perceive better about IT asset capability and limit (Somers & Nelson 2001). Thus, IT-related strategic decisions can be done properly to secure future directions of the organization. The IT executives communicate with all stakeholders about project-related issues to secure IT alignment with business and obtain project support. They also support project activities and take responsibility for project outcomes. Furthermore, project management is an important element to effectively manage IT operation and service delivery. Project managers can take various roles situationally during implementation time to ensure project success (J. Day & M. Bobeva 2003). Particularly, they communicate project goals with their team

and appeal customer support to ensure achievement of business objectives and better performance. They can coordinate and motivate development teams to follow up common goals as well.

The factor ”IT provides value to our business by facilitating the development of new innovations and by increasing the efficiency of our business processes” has a positively significant correlation with “IT project outcomes corresponding with plans”. Particularly, IT can create new chances for the firms through innovation projects (Earl 1994). IT systems can support the project team in discovering and exploiting critical information for competitive advantages and better decisions. IT resource plays an important role in development projects as it supports the business strategy implementation through IT strategy, IT competencies and IT infrastructure (Henderson and Venkatraman 1993, 477). In addition, IT can enable a new business strategy through exploiting IT capabilities. Thus, IT can help software projects produce competitive advantages for the firms such as business process enhancement, productiveness, innovation, and benefits (Kohli & Grover 2008). Aladwani (2000) stated that proper development technology could improve project performance. IT resource can leverage the business agility to support innovation activities and business transformation through IT infrastructure, human capital, and relationships (Agarwal & Sambamurthy 2002). According to Nolan (2005), software firms pursuing innovation or transformation projects usually exploit IT capabilities to improve business processes, gain better positioning and product leadership through harmonizing IT application and standardizing IT infrastructure.

6 CONCLUSIONS

IT project success has become an interesting subject to researchers and practitioners. The main aim of the thesis is to study what are success factors in IT projects and how IT project success factors influence on the overall performance. Data survey was collected with IT barometer research in Finnish data processing association. The past studies have developed lists of project success factors which are essential to IT project management(Craig Standing et al 2006; Iman Attarzadeh 2008; Henrik Brocke et al. 2009; Chaos manifesto 2013). However, these lists indicate that IT projects are diverse and complicated. This complexity makes senior managers hard to understand what common factors can positively impact on IT project success. This study is extendted with organizational aspects and other factors not related to project management domain because there are many reasons which IT project failed and some of them are not related traditional project management. In addition, our study investigates what factors can positively impact on different IT project success specifically related to time, budget, business objectives, total project performance and project outcomes corresponding with plans. This specific investigation has not been done in previous studies which only focused on the general project success. This study lights up important roles of external factors which can positively impact on the IT project success. Thus, this devotes to the accumulation of knowledge for the IT project management.

The study results show some important findings which positively impact on the IT project success in various aspects to answer the first research question which is specifically related to what are success factors in IT projects? Accordingly, the study has an implication that it is important for IT project teams to pay more attentions to three most crtical factors which impact on most of project successes. First, the factor *IT infrastructure, applications, data and processes create an integrated whole (IT architecture)* can help software companies maintain project timeliness during their development implementation, improve their achievement of business objectives to meet increasing customer demands on the market, and gain IT project outcomes as expected to improve project success. Particularly, IT architecture creates high flexibility and new development capabilities for IT project teams during the implementation time to develop proper solutions for dynamic demands, and make better decisions for competitive advanatages and innovations through system intergration and standardization, and enhanced IT competency obtained with an inherent operationg platform.

Second, the factor *Selection of IT solutions works smoothly so that business needs are well taken care* can help IT project teams gain expected outcomes, and business objectives during the development implementation to satisfy company goals. IT project

can achieve these successes in different ways with two popular selections of IT solution in software sector. First, software companies can use their internal expertise to develop proper solutions for core capabilities, innovation and competitive advantages. Second, seninor executives can apply outsourcing strategy to gain IT goals in case of expertise and knowledge shortage for project development. Third, the factor *Business strategy, business models, operative model and IT architecture create an integrated whole* can help IT projects improve their timeliness, achieve business objectives and expected outcomes during the development implementation. This kind of architecture can enable IT projects gain these successes through its flexible capabilities to align different functional departments for comprehensive decision making, reinforce resource complementarity for competitive advantages and innovative solutions, and improve IT efficiency among various IT assets for smooth operation.

Furthermore, the study result found other important factors, which positively impact on project success such as IT project outcomes corresponding with plans and achievement of business objective. The managers should spend more efforts in these factors to improve the project success during the implementation. The research found out the factor ”IT provides value to our business by facilitating the development of new innovations and by increasing the efficiency of our business processes” can help IT projects gain expected outcomes and business objectives. Particularly, software companies exploit IT capabilities to gain business goals, innovation capability and competivtive advantages through IT system standardization and IT application’s harmornization with business ideas within the organization. The factor “Developing systematically IT and IT management competencies needed in the execution of our business “ can help IT projects gain expected outcomes. Particularly, many software firms apply Agile and Scrum methodologies to develop their IT projects effectively in order to gain their business goals, and competive advantages. However, this success only happens if the projects involve enough IT managers and business executives during all development phases to enable effective IT management within the organization for controlling project outcomes. Another important factor ” managing IT and developing its management as a strategic means” can help IT projects achieve business objective. Particularly, IT management can enable IT project teams quickly respond to dynamic demands to achieve business goals and better project performance through strategic alignment and proper resource allocation gained by effective IT management during the implementation time.

The study results found out some important factors which positively impact on total project performance to answer the second research question. First, the factor *IT infrastructure, applications, data and processes create an integrated whole (IT architecture)* can help IT projects gain better total project performance during the implementation

time such as project timeliness and achievement of business objective. A well-structured IT architecture can enable software companies to improve their IT system performance and extend their operation capabilities in order to increase IT project competency. This benefit can enable project team to complete the development implementation in proper time and gain business goals effectively through high flexibility in operation. In addition, the study results show that this factor has a better relationship with project timeliness than achievement of business objective. Thus, IT managers should have a good consideration during the planning and implementation phases towards this factor if IT project goal mainly focuses on project timeliness. Second, the factor *Selection of IT solutions works smoothly so that business needs are well taken care* can help IT project teams improve project success only in aspect of achievement of business objective. IT executives and mamangers should have a comprehensive evaluation on their IT team's capabilities and supportive IT infrastructure during the initial development phases to raise a proper selection of IT solution which can meet business demands effectively. The study findings show that this factor does not have significant correlation with "IT project complete on time and budget" while the prior studies show that buy-or-build decisions can help software firms gain advantages on time and budget. The difference between the study findings and prior literature can stem from development expertise within the organizations and vendors. Particularly, it is costly to fix bugs or rework if the vendors lack of necessary expertise to develop some packages (K. Fowler 2004). Software firms tend to think that the software outsourcing can reduce the development cost. However, many facing various issues related to quality and hidden cost when they did not have good experience with the outsourcing.

Third, the factor *Business strategy, business models, operative model and IT architecture create an integrated whole (EA)* can enable IT project team improve the project performance in aspects of time-to-market and achievement of business objective. The findings show that this factor has a moderate relationship with these successes. Hence, project team should spend more efforts in improving the EA's operation capabilities to maturity level so that it can enable better alignment between IT project activities and business objectives for competitive advanatges. In addition, managers should exploit EA's high standardization to make software release during the implementation time smoothly. The study findings do not show that EA has a significantly moderate correlation with project completed within the specified budget. The difference between the study finding and prior literatures can stem from maturity level of the enterprise architecture within the organizations. The authors stated that reduced IT costs are caused by high level of EA maturity (Aziz and Obitz, 2007; Obitz and Babu K, 2009; TOGAF, 2009; Schmidt and Buxmann, 2010; Tamm et al., 2011).

7 IMPLICATIONS FOR RESEARCH

Our study select a system perspective to develop a list of critical factors through which IT projects can gain their business objectives, expected outcomes, timeliness, and total project performance which are a part of project success. Our list of critical success factors differentiates from the previous researches by focusing on organizational aspects and other factors not belonging to traditional project management area because IT projects failed with various reasons in the past. These factors are related to IT infrastructure, business importance of IT, enterprise architecture, development methodology, IT management, and selection of IT solution. This can enable project managers and senior executives a comprehensive picture of IT project activities and critical factors which can contribute to the project success. This project aspect lights up important roles of external factors which can positively impact on the IT project success. Thus, this devotes to the accumulation of knowledge for the IT project management. This study investigated the mechanism through which IT architecture can impact project success. Particularly, the finding indicates that IT architecture has positively impact on project success such as project outcomes corresponding with plan, business objectives, time efficiency, and project performance. This finding extends previous studies by focusing more intensively on IT architecture capabilities and how it can impact the project success in different manners. The past studies only investigated how IT infrastructure (Chaos manifesto 2013), hardware, software, methods, and tools necessary for project implementation (Wixom & Watson 2001) and data (Somers & Nelson 2001) impact success of development project and performance. These factors only focus on successful technical implementation. Our finding makes a new aspect in development technology by integrating IT infrastructure, applications, process and data as a whole (IT architecture) and investigates how it impact project success in economical aspect, organizational performance and project aspect.

Further, the enterprise architecture has positive impacts on IT project outcomes as plan and achievement of business objectives. The finding extends the past studies related to the importance of IT infrastructure and technology to the project success by integrating business strategy, business model, operating model and IT architecture to discover synergistic relationship among subsystems for project success. The finding also extends Nevo and Wade (2010, 2011) as it concentrates intensively on strategy direction from senior management towards IT project goals through synergies between business departments and IT units to achieve project outcomes and respond quickly to dynamic market. The previous authors mentioned that management can direct the integrated systems to gain synergies.

Furthermore, the study was conducted on surveys collected from senior managers and IT executives in Finnish firms. The majority of research related to IT project planning was done on surveys from the western countries except for Nordic countries. This study extends the literature on IT project planning by carrying out the empirical research in Finland to make a new picture of project planning and its valuable contributions to IT project success in Nordic countries where IT startups have grown fast recently.

8 IMPLICATIONS FOR MANAGEMENT

Our study found that some critical success factors must be considered well enough to ensure achievement of business strategy and expected outcomes. These factors are mainly related to organizational aspects during IT project phases. Senior managers should pay more attention to *IT infrastructure, applications, data and processes create an integrated whole (IT atchitecture)* during project implementation to improve achievement of business objective and expected outcomes because this factor can enable process interoperability and business agility during the project implementation to respond quickly to customer demands and market competition. In addition, top managers should evaluate importance of *Business strategy, business models, operative model and IT architecture create an integrated whole (EA)* during project planning to achieve business objective and expected outcomes through its strategic alignment mechanism. Particularly, it can enable IT projects to gain high responsiveness and better decision-making during the development time. The study indicates that senior executives should spend more efforts in selecting IT solutions in initial project phases to improve achievement of business objective and expected project outcomes. The early selection can enable project teams to meet different business goals and competitive advantages in a responsive way to existing IT competency and resource. In success of total project performance, three critical factors (IT architecture, EA and selection of IT solution) mainly impact on project timeliness and achievement of business objective. Particularly, IT architecture and EA have moderate correlation with two these successes while the selection of IT solution only impacts on the achievement of business objective. Thus, senior managers should utilize these architecture's IT competency and capabilities properly to improve project team's effectiveness so that overlapping resource and obstacle during the implementation can be removed to enable project time-to-market. This success is significantly important for potential growth as it can help software company gain competitive advantages such as product leadership and business profits.

9 LIMITATION

There is a limitation in my research that data was collected in only Finland. The survey respondents are mainly IT managers and business executives who work in corporates and public organizations. Hence, the data is limited within developed western countries. The research only focused on organizational aspects and senior managers perception about IT project performance. In addition, IT project management is mentioned a little in the survey. Hence, this limitation brings project management domain with an opportunity for future research to investigate this study findings with different IT projects across various countries to evaluate their applicability and effectiveness.

REFERENCE LIST

Amrit Tiwana & Benn Konsynski (2010) Complementarities Between Organization IT Architecture and Governance Structure. *Information Systems Re search* , Vol. 21(2), pp. 288–304.

Andy Field (2009) *Discovering Statistics Using SPSS*. Sage Publications, California.

Ani Liza Asnawi, Andrew M. Gravell & Gary B. Wills (2012) Emergence of Agile Methods: Perceptions from Software Practitioners in Malaysia. *IEEE*.

Aladwani, A. M. (2000) IS project characteristics and performance: A Kuwaiti illus tration. *Journal of Global Inform Management*, Vol. 8 (2), 50–57.

Aladwani, A.M. (2002) An integrated performance model of information systems projects. *Journal of Management Information System*, Vol. 19 (1), 185–210.

Ashley Aitken ,Vishnu Lingo (2013) Comparative Analysis of Traditional Software Engineering and Agile Software Development. *46th Hawaii International Conference on System Sciences, 1530-1605*.

Aziz, S., & Obitz, T. (2007) Enterprise Architecture is maturing. Infosys Technolo gies. <http://www.infosys.com/consulting/architectureservices/easurvey/ Documents/ea-survey-summary-07.pdf >, retrieved 5.3.2016.

Baccarini, D. (1999) The Logical Framework Method for Defining Project Success. *Project Management Journal*, Vol. 30 (4), 25-32.

Bharadwaj, A., Sambamurthy, V., & Zmud R. (1999) IT capabilities: theoretical pers pectives and empirical operationalization. *In Paper presented at the 20th international conference on information systems Charlotte*, North Caro lina, United States.

Bernard, S.A. (2005) An Introduction to Enterprise Architecture: Second edition. *Author House, Bloomington*.

Boh, W. & D. Yellin (2006) Using Enterprise Architecture Standards in Managing In formation Technology. *Journal of Management Information Systems,* Vol. 3(23), 163 –207.

Broadbent, M., Weill, P., O'Brien, T., & Neo, B.S. (1996) Firm context and patterns of IT infrastructure capability. In: *Proceedings of the 17th International Conference on Information Systems (ICIS)*, ed. by DeGross-Jarvenpaa-Srinivasan, 174-194.

Bruce S. Buchowicz (1991) A Process Model of Make-vs.-Buy Decision- Making; The Case of Manufacturing Software. *IEEE Transactions on Engineering Management,* Vol.38, No.1, 24-32.

Brynjolfsson, E. & A. Saunders (2010) *Wired for Innovation.* MA: The MIT Press, Cambridge.

Byrd, T.A. (2001) Information Technology, Core Competencies, and Sustained Com petitive Advantage. *Information Resources Management Journal* (14:2), pp.27-36.

Byrd, T.A., & Turner, D.E. (2000) Measuring the Flexibility of Information Technology Infrastructure: Exploratory Analysis of a Construct. *Journal of Manage ment Information Systems* (17:1), pp. 167-208.

Carr, N. G. (2003) IT Doesn't Matter. *Harvard Business Review* (81:5), pp. 41-49.

Chan, Y.E., R. Sabherwal, & J.B. Thatcher (2006) Antecedents and Outcomes of Stra tegic IS Alignment: An Empirical Investigation. *IEEE Transactions on Engineering Management,* (51)3, pp. 27–47.

Chris Fill (2000) The Outsourcing dilemma: A composite approach to the make or buy decision. *Magement Decision*, Vol 38 (1), 43-50.

Clancy, T. (1994) The Chaos Report 1994. Standish Group. <https://www.standishgroup.com/sample_research_files/chaos_report_1994.pdf >, retrieved Feb 20th, 2008.

Collyer, S. & Warren, C. M. (2009) Project management approaches for dynamic envi ronments. *International Journal of Project Management*, vol. 27 (4), 355 - 364.

Cooke, D., Gelman, L., Peterson, W.J. (2001) ERP Trends. In: *The Conference Board*, pp. 1-28.

Craig Standing, Andrew Guilfoyle, Chad Lin & Peter E.D. Love. (2006) The attribution of success and failure in IT projects. *Industrial Management & Data Systems,* Vol. 106 (8), 1148-1165.

Day, J. & Bobeva, M. (2003) Successful IS project leaders: a situational theory perspec tive. *Electronic Journal of Information Systems Evaluation*, Vol. 6 (2), 75-86.

DeLone, W. H. (1988) Determinants of success for computer usage in small business. *MIS Quarterly*, Vol. 12 (1), 51–61.

Deephouse, C., Mukhopadhyay, T., Goldenson, D. R. & Kellner, M. I. (1995) Software processes and project performance. *Journal of Man agement Information Systems*, Vol. 12 (3), 187-205.

Dirk Buchta et al. (2007) *Strategic IT Management: Increase value, control performance, reduce costs*. Spinger Gabler, 2nd edition.

Dos Santos B.L., Peffers, K. & Mauer, D.C. (1993) The Impact of Information Tech nology Investment Announcements on the Market Value of the Firm. *Information Systems Research* (4:1), pp. 1-23.

Duncan Haughey (2011) Understanding the Project Management Triple Constraint. <https://www.projectsmart.co.uk/understanding-the-project-management-triple-constraint.php>, retrieved 9.3.20015.

Dvir, D., Raz, T. & Shenhar, A. (2003) An empirical analysis of the relationship be tween project planning and project success. *International Journal of Project Management*, Vol. 21 (2), 89-95.

Earl, M. J. & Feeny, D. F. (1994) Is Your CIO Adding Value? *Sloan Man agement Re view*, Vol. 35 (3), 11-20.

Eetu Kupiainen, Mika V. Mäntyla, & Juha Itkonen (2015) Using metrics in Agile and Lean Software Development – A systematicliterature review of industrial studies. *Information and Software Technology,* Vol. 62 (1), 143–163.

Eetu Niemi (2009) Enterprise Architecture Benefits: Perceptions from Literature and Practice. In: *the Proceedings of the 7th IBIMA Conference Internet & Information Systems in the Digital Age*, Brescia, Italy.

Ernst and Young Survey (2009). <http://www.ey.com/cz>, retrieved 15.8.2014.

Evans, J. D. (1996) Straightforward statistics for the behavioral sciences. *Pacific Grove*, CA: Brooks/Cole Publishing.

Fergis, K. (2012) The Impact of an Agile Methodology on Software Developoment Costs. <http://repository.upenn.edu/cgi/viewcontent.cgi?article=2017&context= cis_reports >, retrieved 15.10.2014.

French Scrum User Group 2009. A National Survey on Agile Methods in France. <http://www.frenchsug.org>, retrieved 9.6.2015.

G.B. Davis (1988) Commentary on information systems: to buy, build, or customize?. *Accounting Horizons*, Vol. 2 (1), 101–103.

Gray C.F. & Larson E.W. (2008) *Project Management: The Managerial Process* (4th ed). Irwin/McGraw-Hill, NewYork.

G.H. Anthes (2004) Roll your own. *Computerworld*, Vol. 38 (31), 29–30.

Gregor, S. D. Hart, and N. Martin (2007). Enterprise Architectures: Enablers of Busi ness Strategy and IS/IT Alignment in Government. *Information Technol ogy & People*, Vol. (20)2, pp. 96–120.

Grover S. Kerans & Rajiv Sabherwal (2007) Strategic Alignment Between Business and Information Technology: A Knowledge-Based View of Behaviors, Out

come, and Consequences. *Journal of Management Information Systems,* Vol.23, 129-162.

Gurpreet S. Matharu & Anju Mishra (2015) Empirical Study of Agile Software Devel opment Methodologies: A Comparative Analysis. *ACM SIGSOFT Soft ware Engineering.*

Gupta, U.G. and Gupta, A. (1992), "Outsourcing the IS function: is it necessary for your organisation?", *Information Systems Management*, Summer, pp. 44-50.

Henderson, J.C. and N. Venkatraman (1993) Strategic Alignment: Leveraging Infor mation Technology for Transforming Organisations. *IBM Systems Jour nal* (32)1, pp. 4–16.

Henrik Brocke, Falk Uebernickel, and Walter Brenner (2009) Success Factors in IT-Projects to Provide Customer Value Propositions. *20th Australasian Conference on Information Systems*, Melbourne.

IBM (2008). Making work change. <https://www07.ibm.com/au/pdf/making_change_work.pdf>, retrieved 19.9.2015.

Iman Attarzadeh and Siew Hock Ow (2008) Project Management Practices: Success versus Failure, *IEEE*.

Inge Hanschke (2010) *Strategic IT management, " A Toolkit for Enterprise Architecture Management"*, Springer -Verlag Berlin Heidelberg.

J. M. Verner and N. Cerpa. Australian Software Development: What Software Project Management Practices Lead to Success?, *Proceedings of the 2005 Aus tralian Software Engineering Conference (ASWEC'05).*

J. N. Luftman, P. R. Lewis, and S. H and Oldach, "Transforming the enterprise: The alignment of business and information technology strategies ," *IBM Sys tem Journal*, vol. 32, no. 1, pp. 198-221, 1993.

J.M. Nicholas. *Project management for business and technology*. New Delhi: Prentice-Hall inc., 2005.

Janssen, M. and K. Hjort-Madsen (2007) Analyzing Enterprise Architecture in National Governments: The Cases of Denmark and the Netherlands. *Proceedings of the 40th Hawaii International Conference on System Sciences* , p. 218a.

K. Fowler, Build versus buy, *IEEE Instrumentation & Measurement* 7 (3) (2004) 67–73.

K. Schwalbe, *Information Technology Project Management*, 4th edition, Delhi, Baba Barkha Nath Printers, 2006.

Karimi, J., Somers, T. M., & Gupta, Y. P. (2001) Impact of information technology management practices on customer service. *Journal of Management In formation Systems*, 17, 125–158.

Kayworth, T.R., Chatterjee, D., and Sambamurthy, V. Theoretical Justification for IT Infrastructure Investments. *Information Resource Management Journal* (14:3), July-September, 2001, pp .5-14.

Kearns, G.S. and A.L. Lederer (2003) A Resource-Based View of Strategic IT Align ment: How Knowledge Sharing Creates Competitive Advantage. *Deci sion Sciences* (34)1, pp. 1–29.

KIM, C. S. AND PETERSON, D. K. 2003. A comparison of the perceived importance of information systems development strategies by developers from the United States and Korea. *Inform Resources Manag Journal*.16, 1, 1–18.

Kohli, R., and Grover, V. 2008. "Business Value of IT: An Essay on Expanding Re search Directions to Keep up with the Times. *Journal of the Association for Information Systems*, Vol. 9 Issue 2 pp. 23-39 January 2008

Kerzner, H. Project Management: *A Systems Approach to Planning, Scheduling, and Controlling*. Van Nostrand Reinhold, United States of America, 1995.

Kim, G., Shin, B., Kim, K. K., & Lee, H. G. (2011) IT capabilities, process-oriented dynamic capabilities, and firm financial performance. *Journal of the As sociation for Information Systems*, 12, 491–492.

KPMG (2013) Project Management Survey Report 2013: Strategies to capture business value. <https://assets.kpmg.com/content/dam/kpmg/pdf/2013/07/KPMG-Project-Management-Survey-2013.pdf>, retrieved 9.1.2014.

L.E. Canez, K.W. Platts, D.R. Probert, Developing a framework for make-or-buy de cisions, *International Journal of Operations & Production Management* 20 (11) (2000) 1313–1330.

Lewis, J.P. *Project Planning, Scheduling, and Control: A Hands-On Guide to Bringing Projects in On Time and On Budget*, The McGraw-Hill Companies, Inc., USA, 2001.

McKinsey (2009) Delivering large-scale IT projects on time, on budget and on value. <https://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/delivering-large-scale-it-projects-on-time-on-budget-and-on-value>, retrieved 9.9.2015.

Li Jiang and Armin Eberlein. Towards A Framework for Understanding the Relation ships between Classical Software Engineering and Agile Methodologies. *ACM*, 2008.

Miller, D. (1986) Configurations of Strategy and Structure: Towards a Synthesis. *Stra tegic Management Journal* (7)3, pp. 233 –249.

Musuka, P. (2006) Alignment of IT strategy with Business Strategy: Impact on IT Eff ectiveness and Business Performance (Doctoral dissertation, School of Business Leadership University of South Africa In partial fulfillment of the Requirements for the master degree in business leadership, Universi ty of South Africa).

Mohd Hairul Nizam Nasir & Shamsul Sahibuddin (2011) Critical success factors for software projects: A comparative study. *Scientific Research and Essays* Vol. 6(10), pp. 2174-2186.

Mohd Sadiq & Tanveer Hassan (2014) An extended Adaptive Software Development Process Model, *IEEE*.

M, Hue, 1. Varner, L. Zhu, and M, A. Babar, "Software quality and Agile Methods," *Pros,28th Annual International Computer Software and Applications Conference (COMPSAC'04*), pp., 520-525,2004.

M. Slinger, S. Broderick, *The Software Project Manager's Bridge to Agility*, Addison Wesley, 2008.

Nachiappan Nagappan, Andrew Begel, Brendan Murphy. Have Agile Techniques been the Silver Bullet for Software Development at Microsoft? *ACM / IEEE International Symposium on Empirical Software Engineering and Meas urement*, 2013.

Nevo, S., & Wade, M. (2011) Firm-level benefits of IT-enabled resources: a conceptual extension and an empirical assessment. *Journal of Strategic Information Systems*, 20, 403–418.

Nevo, S., & Wade, M. R. (2010) The formation and value of IT-enabled resources: an tecedents and consequences of synergistic relationships. *MIS Quarterly*, 34, 163–183.

Ofer Zwikael & Shlomo Globerson. From Critical Success Factors to Critical Success Processes. *International Journal of Production Research*, Vol. 44, No. 17, 1 September 2006, 3433–3449.

Pawanpreet Kaur, and Sumit Sharma. Agile Software Development in Global Software Engineering. *International Journal of Computer Applications* (0975 – 8887) Volume 97– No.4, July 2014.

Pereira, C.M. and P. Sousa (2004) "A Method to Define an Enterprise Architecture Us ing the Zachman Framework ", *Proceedings of the 2004 ACM Symposi um on Applied Computing*, pp. 1366 –1371.

P Hung, G.C. Low, Factors affecting the buy vs build decision in large Australian or ganizations, *Journal of Information Technology* (2007) 1–14.

PIPC: Global Project Management Survey (2005). <http://www.pmportal.co.uk/uploads/documents/PIPCSurvey.pdf>, re trieved 10.972013.

Pilar Rodriquez et al. Survey on Agile and Lean Usage in Finnish Software Industry. *ACM*, 2012.

PMI (2008) A Guide to The Project Management Body of Knowledge . PMBOK Guide, Fourth Edition. <https://www.works.gov.bh/English/ourstrategy/Project%20Management/Documents/Other%20PM%20Resources/PMBOK GuideFourthEdition_protected.pdf> , retrieved 9.4.2015.

Porter, M.E. (1996) What Is a Strategy? *Harvard Business Review* (74)6, pp. 61 –78.

Posten, R. M. (1985), 'Preventing software requirements specification errors with IEEE 830', IEEE Software, vol. 2, no. 1, 83-86.

Project Management Institute, Inc., *A Guide to the Project Management Body of Knowledge (PMBOK Guide)*, 4th ed. (Newtown Square, PA: Project Management Institute, Inc., 2008), 6.

Preeti Rai & Saru Dhir. Impact of Different Methodologies n Software Development Process. *International journal of computer science and information tech nologies*, Vol. 5 (2), 2014, 1112-1116.

Quinn, J.B., Doorley, Th.L. and Paquette, P.C. (1990), "Beyond products: services-based strategy", *Harvard Business Review*, March/ April, pp. 58-68.

R. Kelley, Build v. buy: when the going gets tough, do the tough go shopping or buil ding?, *Insurance & Technology* 17 (1) (1992) 28–32.

Radha Shankarmani, Renuka Pawar, S. S. Mantha and Vinaya Babu. Agile Methodolo gy Adoption: Benefits and Constraints. *International Journal of Compu ter Applications* (0975 – 8887) Volume 58– No.15, November 2012.

Rafael E. Landaeta, Stacia Viscardi, and Andreas Tolk. Strategic Management of Scrum Projects: An Organizational Learning Perspective. *IEEE Int'l Technology Management Conference*, 2011.

Raoul Vallon, Bernardo José da Silva Estácioc, Rafael Prikladnickic and Thomas Grechenig. Systematic literature review on agile practices in global soft ware development. *Information and Software Technology* 96 (2018) 161–180.

Rashmi Popli1, Anita and Nareshchauhan "Mapping of Traditional Software Develop ment Methods to Agile Methodologies".

R., D. Rijsenbrij, O. Truijens and H. Goedvolk Maes, "Redefining Business–IT Align ment Through A Unified Framework ," in *Proceedings of the Universi teit Van Amsterdam*, 2000.

R.G. Ghattas and S.L. McKee, *Practical project management*, New Delhi: Dorling Kindersly (India) Pvt. Ltd, 2008.

Raquel Flodström (2006) A Framework for the Strategic Management of Information Technology. *Department of Computer and Information Science of Lin köpings university*. Gabler, 2nd edition April 2007

Richard Berntsson-Svensson and Aybüke Aurum. Successful Software Project and Products: An Empirical Investigation, *ISESE'06*, September 21–22, 2006, Rio de Janeiro, Brazil.

Richard Nolan & F.Warren McFarlan (2005) Information Technology and the Board of Directors. *Harvard Business Reiview*.

Richardson, G., B. Jackson, and G. Dickson (1990) A Principles-Based Enterprise Ar chitecture: Lessons from Texaco and Star Enterprise. *MIS Quarterly* (14)4, pp. 385 –403.

Ritu Agarwal & V. Sambamurthy. Principles and models for organizing the IT function. *MIS Quarterly Executive* Vol. 1 No. 1, march 2002.

Robert N. Charette (2005) Why Software Fails: We waste billions of dollars each year on entirely preventable mistakes. *IEEE Spectrum*.

Ross, J.W. (2003) Creating a Strategic IT Architecture Competency: Learning in Stages. *MIS Quarterly Executive* (2)1, pp. 31–43.

Ross, J.W. and G. Westerman (2004) "Preparing for Utility Computing: The Role of IT Architecture and Relationship Management", *IBM Systems Journal* (43)1, pp. 5–19.

Ross, J.W., P. Weill, and D.C. Robertson (2006) *Enterprise Architecture As Strategy: Creating a Foundation for Business Execution*, Boston, MA: Harvard Business School Press.

Royal Academy of Engineering and the British Computer Society (2004) The Challeng es of Complex IT Projects. *The Royal Academy of Engineering*.

Rukshan C. Jayawardena & Mangala R. Perera (2010) Project success factors for In formation Technology (IT) related solution deployments; a study con ducted for Sri Lankan IT vendors. *IEEE*.

R. Whiting, Money machines, *InformationWeek* (962) (2003) 34–44.

S. Ulfeder, Buy! No, Build!, *Computerworld* 37 (22) (2003) 39–40.

Sabherwal, R. and Y.E. Chan (2001) Alignment Between Business and IS Strategies: A Study of Prospectors, Analyzers, and Defenders. *Information Systems Research* (12)1, pp. 11 –33.

Sauer C, Cuthbertson C (2003) The State of IT Project Management in the UK 2002-2003. *Computer Weekly*, 15 April, pp. 1-82.

Scott Ambler 2014, 2011 IT Project Success Rates Survey. <http://www.ambysoft.com/surveys/success2011.html>, retrieved 9.4.2015.

S. Kurokawa, Make-or-buy decisions in R&D: small technology based firms in the Uni ted States and Japan, *IEEE Transactions on Engineering Management* 44 (2) (1997) 124–134.

Schach, S. 2007. *Software Engineering*, Tata McGraw Hill, Ed.7, 4-6.

Segars, A.H. and V. Grover (1996). Designing Company-Wide Information Systems: Risk Factors and Coping Strategies. *Long Range Planning* (29)3, pp. 381–392.

Shenhar, A. J. (2001), 'One size does not fit all projects: exploring classical contingency domains', *Management Science*, vol. 47, no. 3, 394-414.

Shenhar, A., Levy, O., & Dvir, D. (1997). Mapping the dimensions of project success. *Project Management Journal*, 28(2), 5–13.

Simons CL, Parmee IC, Coward PD (2003) 35 Years on: to what Extent has Software Engineering Design Achieved its Goal? *IEE ProcSoftware*., 150(6): 337-350.

Spewak, S.H. and S.C. Hill (1992). *Enterprise Architecture Planning: Developing a Blueprint for Data, Applications, and Technology*. Hoboken, NJ: John Wiley & Sons.

Schmidt, C., & Buxmann, P. (2010) Outcomes and success factors of enterprise IT ar chitecture management: empirical insight from the international financial services industry. *European Journal of Information Systems*, 20(2), 168-185.

Steve Easterbrook, "Software Lifecycles", *University of Toronto Department of Com puter Science*, 2001.

Standish Group (1995) Chaos 1995. <https://www.projectsmart.co.uk/white-papers/chaos-report.pdf>, retrieved 9.8.2014.

Standish Group (2013). CHAOS Manifesto 2013: Think Big, Act Small. <http://versionone.com/ assets/img/files/ChaosManifesto2013.pdf>, re trieved 5.7.2015.

Swink, M. (2003) Completing projects on-time: how project acceleration affects new product development. *Journal of Engineering and Technology Manage ment*, 20(4), 319-344.

The Standish Group Report (2011). <www.controlchaos.com/storage/S3D% 20First%20Chapter.pdf.CHAOS report>, retrieved 5.7.2015.

The Open Group. The Open Group Architecture Framework, Version 9, 2009. <http://www.opengroup.org/architecture/togaf9-doc/arch/index.html>, retrieved 5.7.2015.

T. M. Somers, K. Nelson, "The Impact of Critical Success Factors across the Stages of Enterprise Resource Planning Implementations," in *Proceedings of the 34th Hawaii International Conference on System Sciences*, Hawaii, 2001.

Tanriverdi, H. A. Rai and N Venkatraman (2010) Reframing the dominant quests of information systems strategy research for complex adaptive business systems. *Information Systems Research*, Vol 21 No 4, 2010.

T. Rands. The key role of applications software make-or-buy decisions. *Journal of Stra tegic Information Systems* 1 (4) (1992) 215–223.

The Opengroup. The Business Executive's Guide to IT architecture. <http://www.opengroup.org/public/arch/p1/oview/>, retrieved 9.3.2014.

The Standish Group. The Standish Group Report 1994. <https://www.standishgroup. com/sample_research_files/chaos_report_1994.pdf>, retrieved 20.2. 2014

Thomas, M.; Jacques, P. H.; Adams, J. R. & Kihneman-Woote, J. (2008), 'Developing an effective project: planning and team building combined', *Project Management Journal*,, vol. 39, no. 4, 105-113.

Toomas Tamm, Peter B. Seddon, Graeme Shanks, and Peter Rebnolds. How Does En terprise Architecture Add Value to Organisations? *Communications of the Association for Information Systems*, Volume 28, Article 10, pp. 141-168, March 2011.

Unnati S. Shah. An Excursion to Software Development Life Cycle Models: an Old to Ever-growing Models. *ACM SIGSOFT Software Engineering*, January 2016 Volume 41 Number 1

8th Annual State of Agile Survey 2013. Versionone. <http://www.versionone.com /pdf/2013-state-of-agile-survey.pdf>, retrieved 9.4.2015.

Waters, K. (2014). Agile Methodologies. <http://www.allaboutagile.com/agile-methodologies>, retrieved 9.4.2015.

Venkatesh, V. et al. (2007) Enterprise Architecture Maturity: The Story of the Veterans Health Administration. *MIS Quarterly Executive* (6)2, pp. 79– 90.

Wade, M., & Hulland, J. (2004) Review: the resource-based view and information sys tems research: review, extension: and suggestions for future research. *MIS Quarterly*, 28, 107–142.

Wang, Y.-R. & Gibson, G. E. (2008) A study of preproject planning and project success using ANN and regression models, in *'The 25th International Symposium on Automation and Robotics in Construction'*. ISARC, 688--696.

Winkleman, M., Dole D., Pinkard, L., Molloy, J. et al. (1993) "The outsourcing source book", *Journal of Business Strategy*, Vol. 14 No. 3, May/June, pp. 52-6.

Wixom, and Watson, H. J. (2001) An empirical investigation of the factors affecting data warehousing success. *MIS Quarterly*, Vol. 25, 1, 17–41.

Y. E. Chan, Sid L. Huff, Donald W. Barclay, and Duncan G. Copeland, "Business Stra tegic Orientation, Information Systems Strategic Orientation, and Strate gic Alignment ," *Information Systems Research*, vol. 8, no. 2, pp. 125-150, June 1997.

Yetton, P., Martin, A., Sharma, R., and Johnston, K. (2000) A model of information systems project performance. *Inform. Syst*. J. 10, 4, 263–289.

Yang Yun-tao, WANG Run-xiao, LI Tao. (2010) Relations of Enterprise's IT Re sources, IT Capability and Sustainable Competitive Advantage: An Em pirical Study. *IEEE*.

Zhang, M., & Sarker, S. (2008) Unpacking the effect of IT capability on the performan ce of export-focused SMEs: a report from China. *Information Systems Journal*, 18, 357–380.

Zwikael, O. (2009) The relative importance of the PMBOK® Guide's nine Knowledge Areas during project planning. *Project Management Journal*, vol 40, 94--103.

Zwikael, O. & Globerson, S. (2006) 'Benchmarking of project planning and success in selected industries', Benchmarking: *An International Journal*, vol. 13, no. 6, 688-700.