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Stevan Dedijer
1911-2004

On the 10th anniversary of JISIB: Reflection on academic tribalism

This is volume number 10, meaning JISIB has published articles in intelligence studies for ten consecutive years. We have addressed the changes in the discipline during these years in articles and notes. I want to share with you another reflection.

This year I am a reviewer and a member of the organizing committee of two similar conferences. The first is the CI2020, a conference on collective intelligence with participants from many larger and well-known universities. The second is the ICI2020, this year with a focus on collective intelligence and foresight. There are many more conference and journals presenting and publishing on similar topics simultaneously, but in different networks. Science as a whole—the advancement of knowledge for the benefit of all mankind— would most likely be better off if at least some of these groups merged. That was also my impression when reviewing the extended abstracts for these two conferences. I also tried to see if members of the CI2010 conference would consider joining the other, but that seemed more difficult than first imagined. This is also about ownership and identity, which is not an entirely unfamiliar idea. The consequences of these tendencies are not favorable for the objects we study.

The unnecessary division of networks that look at the same phenomenon is sometimes referred to as "academic tribalism." Academic tribes become a barrier to learning and this can result in close-mindedness[1]. This is also according to my own experience. Academic clustering is a similar mechanism whereby graduates from one institution favor those who come from the same institution, but there are also those universities that systematically refrain from this. Among these is Harvard University, which seldom hires their own PhDs, or so I have been told. If so, that is probably better for the progress of science.

Where is it meaningful to draw a line between academic groups then? Everyone will agree that the natural sciences are quite different from the humanities. Between psychology and business though there is much overlap with psychology in business. Between accounting and management, a good understanding of how to manage a business requires the knowledge of income statements, balance sheets and how to set up a cash flow analysis. One way to think about division is if the method is different. According to this criterion most social scientists should be able to do each other's work, and subsequently go to each other's conferences. Another meaningful division is based on experience and the depth of specialization obtained by the discipline. This criterion is less precise. I do not pretend to have the answer, but I think it's a pity that all these tribes exist, with their own buzzwords often studying more or less the same phenomenon, with the same methods.

What distinguishes intelligence studies from other tribes is, in my opinion, first of all that we see that the private organization is better organized as an intelligence organization, with focus on information gathering and analysis. It has less to do with departments of marketing, HR or accounting, even though the one does not exclude the other. Another way is to see the intelligence organization as a superstructure, a layer that exists above all functional departments where the aim is to achieve a competitive advantage through better information. In this respect the need for CEOs is not unlike those of ministers of state. Now, is this perspective so radically different that it deserves its own tribe with its own journal and conferences? That is the important question. And in some way, I cannot help but think that learning would be better without them, that is, it would be better if it was all one big interchangeable group, going to one another's conferences, and writing for each other's journals. Science would benefit from it. From time to time I have also peeked over into other groups and joined their conferences. What is astonishing especially for an outsider is that you are immediately confronted with a pecking order that

[1] Rogers, S. L., & Cage, A. G. (2017). Academic Tribalism and Subject Specialists as a Challenge to Teaching and Learning in Dual Honours Systems; a Qualitative Perspective From the School of Geography, Geology and the Environment, Keele University, UK. *Journal of Academic Development and Education*, (8).

is related to who has been there the longest and published the most in the group. This cannot be an advantage for the advancement of science, I tell myself. But, then again, pecking orders seems to be the rule rather than the exception for most social creatures, not only chicken.

The first article by Nasullaev et al., entitled "Technology intelligence practices in SMEs: evidence from Estonia," is on operationalization of technology intelligence practices by small firms in catching-up economies. Their analysis reveals that elements of technology intelligence in large and small companies are similar. Furthermore, they conclude that there is no unique set of technology intelligence.

The second article by Nguyen entitled "The effects of cross-functional coordination and competition on knowledge sharing and organisational innovativeness: A qualitative study in a transition economy" reveals the potentially significant effect of coopetition (i.e., the simultaneous coordination and competition) on the degree of knowledge sharing between marketing and other departments in business organisations. The enhanced knowledge sharing can, according to author, positively improve organisational innovativeness.

The third article by Hendar et al. entitled "Market intelligence on business performance: the mediating role of specialized marketing capabilities" integrates market intelligence dimensions and one dimension of marketing capabilities, i.e. specialized marketing capabilities (SMC), into an empirical model to try to gain a deeper understanding of the relationship between market intelligence and SMC and how these factors shape business performance (BP). The study suggests that owners or managers of SMEs recognize that important market intelligence factors are increasing SMC and BP. This helps them make better investment decisions in developing the right combination SMC to increase BP.

The fourth article, by Zafary, is entitled "Implementation of business intelligence considering the role of information systems integration and enterprise resource planning". It shows the value of integrated information systems and enterprise resource planning in the success of business intelligence implementation. The author concludes that organizations should pay more attention to their working processes to improve business intelligence success.

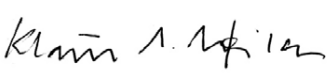
The fifth and last article is an opinion piece by Barnea. The title is "How will AI change intelligence and decision making?" In the article Barnea argues that with increased attention on artificial intelligence (AI) capabilities, the value of the human factor will not become redundant but rather improve its use. Furthermore, in the future AI will be significant to analysis and predictions in advance of competitors' moves and delivering early warning signals of threats both in the private sector as well as in state services.

In the last issue of JISIB we said we were looking forward to a meeting in Bad Nauheim for the ICI2020. Now due to the Corona pandemic the conference will be held online, but we still hope to see you, on video camera, that is.

As always, we would above all like to thank the authors for their contributions to this issue of JISIB. Thanks to Dr. Allison Perrigo for reviewing English grammar and helping with layout design for all articles.

On behalf of the Editorial Board,

Sincerely Yours,



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Technology intelligence practices in SMEs: Evidence from Estonia

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ABSTRACT Technology intelligence is regarded as a strategic tool to support open innovation to identify promising niches of technologies, opportunities and threats, potential partners, future customers and markets. However, it has often been neglected by SMEs due to their constraints in money, time, skills and competences. Hitherto, the literature documented very few cases of the operationalization of technology intelligence practices by small firms of catching-up economies. To remedy this gap, this paper investigates the case of three Estonian SMEs in the manufacturing, information technology and life-sciences industries. Our analysis reveals that elements of technology intelligence in large and small companies are similar. The three medium and small sized companies investigated in this study adopted these elements to their specific context orchestrating their organizational and cultural characteristics. This study details these elements and allows us to understand more precisely the process underlying the phenomenon of technology intelligence in small companies. The major finding of this paper is that a unique set of technology intelligence does not exist. It is important to tailor different elements of technology intelligence to determined needs. It is crucial in the case of SMEs in order to address the limitations mentioned above.

KEYWORDS Case study, catching-up economies, technology intelligence, SMEs

1. INTRODUCTION

Although the role of large companies in innovation is prominent, smaller firms are of growing importance for industry R&D and thus for economic growth. Their positive impact on countries' economic well-being through job and wealth creation stimulates innovation, making them an engine of social and economic development. Small and medium sized enterprises (SMEs) generally have to cope with the constraints of size, financial resources, time and personnel (Acs and Audretsch, 1988; Rothwell and Dodgson, 1993; Freel, 2000). Unstructured processes of innovation, poorly defined internal capabilities and scant opportunities to hire the "best people" hinders SMEs to innovate and access new ideas (De Toni and Nassimbeni 2003; Parida et al., 2012; Bianchi et al., 2010). These restrictions compel SMEs to collaborate with other firms, particularly larger companies, customers, suppliers and research institutions. By accessing partner's technological competences, SMEs compensate for their limitations. Flexibility, adaptability, reduced bureaucracy and the risk-taking advantages of SMEs facilitate the benefit of such collaborations (Vossen, 1998; Laursen and Salter). Thus, open

innovation is a promising remedy to overcome challenges, to develop new sources of income, and to reach more profitable positions in the competitive landscape (Gassmann et al., 2010; Vanhaverbeke et al., 2012; Edwards et al., 2005; Lee et al. 2010). In order to benefit from open innovation, SMEs need technology intelligence. An integration of systematic technology intelligence to decision-making processes can allow firms to monitor technological trends and the latest developments, to identify potential threats, to analyse competitor movements, to find new products, processes or collaboration opportunities. Thereby, using technology intelligence is becoming more and more important in the open innovation paradigm to observe the external environment, to tap into and benefit from external sources of knowledge and to create innovation competences. Hitherto, much of the literature mainly discussed how large and multinational companies implement technology intelligence practices (Lichtenthaler 2006; 2007; Mortara et al., 2008; 2009; Porter, 2005; Arman and Foden, 2010). Considering the fact that SMEs are different from their larger counterparts in many aspects, as stated above, these studies don't provide solutions for SMEs. At the same time, little is known about how SMEs operationalize technology intelligence practices. Savioz (2004) delineated two gaps related to technology intelligence in SMEs. First, there is no detailed investigation on technology intelligence in SMEs in the literature and secondly, the general literature on technology intelligence does not explore the case of small firms. Kilic et al. (2016) called for further contributions to answer the question: "How can SMEs perform technology intelligence more effectively and efficiently". There is still uncertainty in the literature on this question, if all methods and approaches of technology intelligence experienced by large firms are also applicable for SMEs (Stonehouse and Pemberton, 2002; Vishnevskiy et al., 2015). Battistella et al. (2015) argued that SMEs face difficulties in implementing technology intelligence tools and methodologies simply because they are not designed for such firms. More research is needed to find customization strategies. The available literature in technology intelligence evidences that many of the contributions are devoted to technology-based manufacturing firms. Similar studies that investigate the case of companies in the service sector are recommended by Ranjbar & Tavakoli (2015) and Khosropour et al. (2015). In addition, previous research documented poor innovation performance and different structures of SME R&D in catching-up economies comparing to developed countries (Zerka, 2010; Vrgovic et al, 2012; Shi et al., 2016). Vedina and Baumane (2012) stated that, compared with the EU average, SMEs in catching-up economies are lagging behind in terms of several innovation indicators, such as the creation of new knowledge, application of this knowledge in society and intellectual property rights protection. A recent extensive literature review by Manzini and Nasullaev (2017) proposed the necessity of further investigations of technology intelligence process in SMEs of catching-up economies. This study will contribute to the literature by bringing evidence from SMEs of catching-up economies. In doing so, we aim to understand how technology intelligence practices in small companies are organized. The results of this study will allow us to more precisely understand the process underlying the phenomenon of technology intelligence. In particular, this paper helps us to reveal the major issues of technology intelligence faced by SMEs and the best practices that we can learn from them. This paper is structured as follows: in the second section we discuss technology intelligence literature from a general perspective and from the perspective of SMEs. The third section describes the research setting. In the fourth section we detail our empirical case study with three Estonian firms in the manufacturing, IT and life-sciences industries. And finally, the last section discusses the main findings of this study and our conclusion.

2. LITERATURE REVIEW

2.1 Technology intelligence: a general perspective

There are many published studies in technology intelligence, as understanding technological changes and their consequences to the activity of companies has always been important. According to Kerr et al. (2006) technology intelligence is "capturing and delivering technological information as part of the process to develop an awareness of technology threats and opportunities". The classical form of this term is "technical intelligence", a process used to collect or analyze information about the broad range of

foreign science, technology, and weapon systems (Ashton and Stacey, 1995; Kostoff, 1993). Ashton and Klavans (1997) believe that technology intelligence provides decision-makers with actionable results that will produce business assets. Implementing technology intelligence activities systematically ensures companies will master technological discontinuities and integrate intelligence results into decision-making in order to maintain a competitive edge. Lichtenthaler (2004; 2007) explained the failure of the companies due to the organizational inertia, managerial incompetence, lack of financial resources and insufficient technology intelligence. Therefore, many authors called for a systematic organization of technology intelligence already from early 1970s (Utterback and Brown, 1975; Brockhoff, 1991; Ashton and Stacey, 1991; 1995). For instance, Jain (1984) stated that in order to maximize their efforts and opportunities, and allocate resources to the foreseen future, companies need a systematic and more intensified approach of environmental scanning and it should be directed by the goal, focus and the scope of the companies. The author delineated four phases of scanning activities: 1) the primitive phase (scanning without any effort), 2) the ad-hoc phase (company realizes the importance of scanning and undertakes steps to understand some specific events), 3) the proactive phase (unstructured activities) and 4) the reactive phase (planned, structural and intensive approach). However, early identification of emerging threats or opportunities may not solely be enough; it is also important to respond quickly to these changes (Ansoff, 1980). As it was highlighted by Rupert Murdoch: "The world is changing very fast. Big will not beat small anymore. It will be the fast beating the slow." In this vein, the literature evolved by making advances in different aspects of technology intelligence. The first premise that needs to be mentioned here is that technology intelligence should be understood in a consolidated way: it is an organizational intelligence which eventually creates an organizational learning and technology intelligence cannot be fully organized in a dedicated unit (Gerybadze, 1994; Liebowitz, 2000; Savioz, 2004; Lichtenthaler, 2004). The technology intelligence process is a cycle of iterative and parallel interaction of activities that should juxtapose with several external and internal factors. Most studies agree that the technology intelligence process encompasses activities like definition of information need, coordination, collection of information, analysis, filtering, documenting and dissemination of information (Norling et al., 2000; Kerr et al., 2006; Arman and Foden, 2010; Lichtenthaler, 2006). Mortara et al. (2008; 2009) investigated these activities in the case of UK technology-based companies. Manzini et al. (2017) in their action research explored the patent intelligence process specifically tailored to technology intelligence intermediaries. Lichtenthaler (2004) complemented these activities with monitoring (directed) and scanning (undirected) perspectives. Successful operationalization of technology intelligence activities is dependent on several internal and external factors. The literature with various levels of sophistication pointed out some of them. Different literature streams studied include: organization and coordination of technology intelligence activities (Lichtenthaler 2004; 2007; Nosella et al., 2008), technology intelligence methods, tools and their application (Lichtenthaler, 2005; Porter, 2010; Arman and Foden, 2010; Yoon, 2008; Yoon and Kim, 2012), information sources and approaches for information collection and data analysis (Reger, 2001; Savioz 2004; Porter, 2005; Mortara et al, 2008), and players involved in the process (Vischer and Boutellier, 2010). Interesting perspectives come from the contributions that investigated technology intelligence in the context of open innovation (Porter, 2007; Schuh et al., 2008; Veugelers et al., 2010; Durand, 2014; Khosropour et al. 2015). To give some examples, Veugelers et al. (2010) described the selection process of external technologies for investment through real options reasoning. Khosropour et al. (2015) emphasized two approaches of companies in tracking technological changes: 1) building the future of the company based on collaborations, expert opinions and knowledge networks; 2) using technology intelligence to identify future technology areas of the company and adapting networking and open innovation according to these areas. As it should be already clear, the scope of the topics discussed in the technology intelligence literature is broad. However, according to Savioz (2006), size-related issues still remain uncovered. The next section is dedicated to this knowledge gap.

2.2 Technology intelligence in SMEs

Recognition of technological opportunities coupled with the identification of market needs is an essential ingredient of successful innovation (Albagli, 1997). Most SMEs have already realized the essence of intelligence activity; however, they tend to neglect this powerful tool due to resource and competence constraints. SMEs are more interested in immediate and short-term knowledge, whereas intelligence strategies are usually planned for long-term time horizons (Major and Cordey-Hayes, 2000). Nijssen et al. (2001) argued that, the ability to find potential technologies and strategic partners is easier for large firms, simply because in small companies managers tend to be occupied with day-to-day business. Even with these limitations, a survey conducted by Z-punkt found that SMEs envisage the future, analyze products, markets and competitors using simpler approaches (Jannek and Burmeister 2007). Technology intelligence models and approaches designed for large firms are replicable by SMEs only if they are tailored to the specific needs of SMEs. Although the literature portraying technology intelligence practices in SMEs is very scarce, few authors described such approaches. Savioz and Blum (2002) proposed and implemented a novel concept: the opportunity landscape, which combines gatekeeper and knowledge management concepts. Involvement of a formal gatekeeper network approach ensures advantages in terms of roles, resources and organizational learning. In his follow-up study, Savioz (2006) reported that similar elements of technology intelligence found in large firms can be observed in small companies as well. However, these elements need careful selection and customization according to company-specific requirements. Thus, there is no one best way of conducting technology intelligence, there exists only best situational solutions which are influenced by several factors (Savioz et al., 2003). To a large extent, the successful organization of technology intelligence depends on the organizational and cultural fit. Battistella et al. (2015) noted that actionable and collaborative technology intelligence, which also includes the role of innovation intermediary, may provide solutions to the innovation constraints of SMEs. In a similar way, Bianchi et al. (2010) proposed the TRIZ-based easy and quick methodology to identify alternative applications of technologies for small companies.

In sum, the evidence presented in this section clearly show that: very little is currently known about how small companies handle the technology intelligence process and that there is limited understanding on how SMEs in catching-up economies deal with technology intelligence.

3. METHODOLOGY AND RESEARCH DESIGN

A qualitative, explorative approach has been chosen in order to understand how technology intelligence practices are organized in SMEs. Case studies, as an empirical type of research method, help to investigate a contemporary phenomenon in-depth especially when the research object is complex (Yin, 2003; 2012). Therefore, the current study follows a multiple case study design as it allows researchers to develop and test generalizable theories (Eisenhardt & Graebner, 2007). According to Yin (2009) the choice of using a multiple case design grants researchers more robust and compelling results. In this study the cases aim to test and illustrate existing theoretical models in technology intelligence.

This paper investigates three Estonian SMEs in the information technology, manufacturing and life-sciences industries (Table 1). The primary condition for case selection was the size of the company (OECD classification). We contacted Estonian SMEs operating in different industries and three companies were willing to cooperate and provided all necessary information on the investigated topic. This willingness was also due to their interest in implementing formal practices of technology intelligence in the future.

Table 1 Cases and key informants.

Case	Main activity	Company size; (employees)	Key informant
Helmes Estonia	IT	Medium; (200)	Solution architect
Skeleton Technologies	Manufacturer of energy storage systems	Small; (100)	Vice president of product; head of cell development
Centre for Food and Fermentation Technologies	Life sciences	Small; (55)	CEO

Table 2 Interview objective and sub-questions.

Interview objective	*Research sub-questions*
To understand how SMEs handle the process of technology intelligence.	What are the reasons for conducting technology intelligence? How do they define information need? How is the process of technology intelligence coordinated? How do they search for information? Which sources do they use to get information? How do they filter collected information? How do they analyse collected information? Which methods do they use for analysing the information? Which tools (infrastructure) do they use to analyse the information? How do they manage (store, document) results of the analysed information? How do they disseminate and communicate the results of intelligence? How do they measure the outcome (quality) of the intelligence results?

3.1 Data collection and analysis

The data was collected from multiple sources. The primary source of information was semi-structured interviews with key informants from case companies (Table 1). The researchers prepared an interview guide to be used during in person meetings. The main objective of the interviews was to explore how SMEs handle the process of technology intelligence. Based on this information, we developed other research sub-questions or research issues that were included in our interview guide (Table 2).

We used a context-based questionnaire as complementary to our research protocol to collect the data. The questionnaire was developed by our researchers in the framework of the research project on technology intelligence and this process was performed in three stages. First was the development of the initial survey questionnaire after reviewing literature and existing scales, Next was the validation of the questionnaire with field experts and companies (pilot study). And finally, was the modification of the questionnaire based on collected feedback. This allowed us to achieve a variation in data collection and approach the research questions from different angles. The interviews lasted 90 minutes on average.

Secondary sources provided by the companies were used to triangulate collected information. This also enabled us to avoid post hoc rationalizations and ensure construct validity. In particular, notes from company visits and informal meetings, internal documents such as reports, brochures and presentations provided by the companies and other internet materials were used to complement the interviews.

We audio-recorded all interviews and the transcripts along with all other sources were used for data analysis. We followed the suggestions of Miles and Huberman (1994) and case analysis was conducted in three stages:

1) Data reduction and coding: first, the collected data was coded based on category systems (Richards, 2005) already existing in the literature (for example, Arman and Foden, 2010; Lichtenthaler, 2003, 2004a, 2004b, 2007; Mortara et al., 2009, 2010) and a short description of each case was prepared.
2) Within case analysis: then, we collected and analysed the data of each case separately in order to have a general understanding of the technology intelligence activities within the company.
3) Cross-case analysis: in order to detect major similarities and differences, we compared three cases. This helped us to identify commonalities and different perspectives on central issues (Patton, 1990).

To ensure the validity of the collected data we sent the early version of the paper to companies and collected their reviews and feedbacks.

4. RESEARCH FINDINGS

The findings start with the description of the individual cases. Then, it gives the summary of the main findings using a cross-case analysis approach.

4.1 Case 1: Helmes Estonia

Helmes is an international, Tallinn-based company that provides custom and ready-made software solutions and complex system integration projects for its clients across all around Europe. It is a B2B oriented company that looks for long-term solutions to enable clients to grow and aims to grow with its clients. During the 26 years of its existence, Helmes has worked with major industries including telecom, banking, insurance, logistics, public sector, healthcare and manufacturing. For example, the company provided tailor-made software solutions to actors such as OECD, E-Estonia, Telia, King's College London, and Audatex.

Helmes doesn't yet have a systematic technology intelligence process. Instead, it is possible to find some implicit elements of technology intelligence in the company. The intelligence process is directly incorporated in the Helmes business strategy. Technology intelligence activities are mainly conducted by the general development unit. Product development is carried out in permanent team structures whose members change according to the phases of the project. A typical team consists of team leaders, analysts, solution architects and developers (programmers) mentored by business area leaders. Each team is independent and not centrally regulated. Helmes analysts have a key role in intelligence activities. Their tasks are vision articulation and definition of goals, needs and success metrics, designing, planning and leading the research and efficient analysis process, mapping and visualizing business and technological processes, and documenting and keeping the analysis information up-to-date. When a business area leader brings in a new lead, the company assigns a "top gun" analyst to collect preliminary information about the potential client's organization in order to provide an initial solution. This "quickstart" process aims to map the current business and technological environment of the client, identifies the technology structure, manual interfaces, business deficiencies and if these deficiencies are fixable with information systems. After spending three intense days in the client's company, the top-gun analyst produces a report which will be used to find a solution to the client's need.

4.1.1 "Helmes Lab"

Some years ago, the company launched an initiative called the "Helmes Lab". By asking "what emerging technologies can be beneficial for Helmes?" and "what emerging technologies can be integrated to ongoing and future projects of the company?", the general development unit identified some areas that need to be tracked closely. The initial purpose was to first determine general topics and then analyse them stepwise in focus groups. As a result, the general development unit spotted the following topics for in-depth investigation: big data, artificial intelligence, neural networks, internet of things (IoT), block chain technologies, smart contracts, and microservices. The importance of these emerging technologies was realized by all levels of the company; however, employees didn't have time to familiarize themselves with these developments. Business area leaders who were aware of the competencies and capabilities of their teams and when the next customer was due formed a focus group from the members of the team by selecting a specific type of technology. Although, Helmes Lab was an interest-based process, the initiative came from above (general development unit, business area leaders) to the employees (team members). The choice of technologies selected by focus groups in most cases derived from the needs of clients and interests of the business area leaders and team members in order to have a thorough understanding in a specific field. Focus groups in turn went through several stages to test this technology in the lab to find potential uses. First, they collected information from different sources, analysed the collected information and filtered it. For example, in the case of IoT technologies, several questions were developed to collect the information. For example, "who are the vendors of IoT analytics?"; "Which one to select?"; and "Is it feasible for our project?" The main source of information was the internet and official documents of the other companies. For blockchain technologies, focus groups could address, for instance, udemy courses or e-platforms for getting preliminary guidelines. The work on the projects lasted from one to two months. When the collected information was analysed and proof-tested by the focus groups, they stored the process in the company wikipage. Then the results of the analysis were presented to the whole Helmes team. The overall process, including the final report, presentation and discussion notes were stored in the company repository "confluence". If any team wished to apply the result of this intelligence to their projects, they could come

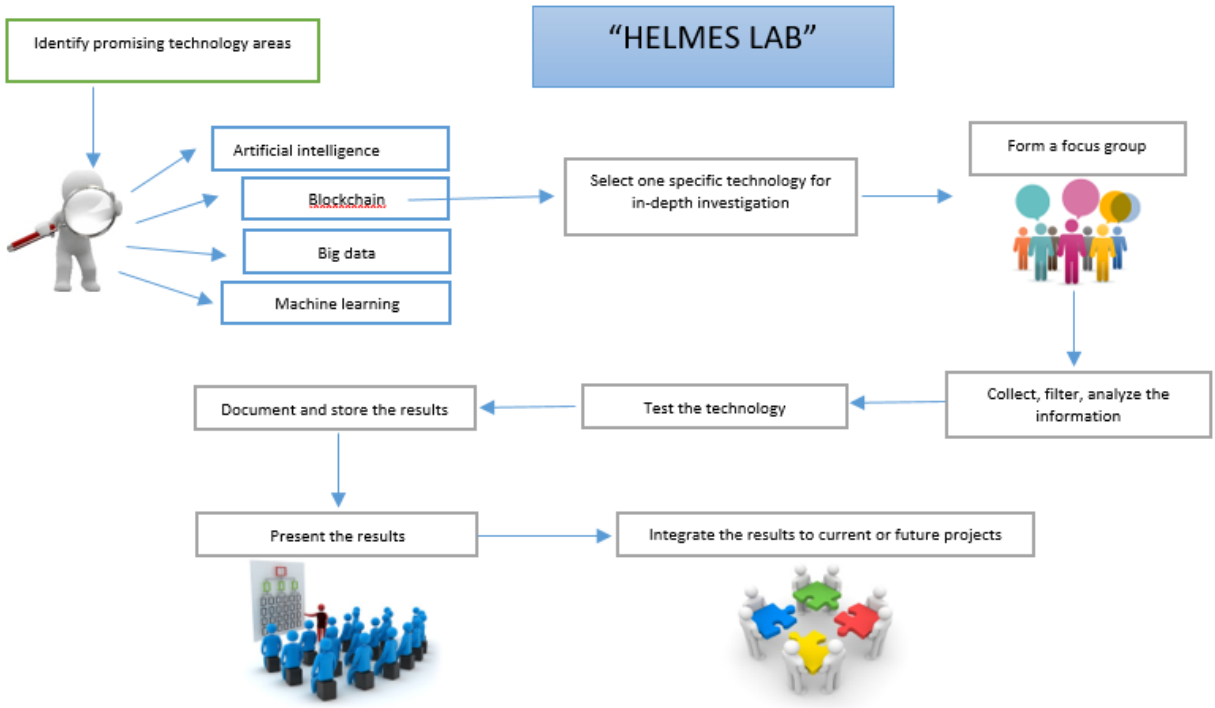

Figure 1 "Helmes Lab" initiative.

back to this repository and retrieve the information. The manager argues that, "identifying and implementing new technologies in our company is rather simple. However, it is achieved through continuous analysis, tests and discussions. One of the main criteria of their selection is, they have to be in the market for a while, proved their usefulness."

Helmes Lab is a dynamic process in a way that the members evolve constantly and several focus groups may exist simultaneously (Figure 1).

4.1.2 "Hack Day"

As with "Helmes Lab", "Hack Day" is another Helmes initiative, which takes place twice a year. Usually it is a two-day event organized with an aim to understand emerging technologies in the environment of the company. Again, the main objective is to detect interesting technologies and bring them into company projects. On the first day, Helmes invites an expert or group of experts from universities, research centers, government agencies or companies to discuss selected topics. On the second day, teams can choose a technology of interest, test this technology out during the day and conclude if this technology could be useful for them. Unlike Helmes Lab, here the approach is bottom-up and the employees decide which technologies to study. The general development unit may assign mentors to teams. Employees with preliminary knowledge about the technology are suggested to search for information. It helps to filter the data and select relevant and appropriate technology.

4.1.3 "Technation Talks"

"Technation Talks" is another format for discussions where every member of the company shares their experience, results of the projects, challenges, success stories, and suggestions in front of the management team. It is an interactive way of experience sharing to improve effectiveness of the ongoing projects. The event takes place twice a month and topics presented during the "Technation Talks" are stored in a confluence database. Storing or archiving the information has a great value for the company. The manager says that: "some ideas that five years ago were not relevant may become important today. Therefore, we try to document each process in our repository even if it is time-consuming".

For Helmes, internet, internal and external databases, conferences, fairs, seminars, exhibitions, online communities and web forums, consultants, job rotation, acquaintances and friends are major sources of information. The company closely collaborates with universities, associations and government agencies. The company doesn't have a selected set of methods that are adopted in every case. Alternatively, Helmes selects the methods

according to the information that is being analysed and skills the employees have to use this method. Qualitative methods that support internal and external communication are preferred. The company uses benchmarking studies, market analysis, flexible expert interviews, expert panels, roadmaps, simulations, interviews, focus-groups (panels, workshops) and cost-benefit analysis to a larger extent.

For Helmes, one working solution or created tool in use which increases efficiency or creates a new client lead is a success of technology intelligence efforts.

4.2 Case 2. Skeleton Technologies

Skeleton Technologies was established in 2009 with an aspiration to bring innovative solutions into the energy storage industry. Over ten years, the company transformed itself as a major player in the industry with its "curved graphene" SkelCap ultracapacitors. Ultracapacitors are used for fast energy storage. Today the company develops and produces ultracapacitor cells, modules and systems for the automotive industry, transportation, grid and renewables, industrial manufacturing, material handling and maritime industries. The inventions of Skeleton Technologies are currently protected with 14 patent families. The company has three subsidiaries in Germany (manufacturing and sales) and Estonia (R&D and pilot production) with 100 employees in total. Surveying current and emerging energy storage technologies, competitors and markets is a special focus of the company. The company doesn't have any institutional arrangement for technology intelligence. Intelligence activities are performed in all levels of the company in unsystematic and informal ways. R&D in Skeleton Technologies is divided into four areas: material, module, cell and system development. Different development departments are constantly on the lookout for new technologies, ideas, opportunities and competitors. As the vice-president of products for the company stated: "That is not luxury or what you can do, that is what you must do in order to ensure that your developments are in vein".

The company has defined areas of interest to monitor. Technology intelligence activities are directed to identify the latest developments in energy storage technology, grid-based energy storage and their industrial applications. Different teams try to keep track of the broad market, new customers, potential applications of the ultracapacitors and competitors active in the same industry. These activities are carried out with questions in mind such as: What are the new technologies that might affect our business? In which direction should we develop our technologies? What are our competitors are doing? What are the plausible industries that might need our technologies? The information need for data collection and analysis in a specific technology or competitor comes from the internal process development and market itself, enriched with an input from different departments. For example, sales or business development departments with information about certain applications of technology can come to the cell development department and request further intelligence, because people in cell development have a bulk competence when it comes to deep understanding of the question. Team members also share their interests and information deficiencies during the daily stand-up meetings. So, the need for information can flow across levels of the company regardless if the approach is top-down or bottom-up. In company technology intelligence is a continuous process where each employee tries to keep up with daily news in business or industry, scientific research and technology development news, publicly available information regarding technology applications, competitors and business opportunities. Intelligence in Skeleton Technologies is based on the "old school of networking". Members of the company use internet, publicly available statistics and statistical data, patents, scientific publications, field and non-field publications, company press-releases, trip reports, meeting notes, conferences and seminars, "mouth to mouth propaganda", and customers and suppliers as sources of information to a considerable extent. The vice-president believes that,"We also look for companies that have similar organizational setup as we have here in Skeleton Technologies. For instance, we are collaborating with a company in Germany and its R&D department which has thorough insights about what the customer requirements about next generation energy storage technologies are".

In order to check if the information is stored by someone already or available in-house, employees can directly address team leaders. In Skeleton Technologies it is a straightforward process, a benefit of the small

size of the company. Collected information is analysed through different intelligence methods. Within the company, methods in which employees have expertise and profound knowledge are preferred. Frequently applied methods include patent analysis, roadmaps, interviews, expert panels, benchmarking, market analysis, and SWOT. If the managers see the necessity for a large-scale analysis, they will outsource such services. The results of intelligence activities can be presented at weekly, quarterly or annual meetings, such as "demo days", "OKR (objectives-key results)" and "12-month outlook" (Figure 2). For example, "demo days" is organized once every two weeks. It is where team members present their findings from analyses they have done. These events are used to keep the company in line with its mission and strategies. However, if there are urgent cases, it is not an issue to organize ad-hoc meetings. Intelligence results, reports and meeting notes are stored in an internal company database. The effectiveness of intelligence results is measured with a project level metric. If the project was successful, then it is the success of technology intelligence results as well. Skeleton Technologies is looking forward to establishing a dedicated unit and budget for technology intelligence in the near future. The head of the cell department agrees that: "For an emerging company like us it is critical to have a devoted person or unit for such activities. We believe that, at this moment we are doing not bad, however we have to reconsider our capabilities how to do it in the future. Because a company of 100 employees cannot do it in the same way as a company of 300 employees".

4.3 Case 3. Centre of Food and Fermentation Technologies

Centre of Food and Fermentation Technologies (CFFT) is an Estonian R&D company based on modern analytical methods and principles of systems and synthetic biology that aims to develop and introduce innovative food and fermentation technologies. It was founded in 2004 and currently owns a state-of-the-art laboratory, 55 highly qualified personnel and necessary know-how. The centre provides contract services in solving specific problems regarding product development from idea to full solution, market analysis, chemical, physical and microbiological analysis, sensory evaluation, and consumer studies. The scope of expertise of the centre includes fermentation, analytics, food technology and sensorics. Some of the best-known customers are DuPont, Lallemand, Santa Maria, and Valio. The management of the CFFT realizes that the future of technological innovations in life sciences will be highly influenced by the aptitude of the company to analyse and take advantage of business and technological

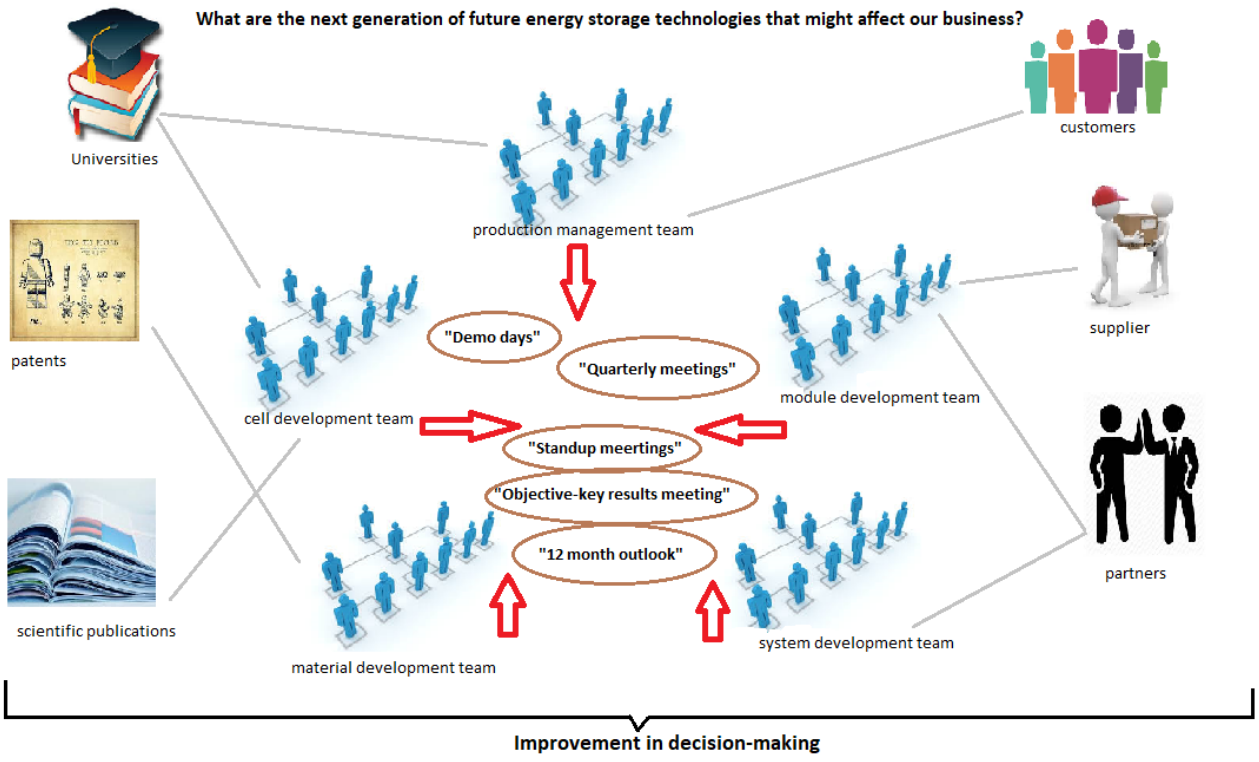

Figure 2 Technology intelligence system of Skeleton Technologies.

insights, as well as its ability to collaborate with different players who bring knowledge, expertise and new opportunities. Open innovation in the life sciences is more significant than other industries simply because this field is knowledge and resource intensive. Fermentation as a world class competence requires constant research, sharing of ideas and experiences, and continuous learning. Although, technology intelligence at CFFT is not done via a formal or systematic process, the centre tries to keep an eye on emerging technologies that will give a competitive edge. CFFT particularly focuses on systems and synthetic biology and tries to understand and use methods called -omics methods, e.g. proteomics, genomics, metabolomics, in a complex. In order to be ahead of the curve, the centre conducts research in microbiome and cell modelling, watches novelties in these areas, and tracks competitors and other companies to establish future partnerships. For CFFT, something that seems promising is artificial intelligence (AI). The centre is trying to apply AI methods and systems, like IBM Watson in its research projects to generate meaningful results. According to the CEO, "For us, the best solution would be if we could integrate some of the big data analytics that would teach the system to collect information, analyse it, make its own conclusions and help us to move forward".

Technology intelligence in CFFT is a collective and participatory process. The whole team of competent people includes department managers, team leaders and scientists that are engaged in intelligence activities. The centre doesn't have any unit or designated person for this task and the CEO of the centre considers it to be the correct temporary approach for small companies like CFFT. The role of the R&D director in this process should be credited as he has been with the centre since the beginning and involved in all directions. The approach for technology intelligence in CFFT is both continuous and project-based. All managers in the company are PhDs in their areas and in order to respond to specific needs of clients they always educate themselves, look for new opportunities, participate in conferences and organize meetings so that people can share experiences. The need for continuous learning is primarily dictated by the organizational structure that the centre possesses. Within the research directions—whether it is food technology (bakery products, plant-based products, beverages), bio-technology (yeasts, lactic acid bacteria, E. coli bacteria) or the sensory department—there is an ongoing intelligence process in order to be up to date with the latest news in these realms. And when there is a specific request from a client in one of these areas the management of the company assigns the people to be involved in the project. If the request of the client is a streamline issue and something that the centre has done before, then appointed department discusses the project and budget with the client, collects the necessary information, conducts market research and delivers the findings to the client and the management. But when the project is more complex and concerted effort is needed, the CEO along with heads of all departments and the client discuss the project and all possible opportunities, map out a plan, and negotiate the budget. Then again one or several departments are defined to work on the project. The key informant of CFFT reports are publications and internet, which are the most convenient sources of information when there is a necessity of further investigations on the client's need. The centre is a member of different networks and during the communications clients also provide valuable knowledge. The people from different departments are sent to conferences, fairs, seminars or exhibitions from time to time. However, one of the major concerns related with this type of events is that they are budget dependent. To rectify this limitation, the company tries to take advantage of networks, such as through R&D cooperation with universities, joint ventures, alliances with firms and participation in public R&D programs. The CEO of the company asserts that "We are always open for collaboration and not afraid of sharing our competences and knowledge with our partners. It is not a matter of your ideas or know how being stolen. It is a matter of if these ideas are good and how they serve common interests".

The person who collects the information in the company also checks the quality and relevance of it. All collected information is stored in the internal database and employees use e-mails or platforms like Slack to discuss their search results or findings. More qualitative methods are used in the company to interpret the collected information. Employees prefer practical approaches that imply interaction and co-working. Some widely used methods in CFFT are publication analysis, benchmarking, market analysis, competitor

analysis, portfolios and roadmaps. These methods are applied according to "as little as you can and as much as you have to know about the method" principle. The outcomes of the analyses are presented and discussed in weekly project managers' meetings and weekly science seminars. The results are also shared with clients upon their interest and request.

4.4 Summary of findings: cross-case analysis

The cases of three companies were analysed in order to understand the situation of SMEs in terms of practicing technology intelligence activities. This, in turn, provided us some interesting findings that are summarized in a cross-case analysis. First, concerning the objectives of conducting technology intelligence, companies exhibited similar goals and purposes for performing this activity. Helmes and CFFT were more interested in identifying emerging technologies and incorporating them into their projects. Skeleton Technologies aims to monitor current and new energy storage technologies, track the activities of specific organizations working in the field and determine alternative technology applications. An emphasis also can be given to the scope of the search done by companies. In all three cases companies had a defined area of interest and technologies dictated by the business they are involved in. What emerges about the definition of information needs is that the companies practiced both top-down and bottom-up approaches where the need for new information came from both decision-makers and employees, making the process participatory. Particularly, organizing intelligence activities in different initiatives like the "Helmes Lab", "Hack Day", Technation Talks", "Demo Days", "Stand-up meetings", "OKR" or "12-month outlook" enabled the companies to involve all layers of the organization and benefit from diverse ideas. In terms of the coordination of the technology intelligence process, none of the companies had institutional arrangements for technology intelligence. Instead, this task was diffused throughout the company and everyone contributed for the fulfilment. Consequently, R&D departments (in Helmes' analysts and General Development Unit; in Skeleton Technologies four development departments, in particular the Cell Development Department; in CFFT the R&D director and CEO) had a special role in this process. The companies did not allocate a budget for the technology intelligence process. One interesting finding that emerged from our empirical study is that all of the companies followed continuous and project-based (issue-driven) approaches of technology intelligence (Rohrbeck and Gemunden, 2008). For instance, in the case of Helmes, a top gun analyst in a quick-start process performed project-based intelligence by collecting, analysing and disseminating information on an ad-hoc basis about one specific client before the launch of the project. In Skeleton Technologies, technology intelligence had a continuous flow. In CFFT technology intelligence was operationalized in decentralized groups (departments) and organized for each client (project) separately. Nevertheless, CFFT implemented continuous surveillance in microbiome and cell modelling research directions. Regarding sources for information, the internet was the most common source followed by internal and external databases, customers, suppliers, job rotations, conferences, fairs and seminars. However, putting both companies in the same box in terms of information sources may be misleading. The selection of information sources, aside from size and resource characteristics, is influenced by traits of the industry in which companies are active (science-driven vs market-driven companies – Savioz, 2006). For example, CFFT as a science-driven company deployed publications, internet, R&D cooperation with universities, joint ventures and alliances with firms to a greater extent, while Helmes and Skeleton Technologies used patents, statistics and statistical data, conferences, fairs, seminars and any type of informal meetings as major sources of information. When it comes to intelligence methods used, companies applied both quantitative and qualitative methods and tools that don't require profound expertise and that support internal and external communication (Rohrbeck et al., 2009). According to Popper's Foresight Diamond (Popper, 2008), companies used methods which facilitate evidence, expertise and interaction (market analysis, benchmarking, brainstorming, patent analysis, roadmaps, workshops, interviews, expert panels and others). One unanticipated finding was that the companies had a flexible structure for communication and information sharing. None of the interviews mentioned communication barriers or incompetence in the companies. As was stated in Savioz (2006) and Vossen (1998),

advantages of smallness are the "direct-decision making process, clear coordination and communication". In all cases success of the project is associated with effectiveness of the technology intelligence results. The most important finding that emerged from this study is that all companies highlighted their interests in adapting systematic and formalized approaches for technology intelligence in the future.

5. DISCUSSION AND CONCLUSIONS

Given the importance of exploitation of technological opportunities and ideas, potential partners and customers, and competences in the open innovation paradigm, SMEs are becoming more involved in such practices in order to secure a competitive advantage (Van de Vrande et al., 2009; Edwards et al., 2005; Lee et al. 2010). Technology intelligence is regarded as a robust tool to support open innovation to identify promising technology niches, opportunities and threats (Iansiti, 2000; Durand, 2014). Although the real need for technology intelligence is quite well-realized by SMEs, it has often been neglected due to their constraints in money, time, skills and competences (Savioz, 2004; 2006; Battistella et al., 2015). On top of this, so far, the literature documented few cases of operationalization of technology intelligence practices by small firms in catching-up economies. To remedy this knowledge gap, the present study was designed to determine the process and elements of technology intelligence in SMEs. In order to explore how SMEs handle the process of technology intelligence, we investigated three Estonian firms in different industries in-depth. The results of our empirical case study show that the capacity of technology intelligence as a powerful tool is not fully exploited by SMEs yet. The past research pointed out spontaneous and unstructured organization of technology intelligence by small firms. Our analysis revealed certain processes of technology intelligence that don't follow the models presented in the literature. Despite this fact, the results of this study confirm the findings of previous contributions on the topic: similar elements of technology intelligence that had been found in large firms were also present in the case of small companies (Savioz, 2004; 2006). However, considering the fact that, "small business is not a little big business" (Welsh and White, 1980), these elements (technology intelligence aims and goals, structure, people, methods and tools, process) should be adapted to the specific context of SMEs. In our cases, SMEs orchestrated these elements of technology intelligence with their organizational and cultural characteristics.

The emergence of large volumes of data and the necessity of transforming it into useful information for decision-making posed some challenges for SMEs. Technology intelligence as a strategic tool has become equally important both for large and small companies. The results of this study corroborate the findings of a great deal of the previous work stating that technology intelligence is not a process specific only to large or multinational companies. Our case studies provided a general understanding how decision-makers of SMEs can benefit from technology intelligence if it is organized in a proper way. We do not argue that companies should implement unique technology intelligence. Probably, such a setting does not exist. As mentioned above, SMEs should tailor different elements of technology intelligence to their needs. In particular, early contributions provided intelligence related tools to meet this objective (for example, Mortara et al., 2009 – technology intelligence toolbox; Rohrbeck et al., 2006 – technology radar; Savioz and Blum, 2002 – opportunity landscape; Battistella et al., 2015 – extended map). SMEs have a favourable position in this situation as they have less bureaucratic decision-making, but more creative and dynamic organizational culture.

The findings of this study also suggest the importance of the alignment of the business strategy and technology intelligence objectives. In fact, Kerr and Phaal (2018) asserted the necessity of future studies that investigate a formal link between Technology intelligence and strategic planning. Our study demonstrated this relatedness even though the companies had an informal arrangement of technology intelligence.

The second objective of the paper was to understand how SMEs in catching-up economies deal with the processes of technology intelligence and open innovation, both understudied (Tiits et al. 2015; de Jong et al. 2010). Although our sample includes only three companies, we notice considerable differences between SMEs of catching-up economies and developed countries based on the results given in the literature. For instance, de Jager et al. (2002) distinguished four levels of technology capabilities of firms in their staircase model, namely 1) low-

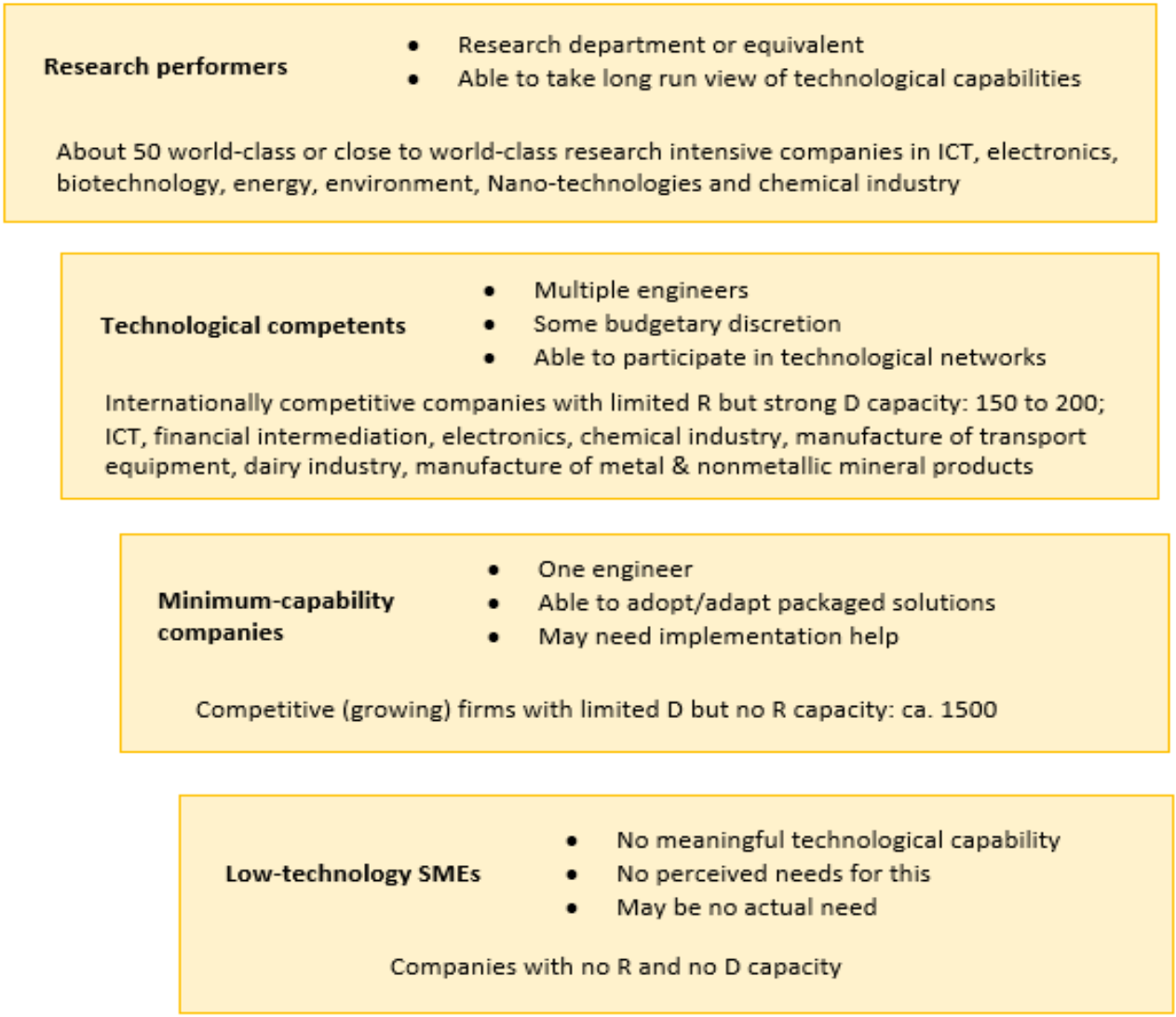

Figure 3 The competence staircase. Source: de Jager et al. (2002) and Kalvet (2009).

technology SMEs, 2) minimum-capability companies, 3) technological competents and 4) research performers. This is in line with Kalvet's (2009) three types of Estonian firms classified in terms of R&D competencies. Figure 3 summarizes these two approaches. We believe that this model synthesizes the position of our case companies also from a technology intelligence point of view. As Nosella et al. (2008) stated, the technology monitoring process in firms is influenced by several factors including the level of resources devoted to R&D activities. That is to say, the companies we investigated have medium R but strong D capacity with informal and uncoordinated technology intelligence approaches.

5.1 Research and managerial implications

This paper has research and managerial implications. It contributes to the current body of knowledge with general understanding about technology intelligence activities in small companies. Researchers can benefit from this article to explore elements of technology intelligence that are operationalized in the case of SMEs. The findings from these cases can provide an overview in terms of approaching SMEs to identify technology intelligence practices. From a methodological point of view, the paper brings to light questions that can be used to learn more about technology intelligence in such settings. From a practitioner point of view, this can be helpful to managers to identify best practices to learn and implement in their own companies. The activities described in the case studies can be taken as a template to implement technology intelligence practices.

5.2 Limitations and areas for future research

The major limitation of this paper is that it investigates a limited number of SMEs in a specific county. In order to have a thorough knowledge about technology intelligence in such settings more companies in different contexts should be investigated. Moreover, discussions in the latest literature highlight the rising interest in start-up companies. Further investigations with this type of companies seem promising.

Moreover, further research may focus on each element of technology intelligence independently to review how SMEs deal with them. We also propose to use other methods of qualitative research (i.e. action studies) or quantitative research to answer specific questions.

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The effects of cross-functional coordination and competition on knowledge sharing and organisational innovativeness: A qualitative study in a transition economy

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ABSTRACT Adopting a coopetition framework and a qualitative study using depth-interviews of mid- and top-levels managers in Vietnamese business organisations, this study examines the potential significance of different coordination mechanisms (decentralisation, formalisation, lateral relations, informal networking, and shared vision) in fostering knowledge sharing between marketing and other departments in the presence of cross-functional competition. This study reveals the potentially significant effect of coopetition (i.e., simultaneous coordination and competition) on the degree of knowledge sharing between marketing and other departments in business organisations. The enhanced knowledge sharing can, in turn, positively improve organisational innovativeness. These findings add to limited research on intra-firm coopetition and shed light on how cross-functional coordination and competition can be managed to foster intra-organisational knowledge sharing towards enhancing innovation in the context of Vietnam, an emerging Asian country.

KEYWORDS Coopetition, coordination, competition, cross-functional knowledge sharing, organisational innovativeness, transition economy

1. BACKGROUND

Cross-functional knowledge sharing is a process of sharing knowledge between departments within an organisation. This definition is based on that of Argote and Ingram (2000, p.151), who view knowledge as 'a process through which one unit (e.g., group, department or division) is affected by the experience of another.' Cross-functional knowledge sharing is necessary because departments need to exchange knowledge to perform their tasks. At the cross-functional interfaces, the interactions between marketing and other departments involve the sharing of different types of knowledge, including market knowledge, technological knowledge, and financial knowledge (Homburg, Jensen, and Krohmer, 2008; Atuahene-Gima and Evangelista, 2000). Knowledge sharing between marketing and other departments enables the integration of different pools of interdisciplinary knowledge, which is a prerequisite for an organisation to develop collective intelligence (Søilen, 2019). The developed collective intelligence, in turn, becomes a useful tool for early warnings and detection of weak signals in organisations in a turbulent business environment (Almeida and Lesca, 2019).

However, knowledge sharing between marketing and other organisational functions is said to be difficult (Luo, Slotegraaf, and Pan, 2006). Among the main barriers to knowledge sharing is cross-functional competition (Maltz and Kohli, 1996; Houston et al., 2001), which

refers to the extent to which departments compete for limited internal resources and power. In numerous situations, competing departments are often reluctant to share knowledge (Luo, Slotegraaf, and Pan, 2006). A question is whether organisations can effectively manage the conflicting processes of coordination and competition to enhance knowledge sharing between marketing and other departments to achieve superior performance.

Although previous studies have emphasised the importance of coordination within an organisation, few studies have systematically investigated the role of both formal and informal coordination mechanisms in fostering organisational knowledge sharing. For example, Ghoshal, Korine and Szulanski (1994) investigated only formal mechanisms including centralisation and lateral relations; Tagliaventi, Bertolotti and Macrì (2010) and Fey and Furu (2008) examined only informal mechanisms, respectively informal networking and shared vision. Although some studies, such as those of Tsai (2002) and Willem, Buelens and Scarbrough (2006), investigated both formal and informal mechanisms, they included only centralisation and informal networking and did not focus on other mechanisms such as formalisation and shared vision. Little is known about the differences in the effects of various coordination mechanisms on knowledge sharing. Under resource constraints, managers need to know whether various coordination mechanisms have different powers in promoting knowledge sharing. In this way, they will be able to use limited resources effectively to coordinate different organisational units to share knowledge and ultimately develop an effective knowledge management strategy. Therefore, a systematic investigation of the effects of various formal and informal coordination mechanisms on organisational knowledge sharing in a single study is needed.

A review of the knowledge sharing and organisational coordination literature found that many studies focus on knowledge sharing between subsidiaries or divisions within multinational corporations or large organisations (e.g. Gupta and Govindarajan, 2000; Willem, Buelens, and Scarbrough, 2006). Little research has been done to investigate knowledge sharing among departments such as marketing, research and development (R&D) and production within a business organisation (e.g. Luo, Slotegraaf, and Pan, 2006; Ruekert and Walker, 1987). The Belgian study by Willem and Buelens (2007) may be one of the few studies on departmental knowledge sharing. However, their study is in the context of public sector organisations rather than business organisations. This raises the need for a study that systematically investigates the effects of both formal and informal coordination mechanisms on knowledge sharing between departments within a business organisation.

In addition, a literature review regarding intraorganisational knowledge sharing found that few studies have investigated the effect of coordination on knowledge sharing in the presence of competition (e.g. Tsai, 2002). Moreover, little research has been done to examine how knowledge sharing between marketing and other departments (in the presence of cross-functional coordination and competition) can enhance organisational performance. In other words, how marketing and other competing departments are coordinated to share knowledge to enhance performance is another gap that should be bridged.

In terms of research venue, most of the studies on cross-functional knowledge sharing have been conducted in developed Western countries rather than in Asian developing countries such as Vietnam, China or Thailand. Asian countries may differ from Western countries in terms of a culture that influences knowledge sharing (Chow, Deng, and Ho, 2000). People from Western countries are more individualistic than those in the East; they tend to be loosely organised, place less emphasis on rank and status, and have a tendency towards self-enhancement (Hofstede, 2007). In contrast, in Asian countries, which have a collectivist culture, communication is dependent on the rank or gender of the actors. Asian people emphasise order and harmony, avoid conflict and respect the senior members of organisations. They are also in-group oriented and often hostile towards out-group members (Bhagat et al., 2002). In a collectivist culture, it may be more difficult for an employee in an organisation to share knowledge with out-group members (e.g. employees from other departments) (Chow, Deng, and Ho, 2000). Therefore, a study on cross-functional knowledge sharing in the context of an Asian country can add more insight to the literature.

The research gaps mentioned above suggest a need to investigate the effect of both formal

and informal coordination mechanisms on knowledge sharing between marketing and other departments. These departments usually compete for an organisation's scarce resources; therefore, they are often reluctant to share information because they want to prevent competing departments from gaining knowledge (Luo, Slotegraaf, and Pan, 2006). This raises the issue of whether organisations can use different coordination mechanisms to coordinate knowledge sharing between the marketing department and other departments, especially when they are competing with one another. Accordingly, two research questions have been proposed:

RQ1: What is the effect of coordination on cross-functional knowledge sharing in an organisation?

RQ2: What is the effect of coordination on cross-functional knowledge sharing in the presence of cross-functional competition?

From a managerial perspective, it is necessary for managers to pay more attention to the link between organisational knowledge sharing and its outcomes. Previous studies have repeatedly emphasised the value of organisational knowledge sharing in terms of innovation (e.g. van Wijk, Jansen, and Lyles, 2008; Calantone, Cavusgil, and Zhao, 2002; Tsai, 2001). This means organisational innovativeness is a possible outcome of cross-functional knowledge sharing (van Wijk, Jansen & Lyles, 2008). Moreover, authors from the marketing literature (e.g. Calantone, Cavusgil, and Zhao, 2002; Salomo, Talke, and Strecker, 2008) suggest that organisational innovativeness is among the important antecedents of organisational performance. This line of reasoning shows that cross-functional knowledge sharing could affect organisational performance through organisational innovativeness. In this study, the question is how knowledge shared at the interfaces between marketing and competing departments in the governance of coordination mechanisms affects organisational performance by improving organisational innovativeness. This question is significant because answering it provides a better understanding of whether these above performance outcomes of cross-functional knowledge sharing are still likely to occur even in the presence of competition among marketing and other departments. The third research question is as follows:

RQ3: How does cross-functional knowledge sharing affect organisational innovativeness?

2. RESEARCH METHODS

2.1 A semi-structured depth interview

To answer the three research questions, this study conducted semi-structured depth interviews. The purpose was to obtain an overall understanding of cross-functional knowledge sharing between marketing and other departments and to develop a coopetition model that can explain the effect of the interaction between cross-functional coordination and competition on cross-functional knowledge sharing and organisational innovativeness in the context of Vietnamese firms.

In this study, semi-structured depth interviews with managers of Vietnamese business organisations were used. A semi-structured depth interview commonly refers to an interview in which the interviewer has a list of pre-prepared questions in a general form, and he or she can adapt or vary the sequence of questions according to the response of the interviewee. Depth interviews were chosen rather than a focus group because this technique is less costly (Adams and Cox, 2008). Moreover, depth interviews were more feasible because inviting people with high social status (e.g. top managers) to participate in a focus group can prove difficult (Krueger and Casey, 2009; Morgan, 1988). This study used a semi-structured approach to depth interviewing rather than a structured approach because the semi-structured form is more flexible than the structured form and allows key issues not identified before the interviews to emerge through the discussion. The use of semi-structured interviewing encouraged informants to express their views without being constrained by a limited set of preconceived questions in the structured interview.

2.2 Sample organisations and informants

For the depth interviews, purposeful sampling was adopted. Organisations were selected if they were considered 'information rich' to maximise understanding about the research issues (Onwuegbuzie and Leech, 2007). The organisations selected for the depth interviews needed to be large-sized firms. According to

Degree 56 ND-CP of the Vietnamese government, the conditions for being a large business organisation are as follows. For the manufacturing industry, organisations need to have total capital of more than VND 100 billion, or more than 300 full-time equivalent employees. For service and trading industries, organisations need to have total capital of more than VND 50 billion, or more than 100 full-time equivalent employees (Vietnamese-Government 2009). The reason for including only large organisations in this study is that large organisations tend to have sufficient financial resources to implement adequate knowledge management systems (Kuan Yew and Aspinwall, 2004; Serenko, Bontis, and Hardie, 2007) to support cross-functional knowledge sharing, whereas small- and medium-sized organisations are less advanced at launching formalised knowledge management programs.

Organisations participating in the depth interviews needed to have marketing departments and other functions (including sales, R&D, manufacturing, and accounting and finance). The purpose was to ensure rich information about cross-functional knowledge sharing and related research issues could be provided. In addition, the depth interviews were conducted in different types of organisations, including state-owned enterprises, joint stock companies, joint venture companies, limited proprietary companies and private companies. Moreover, the organisations selected for interviews represented different industries in Vietnam (manufacturing, service and trading). The purpose of this selection was to identify whether the proposed model was applicable across different types of organisations and industries.

To overcome budget and time constraints, the study used the convenience-sampling approach to select data. This approach involved selecting organisations that were accessible and were willing to participate in the study. Following this, organisations with headquarters located in Ho Chi Minh City, the largest business centre in Vietnam where the principal researcher was living and working, were selected. The sample size for depth interviews was seven, which is within the range of six to twelve, as suggested by earlier studies (Guest, Bunce, and Johnson, 2006; Carter and Henderson, 2005).

Midlevel (department heads or vice department heads) or top managers (members of the management team) were the potential informants. Moreover, they were selected from various departments (e.g. marketing, sales, R&D, manufacturing or production, finance and accounting) because these departments are likely to share knowledge with one another.

Table 1 List of participants and demographic information. Comp = company, *Company names and participant's names are anonymous, YC = years of experience at the company; YCP = years of experience at the current position Own = ownership type. FO: Organisation with foreign capital/ownership (including 100% foreign-owned enterprise or joint venture), DO: Organisation with domestic ownership (limited enterprise or state-owned enterprise), Size = number of employees at the company. Value = company size (paid-in capital) in AUD million. **: No information about company size in terms of number of employees and paid-in capital was provided, daily sales figure was obtained.

Comp*	***Participant's position****	***YC***	***YCP***	***Own***	***Industry type***	***Size***	***Value***
A	Finance manager	8	5	FO	Real estate	50	50
B	Chief financial officer	3	3	FO	Manufacturing (consumer products)	5,000	125
C	Marketing manager	5	2	DO	IT-services	240	Daily sales of AUD 1.5 million**
D	R&D manager, production manager	9	5	FO	Life insurance	1,500	75
E	Accounting manager	10	5	DO	Construction	10,400	380
F	Planning manager, financial controller	10	5	FO	Manufacturing (beverage)	3,000	200-300
G	Chief financial officer	11	8	DO	Trading (medicine and equipment)	140	10

According to previous studies (e.g. Evangelista and Hau, 2009; Luo, Slotegraaf, and Pan, 2006; Nguyen et al., 2018), targeted participants need to have at least two years of working experience within their current organisations to ensure that they have adequate knowledge about the research issues. Potential participants were initially contacted by email. If they agreed to participate in the project, a meeting was scheduled. Participants were selected based on the following criteria: (1) ownership (domestic and foreign), (2) industry type, (3) presence of a marketing department, and (4) organisational size. The list of participants and demographic information is shown in Table 1.

2.3 The interview process

A semi-structured interview, as suggested by Creswell (2009), was adopted. Since the research site was Vietnam, Vietnamese was the language used in most of the interviews. Due to the sensitivity of the topic of coordination and competition between functional departments (Massey and Dawes, 2007), the interviews were conducted in a safe and convenient location that could protect the participants' privacy to the greatest extent possible (e.g. the participant's office or a quiet, private room in a café bar).

On average, the interviews lasted about one hour, plus 15 minutes to confirm the participants' responses. The questions for the in-depth interviews were mostly open-ended to encourage unstructured talk from the participants about their experiences and opinions and to obtain as many details on the research issues as possible. The information obtained during the interview was tape-recorded (subject to the agreement of the participants) and then was transcribed. The transcripts served as the primary source of data for the qualitative analysis. The depth-interview guide is shown in Appendix 1.

3. RESEARCH RESULTS

To investigate knowledge sharing between marketing and other departments, this study focused only on the relationships between marketing, sales, manufacturing or production, accounting and finance, and R&D. This is because these departments are likely to share and receive knowledge from the marketing department (Luo, Slotegraaf, and Pan, 2006). Knowledge shared between these departments can be classified as knowledge inflows (received) and outflows (shared) from the perspective of the marketing department. Knowledge includes information and know-how (experience) (Kogut and Zander, 1992); therefore, it should be noted that the term *knowledge* adopted in this study includes *information*, particularly in the context of the informants in the depth interviews.

3.1 Knowledge received by the marketing department

Consistent with the literature, the knowledge inflows of marketing departments according to the informants include (1) market knowledge (customer and competitor information, and customer feedback) from sales departments, (2) technological knowledge (product information and product customisation) from manufacturing or production and R&D departments, and (3) financial knowledge (funding, product costing and pricing) from accounting and finance departments.

Regarding the purpose of the cross-functional shared knowledge, the exchange of technological and product knowledge during interactions with other departments can help marketing departments to develop effective marketing plans and make various marketing decisions. The head of R&D and production of company B discussed the interaction between the marketing department and the R&D and production departments:

> "My production department and R&D department have to share technology and product information with the marketing department and make sure it understands the purposes of products designed for related groups of customers, and why we have to sell these products to these groups of customers. Thus, the marketing department can develop efficient and effective advertising plans without misleading customers. It has to design advertising slogans and describe the rights of customers; to make sure they understand about the products and to attract them via many channels such as brochures, television, newspapers or customer meetings."

In terms of financial knowledge, marketing departments receive financial knowledge from the accounting and finance departments for

market segment decisions and pricing schemes. An example was provided by the financial controller of company F:

> "The marketing department has to work with the finance department to receive information about the costing, pricing, cost of goods manufactured so that they can analyse and make decisions for each market segment."

Similarly, the chief financial officer of company G talked about the use of financial information from the marketing department:

> "The marketing department usually contacts the accounting and finance departments to receive financial information relevant to its work, such as developing their functional product lines. Financial knowledge received from the marketing department includes banking information, funding needs, and credit lines offered from banks. Therefore, the marketing department can participate in some bidding programs. The purpose of financial knowledge is to improve the competitiveness of pricing schemes as compared with the competitors."

This information sharing relationship at the interface between marketing and accounting and finance is also linked to budgets. Accordingly, marketing departments receive budget information from finance departments. This was highlighted in the words of the marketing manager from company C:

> "The marketing department also needs information about allocated budgets; although the amount of the budget allocated to our department has been predetermined by the board of management, we need to know how much budget is left for us so that we can propose good business alternatives during the financial year."

3.2 Knowledge shared by the marketing department

The information shared by the marketing department mostly includes market demands, market movements, consumer market insights, customer preferences and feedback, and product information. The receivers of the

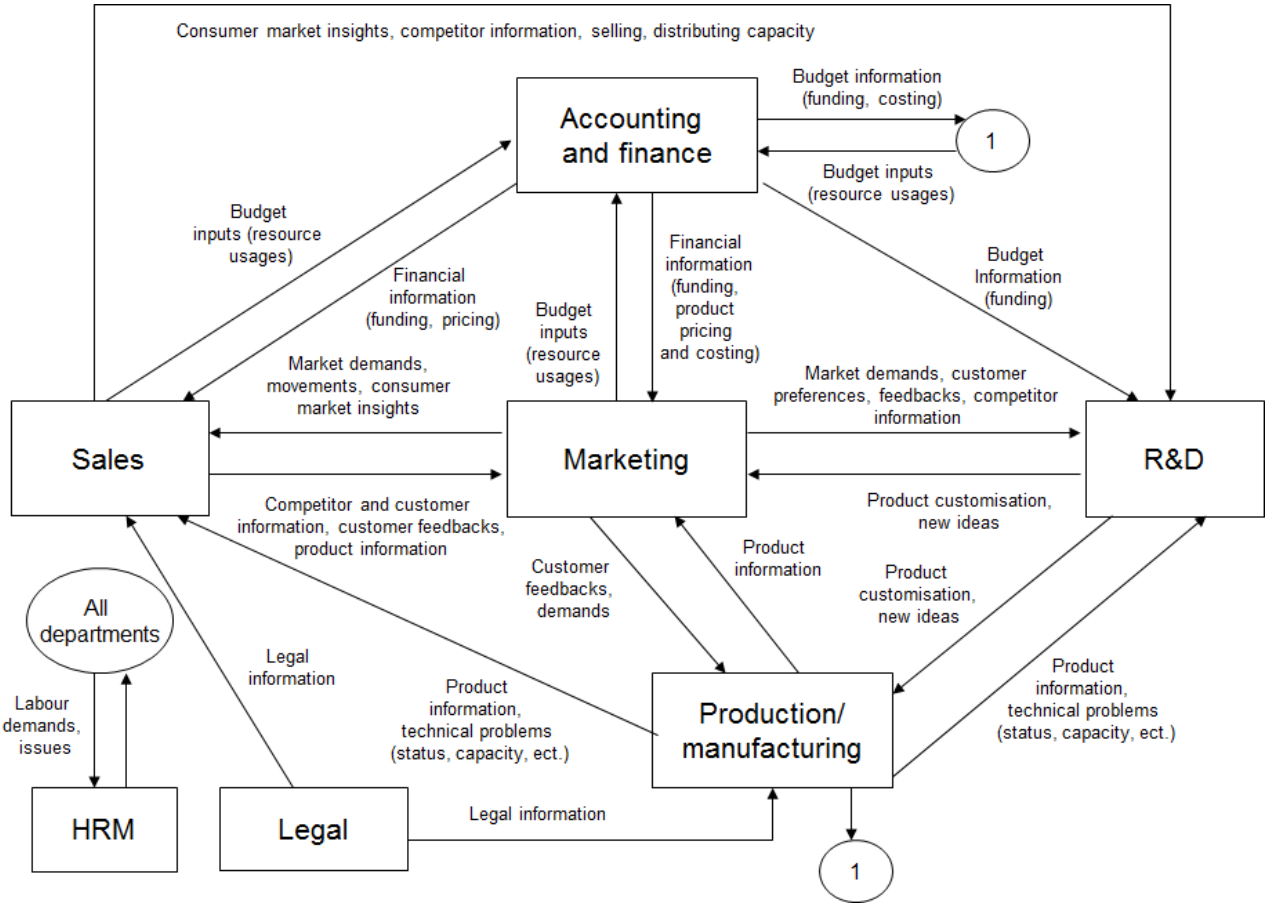

Figure 1 Cross-functional knowledge sharing between marketing and other departments from the depth interviews.

information include the sales, R&D, and manufacturing or production departments. The marketing department also shares budget information (e.g. sales budget) and resource usages (labour, capital needed) as part of the financial knowledge shared with the accounting and finance departments. The resources used by marketing departments include labour, and the financial resources needed to perform their activities (e.g. advertising and marketing campaigns). This information is internally developed by the marketing department or received from other departments (see Figure 1). These observations were reflected in the words of the marketing manager from company C:

> "My marketing department supplies internal reports to other departments monthly. The purpose is to describe market demands, market trends, the size of the market as well as the purchasing power of customers, the partners we have contacted, and the potential of future partners. The other purpose of the shared information from the marketing department is to show the department's potentials to other departments, to let them know what we have done, what we have achieved, and how we have succeeded."

These findings were also evident during the interview with the head of R&D and production from company D:

> "Usually, the marketing department has to do market research about the new products of competitors. The marketing department gives feedback on the market information to the R&D department so that the R&D department can create ideas about new and competing products."

Similarly, the financial controller of company F shared his/her own view about the knowledge outflows from the marketing department in terms of both strategic and operational levels:

> "At the strategic level […], the marketing department has to share its market information, such as their forecasts about the potential developments or movements in the market, consumer preferences, and their changes. If a given strategy of the company is to catch the market trends, this information will be shared by the marketing department. Based on this information, the marketing department has to identify the products' positions in the market [….]. Thus, it has to work out its aims and product target outputs […]. The marketing department shares this information with other departments. With this information provided by the marketing department, other departments, such as production and sales, will determine whether their capabilities can meet the target outputs.
>
> "From the operational level, the marketing department shares information regarding the aims or the objectives of the products' specifications with other departments, such as R&D, so that R&D will work for it. Even for the case of a wrapping design for a product, the marketing department needs a unique wrapping design; it will share the related information about the ideas of wrapping with the R&D department. Also, the finance department needs to receive this piece of information so that it can work out the cost of wrapping as a component of production costs."

Moreover, there is a strong knowledge-sharing relationship between marketing departments and accounting and finance departments in terms of financial information. The chief financial officer of company G stated that:

> "The marketing and sales departments usually contact the accounting department to share operating information via the customer order system and the relationships between them and customers concerning the debt collection information […] and customer credit lines."

Figure 1 summarises the depth-interview results, indicating overall cross-functional knowledge sharing between marketing and other departments such as sales, accounting and finance, R&D, and production and manufacturing, during their interactions.

3.3 The antecedents of knowledge sharing

3.3.1 Cross-functional coordination

The purpose of the depth interviews was to determine whether the coordination mechanisms stated in the proposed model, including decentralisation, formalisation,

lateral relations, informal networking and shared vision, are adopted in organisations. The depth interviews also identified whether these mechanisms promote cross-functional knowledge sharing. This section presents the responses of the informants during the depth interviews regarding the presence of these coordination mechanisms in their respective organisations and the effects of the coordination mechanisms on cross-functional knowledge sharing.

3.3.2 Decentralisation

One of the key mechanisms identified in the literature used for cross-functional knowledge sharing is decentralisation. As explained earlier, decentralisation refers to the extent to which major decisions are made at lower levels of the organisational hierarchy. Therefore, decentralisation is measured by the level of autonomy of employees in terms of making decisions. The observations from the depth interviews showed that the level of decentralisation varied among participant organisations. Some organisations, for example company G, maintain a decentralised structure. These organisations allow their departments to communicate and share knowledge freely. For instance, one of the informants, the chief financial officer of company G, pointed out that:

> "Basically, people can share information and knowledge freely as long as they don't go too far, for example, sharing the company's confidential information with outsiders that can cause loss to the company or ruin the company's reputation."

The interview results showed that there are some organisations with a centralised structure (e.g. companies B, C, D and F). These organisations have established rules that govern cross-functional knowledge sharing according to many levels of confidentiality. The marketing manager of company C described his/her company practice:

> "There are many layers of information sharing to protect confidential information. For example, normal information that can be publicised can be shared among employees from different departments. [....] we divide the levels of confidentiality into different colours according to different layers, blue, yellow and red. For example, the information with a red colour label can be shared only among the members of the management team; on a rare occasion, it can be passed to senior managers or people who are authorised. The lower-level employees, depending on their duties, can obtain and know information with a yellow label. [...]. Information relating to a particular project is restricted to only the members of this project, and is not shared with anyone."

However, in some organisations (e.g. companies B, D and F), a lower level of decentralisation has been chosen to control the knowledge flows between departments. The financial controller of company F highlighted that:

> "Actually, there is no knowledge sharing in a spontaneous way. Knowledge sharing should be under the control of some procedures. Not all information can be shared between employees at all levels. Private or highly confidential information can only be shared between top managers."

Another informant, the R&D and production manager of company D, insisted that:

> "Our company requires departments to share only relevant knowledge. Our company defines some levels of information sharing; for example, the strictly confidential level refers to information that cannot be shared with everyone. There are polices that clearly define which information can be shared and which cannot be shared as there are many information sharing levels."

Another example of the use of limited decentralisation to control the information flows between departments was given by the chief financial officer of company B:

> "My company also has various information sharing levels such as 'red status', 'strictly confidential', 'for internal use', or 'information that can be publicised'. Even if a piece of information can be publicised, only some departments, not all the departments, have a right to publicise it."

It was observed that in the organisations with a decentralised structure, departments have more flexibility to share knowledge with others. It could be inferred from the data from

the depth interviews that decentralisation has a positive relationship with cross-functional knowledge sharing. This means that a higher (lower) level of decentralisation can increase (decrease) the level of cross-functional knowledge sharing.

3.3.3 Formalisation

As defined earlier, formalisation refers to the extent to which policies, rules, task descriptions and procedures are written down in manuals and established as standard routines (Willem and Buelens 2007). The depth-interview data showed that some organisations (e.g. companies B, D, E and F) have adopted standardised working manuals, agendas and work procedures. For example, the R&D and production manager from company D asked:

> "What does this working manual cover? It does not specify how to share information cross-functionally; however, it specifies the departments' responsibilities and which types of information departments can share to accomplish their assigned tasks."

In these organisations with some level of formalisation, information and knowledge exchange between departments is supported. It was observed that organisations with a high level of formalisation with standardised work procedures can encourage communication between departments. For example, the financial controller from company F noted that:

> "We have specified the roles and tasks for each department and who will share information. They are documented and then sent to related departments so that the departments can follow up, coordinate and share information."

Another example was given by the accounting manager from company E, who argued that formalisation allows departments to understand and cooperate with each other, acting as a vehicle for knowledge sharing:

> "Our company [...] has implemented an internal network and the ISO [International Organisation for Standardisation] system. Thus, information can be shared cross-functionally [...]. Information shared in our internal network also includes details of daily working schedules, procedures and predetermined tasks. Using the internal network, departments will know which information other departments need so that they can coordinate more effectively via information and knowledge sharing."

Similarly, the chief financial officer of company B emphasised the importance of formalisation for information and knowledge sharing within his/her organisation:

> "If the procedures are formalised, the information will be transferred to the right people and the right places where it should go to."

The interview results from companies B, E and F showed that the formalisation of policies and procedures could help companies coordinate different departments to share knowledge.

3.3.4 Lateral relations

Most of the informants reported that lateral relations used in their respective organisations are in the form of cross-functional teams or projects, such as new product development and information system development (Willem and Buelens, 2007). For example, the R&D and production manager from company D noted that:

> "There are some projects, for example, a project for developing a new product. This project includes many people from different departments such as R&D, marketing and production. Another example is a kind of project to improve customer services. [...]. This project involves many departments, including production, IT [Information Technology], R&D and customer services. The focus of this project depends on the strategy of our company at the given time. For each project, there is a project leader who coordinates related departments."

The interview results showed that lateral relations in companies B and G, such as cross-functional teams, lead to cross-functional knowledge sharing. The chief financial officer from company G talked about a system development project in his/her company that requires information and experience sharing between marketing and other departments:

> "Currently, we are developing an ERP [Enterprise Resource Planning] system with ORACLE software. To develop the system

> successfully, our company has formed a project team including some key persons from IT, marketing and accounting and related departments. [...]. They have to share experiences and information during the project development."

The role of lateral relations in promoting information and knowledge exchange between marketing and other departments was also observed during the interview of the chief financial officer from company B:

> "Cross-functional knowledge sharing can be promoted as the company organises many project teams with a lot of input from different departments. For each project, we nominate a person as the project sponsor and other members who are from different departments. This is because decisions relating to a project can be made based on the input from many functions. The project members, of course, are the people who have to participate and share information and knowledge. Temporarily, there are some cross-functional training sections, for example, when the marketing department needs knowledge about management accounting so that they can apply what they have learned to manage products in a flexible way."

The depth interview results from companies B and G showed that these organisations do share knowledge by using lateral relationships or lateral interactions.

3.3.5 Informal networking

Informal networking refers to the informal relationships between employees from different departments. When interviewed about informal networking, most of the informants focused on the corporate social events that their companies organise for their employees. The finance manager of company A commented that:

> "According to the regulations of our company, a family event is organised once per year. This event can be held somewhere far from the city. Family members of our employees from different departments are encouraged to participate."

Talking about corporate social events, the accounting manager from company E indicated that:

> "As a state-owned enterprise, our company has to follow the government policy to let our people have many social events during the years, for example, lunar New Year and public holidays. Our company provides employees with not only money but also spirit [non-monetary benefits such as encouragement] so that they can have refreshment and gain a strong commitment to work. Sometimes, people can go out for picnics combined with some classes about technology transfer."

Similarly, the marketing manager from company C noted that:

> "Our company provides a lot of opportunities for people from different departments to participate in various events, meetings, holiday trips at the end of each year, and cross-functional parties so that we can have stronger connections to work with each other easily."

The role of informal relationships between employees from different departments in exchanging information and knowledge was observed during the interview with the finance manager from company A:

> "People can have strong connections during social events. During work, maybe they do not understand each other; however, after the picnics, company parties, or other social events, they can learn from each other to have a better understanding. Thus, they can share more work-related information and knowledge via these social activities."

The above statements of companies A, C and E showed that informal networking could help create mutual understanding between employees from different departments, thereby contributing to cross-functional information sharing. These observations suggest that there is a positive relationship between informal networking and cross-functional knowledge sharing.

3.3.6 Shared vision

Shared vision was defined as the agreement on the organisation's vision across all hierarchical levels. According to the views of most of the informants, shared vision refers to 'sharing goals', 'common corporate goals', or 'organisational targets' following

organisational strategies, which is determined by and shared by the top managers with the lower levels of the organisational hierarchy. Examples of shared vision were evident in the interviews of some of the informants, as follows:

> "Shared vision is sharing goals, relating to the strategies developed every year, depending upon the strategy for each year. Every year, our company develops different key performance indicators with targeted numbers." [The R&D and production manager from company D]

> "At the departmental level, departments have their objectives; however, there is a shared vision at the organisational level. They have to follow the common goals of our company." [The marketing manager from company C]

> "[...] people, at least one time per quarter have to be informed about the company's shared vision. At the beginning of each year, the board of management formulates a corporate vision. Our company has an overall ODSM [Objectives, Goals, Strategies and Management] model to develop visions as well as corporate strategic plans." [The chief financial officer from company B]

> "The company organises some briefings on a six-month basis. The purpose is to summarise the overall business performance and make a plan and targets for the forthcoming periods. The company allocates work to departments and provides a guideline to them so that they can coordinate towards common goals." [The chief financial officer from company G]

Interview data showed that shared visions could provide departments with mutual understanding and align their efforts towards organisational common goals, allowing knowledge to be shared smoothly. For example, the chief financial officer from company G indicated that:

> "Of course, shared vision is good for knowledge sharing between business units. First, shared vision creates a friendly environment for people to interact directly and show their ideas and opinions. Through seminars and meetings, all people from all departments can share and receive information in a formal way so that they can understand the company's business thoroughly."

The financial controller from company F noted that shared vision has a role in disseminating information and experience between departments:

> "At the beginning of the year, we have our plans… the targets for the year… and the departments have to sit together, we can call the meetings "cascade meetings" … and the targets will be transferred from the top level to the lower level of the organisational hierarchy. During the meeting, departments will share their information and experience about how to support others towards achieving mutual goals."

The observations from the depth interviews of companies F and G suggested that shared vision can promote cooperation and interaction between departments and thus enhance the sharing of information and experience. This provides additional insight into the effect of shared vision on cross-functional knowledge sharing.

3.4 Cross-Functional Competition

3.4.1 Types of cross-functional competition

Cross-functional competition was defined as the extent to which departments compete for limited tangible and intangible resources (Luo, Slotegraaf, and Pan, 2006). The observations from the depth interviews reflected these aspects of cross-functional competition. Competition can be for internal resources relates to labour, funding and capital. The resource allocation decisions of the board of management can be a cause of competition across departments. An example was given by the CFO of company G:

> "Besides assigning business targets to operating departments, the board of management also provides these departments with resources such as labour, capital and services. Of course, some departments may have more priorities in terms of capital allocation, labour and policy. The consequence is that the remaining departments may raise their voices, and then cross-functional competition occurs."

The marketing manager from company C claimed that cross-functional competition in his/her company was the consequence of the conflict of interests between departments regarding limited tangible resources:

> "The marketing department is competing with other departments when many events are going to be held. The marketing programs and advertising campaigns need a lot of money, and sometimes we get into trouble with our budget that is predetermined by the finance department. Other departments are not happy. They claim that our marketing expenditure is too high. The finance department requires us to specify our costs in detail, and they provide money to us in 'dribs and drabs', and thus slow down the progress of our marketing programs […].
>
> "In addition, the competition is in terms of budgeting. Every year, our company implements a cost-cutting program, then the company's resources, for example, IT capacity or money allocated to departments, are limited. Departments are competing for these resources. They need a lot of support from the company in terms of resource allocation. However, the accounting and finance departments control the budgets tightly. Thus, there are conflicts of interest between departments during the sharing of the common resources as there is a big difference between what they need and what they have."

Similarly, the R&D and product manager from company D described cross-functional competition for limited tangible resources between marketing and other departments:

> "An example of cross-functional competition is in terms of IT capacity. In our company, IT resource capacity is a constraint; however, many departments need IT support. The marketing department needs technical support for various advertising campaigns; the customer services department needs IT supports to serve their customers better. The production department needs to improve its products. It also needs IT support to develop, maintain, and upgrade the product database systems for better production customisations and precise fee calculations. Three departments require IT support and at the same time the IT resources are limited."

Besides competition for tangible resources, there is competition for intangible resources, such as departments' status when their interests conflict. An example of competition for status was shown in the talk with the CFO of company B:

> "I think cross-functional competition does exist, or even if departments have common corporate goals, they all want to show that their performance and contribution are better than those of others. […] for my understanding, there is a competition between departments in terms of time, efficiency, and effectiveness, to show they perform better and quicker. […] this kind of competition reflects and shows a higher level of importance and status of departments in the company."

Similarly, the CFO of company G expressed that:

> "The marketing department always wants to show its status as a 'special child' or 'pet' of the company […]. Several years ago, there was strong competition between the sales and marketing departments. The purpose of the top management during this time was to develop the medicine market via many distribution channels in the nearby provinces and other satellite areas. During the implementation of the distribution channels, the marketing department had shown their power and 'put their foot' on the market of the sales department. It wanted to show its good face and competed strongly with the sales department. It sold similar products for lower prices than those of the sales department while it had more advantages in terms of customer contact and information."

An example of a conflict of interest between marketing and other departments was given by the CFO of company G.

> "Marketing and sales really want to improve sales to achieve their targets; they want to sell to customers on credit without being concerned about whether these customers have the ability to pay debts […]. The consequence is that bad debts increase, and the accounting and finance departments are

blamed for a considerable increase in uncollectable debts. Thus, these departments are conflicting in terms of customers' accounts receivable and bad debt management.

"Sometimes, departments have many ways of doing things differently or even competing for ideas. Take the case of the marketing and sales departments as an example. The sales department sells products to customers with competitive prices according to different categories of customers. It always makes sure the prices are low and stable. However, the marketing department only wants to develop market share and boost revenue without being concerned about profit. Thus, these two departments are competing in terms of ideas and business approaches."

3.4.2 The impacts of competition on cross-functional knowledge sharing

The depth interview of the production and R&D manager from company D reflected his/her negative attitude towards cross-functional competition. This manager claimed that cross-functional competition had impeded knowledge sharing:

"Actually, competition reduces knowledge sharing because people want to protect the rights of their departments; therefore, they do not want to share information or knowledge with other departments. If they share information, the competing departments will know more about their departments; thus, they will take advantage of the shared information, and they will lead the competition."

The CFO from company G expressed a more neutral view, suggesting cross-functional competition can be both good and bad for cross-functional knowledge sharing:

"Competition has both positive and negative sides. The positive side of competition is that it can promote learning and growth, searching for knowledge so that people can improve themselves. The negative side of competition is that some departments can be selfish. They hide information to hinder the work of other departments. Therefore, the top managers control all the activities and monitor all competing departments so that the competing departments can go on in the right way."

From a different perspective, informants from companies B, D and E claimed that cross-functional competition induces employees' positive behaviours towards knowledge sharing. The behaviours related to learning motivation during cross-functional interactions. One informant, the CFO of company B stated that:

"I think that if the competition is based on determining which function is saying it better or more correctly, basically, it is a form of knowledge sharing. This is because they have to justify that their ideas are better than those of others. Thus, from this aspect, I agree that competition can improve knowledge sharing."

How cross-functional competition promotes cross-functional knowledge sharing via encouraging learning is reflected in the view of the R&D and production manager from company D:

"Competition facilitates learning. They can learn from the competing departments, or they can self-study. When they learn in whatever way, they can improve their knowledge to understand their competitors better so that they can do their job better. In addition, competition can promote learning motivation. The more they learn or study, the more they will be confident in knowledge sharing. Therefore, certainly, competition improves learning and sharing knowledge."

In addition, the accounting manager of company E talked about the benefit of what he/she called 'positive' or 'constructive' competition in terms of organisational learning:

"If there is positive or constructive competition, people will try their best to get rewards from the company. From the whole company perspective, it is good. Because of positive competition between departments, people have to learn and study as much as possible so that they can improve themselves to contribute to the company."

For department behaviour in terms of knowledge sharing, most of the informants

suggested that, in the presence of cross-functional competition, departments mostly want to receive knowledge from competing departments. The CFO from company B stated that:

> "You will not 'die' if you get more knowledge than normal. If you receive more knowledge, you will have more inputs for better planning and decision making. Thus, receiving knowledge from other departments will bring benefits to them. They can identify areas for improvements. They can listen to critics or attacking ideas from other departments. They can utilise them as inputs for their improvements."

In general, the observations from the depth interviews showed that the effects of cross-functional competition on cross-functional knowledge sharing are mixed because there are two different perspectives on cross-functional competition. The first perspective, consistent with previous studies (e.g. Narver and Slater 1990; Maltz and Kohli 2000), is that cross-functional competition is a barrier to cross-functional knowledge sharing. The informants from companies D and G suggested that, in the presence of competition, departments are likely to guard instead of share knowledge. This means that cross-functional competition eliminates cross-functional knowledge sharing, thus creating a real barrier to knowledge sharing. Moreover, the analysis of data from the interviews of the informants from companies B, D and E showed that cross-functional competition stimulates learning from competing departments when these departments are coordinated. Learning behaviour can be directed towards knowledge exchange between departments. This observation provides helpful qualitative insight into how cross-functional competition strengthens the effect of coordination on cross-functional knowledge sharing.

3.5 Innovativeness: The outcome of cross-functional knowledge sharing

The observations from the depth interviews showed that an important outcome of cross-functional knowledge sharing is organisational innovativeness. When interviewed about the relationship between cross-functional knowledge sharing and organisational innovativeness, most of the informants explained that, by combining different pools of knowledge and integrating various perspectives from marketing and other departments, organisations could improve their ability to innovate and adapt to market changes. For instance, the R&D and production manager from company D stated that:

> "Departments have different ideas, for example, in a product development project [….]. If the IT or accounting department shares knowledge or expertise about a work process, the work will flow smoothly and reduce the time to develop this new product. Another point is that, in a new product development project, we need information about what competitors are doing, such as the rights, the insurance premium, the insurance claim, etc. The marketing department can obtain this market intelligence and provide them to us so that we can analyse the information and provide new ideas to implement new products better. Knowledge sharing is good because we can have market information in advance so that we can approach the market carefully and respond quickly to market changes."

This above statement is in accord with the view of the accounting manager from company E, who praised the strength of knowledge combination and its effect on innovation:

> "There is an idiom: 'two heads are better than one'. When we combine the efforts and knowledge of many people from many departments, we can find a new way of doing things […]. For example, building high towers using new technologies transferred from overseas rather than using Ferro-concrete. The purpose is to shorten the build time by about two months."

The financial controller of company F added:

> "People just have only their own views; if they share knowledge with others from different departments, they can have a more comprehensive view of a problem that can satisfy many stakeholders. Thus, the innovation process is doable and relevant."

The CFO of company G emphasised the relevance of cross-functional knowledge sharing for innovativeness in terms of new product development and business process improvement:

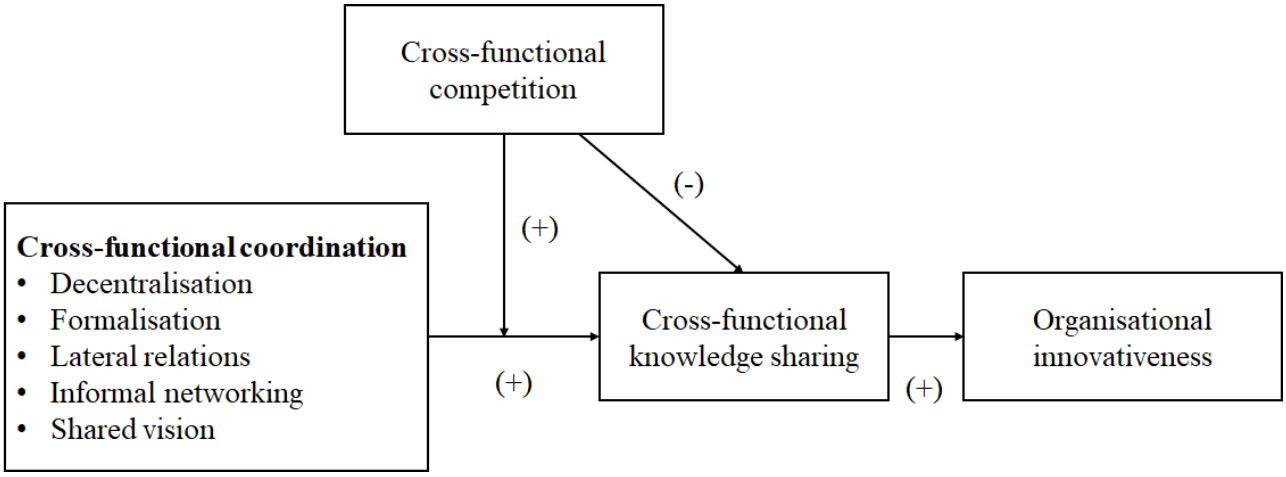

Figure 2 The coopetition model of knowledge sharing.

> "Knowledge sharing between departments can allow new ideas to be developed. […] The knowledge sharing process can facilitate our learning from the market to search for new products or new equipment to widen our market share and improve our revenue."

The depth interviews from companies D, E, F and G provided additional insight into the positive relationship between cross-functional knowledge sharing and organisational innovativeness.

From the qualitative analysis results, the coopetition model of knowledge sharing was developed (Figure 2). The model shows the interaction between five different cross-functional coordination mechanisms (decentralisation, formalisation, lateral relations, informal networking, and shared vision) and cross-functional competition, which can promote cross-functional knowledge sharing, which in turn, enhance organisational innovativeness. Interestingly, cross-functional coopetition can be viewed as a double-edged sword, while it can strengthen the effect of cross-functional coordination in enhancing knowledge sharing; however, it eliminates knowledge sharing at the same time.

4. CONCLUSION AND IMPLICATIONS

This study led to two main conclusions about cross-functional knowledge sharing in the context of Vietnam. First, the observations from the depth interviews showed that cross-functional competition could positively moderate the relationship between coordination mechanisms and cross-functional knowledge sharing. Second, knowledge sharing that promotes organisational innovativeness was observed in most of the interviews. The qualitative results indicated that the joint effect of coordination and competition potentially promotes knowledge sharing and innovativeness, and this effect can be applied in the context of Vietnam.

The study's results with the proposed model and hypotheses can help to answer the study's research questions: (1) the potential effect of different coordination mechanisms on cross-functional knowledge sharing was found (RQ1); (2) a coopetition framework could be built and applied to explain the level of knowledge sharing (RQ2), and (3) knowledge shared between competing departments under the governance of various coordination mechanisms can enhance organisational innovativeness (RQ3).

From a theoretical perspective, this study is significant because it adds to a debate over the value of cross-functional competition. There is a notion that competition between organisational functions is always unfavourable and should be avoided (e.g. Narver and Slater, 1990; Maltz and Kohli, 2000; Jaworski and Kohli, 1993). Conversely, there is a claim that cross-functional competition is not always unfavourable and can even generate competitive benefits in terms of learning, innovation and performance (Luo, Slotegraaf, and Pan, 2006; Lado, Boyd, and Hanlon, 1997). Adopting a coopetition framework, this study examines the potential significance of coordination in fostering knowledge sharing between marketing and other departments to improve organisational performance in the presence of cross-functional competition.

This study is also necessary from a practical standpoint because organisational

performance may depend on the capability of departments to share knowledge in the presence of competition (Luo, Slotegraaf, and Pan, 2006). If the potential value of coordination in knowledge sharing between marketing and competing departments is tested and confirmed, organisations should be able to manage these conflicting processes of coordination and competition to achieve superior performance.

To extend the current body of literature, further avenues for research are suggested. First, this study focused only on the extent of cross-functional knowledge sharing, assuming that knowledge sharing is unidimensional. Future research should be undertaken to investigate multi-dimensions of cross-functional knowledge sharing beyond the extent, such as quality and speed. Quality of knowledge sharing refers to the relevance, accuracy, reliability and timeliness of the chain of wisdom of knowledge shared (Low and Mohr, 2001); the speed of knowledge sharing relates to how quickly and efficiently knowledge is shared (Hansen, 2002). These two dimensions are worth investigating because they would provide a more comprehensive understanding of knowledge sharing. Second, this study did not specify the two significant processes of knowledge sharing: knowledge donating and knowledge collecting. Knowledge donating refers to communicating information to others while knowledge collecting relates to consulting others to share their knowledge (van den Hoof and De Ridder, 2004). Further studies to investigate these two processes are needed because they may provide more insight into the knowledge flows at the interfaces between marketing departments and other departments. Finally, the proposed coopetition model of knowledge sharing should be further tested quantitatively using longitudinal research designs in future research.

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APPENDIX 1. Depth interview guide

Knowledge sharing	**Key question 1** Can you please describe the process of sharing information and experience between different departments in your company? Potential follow-up questions • What kinds of information or knowledge are being shared between marketing and other departments in your company? • How do they share the information or knowledge? • How do they use the information or knowledge?
Coordination	**Key question 2** Can you please describe how your company encourages or supports different departments to share information or knowledge with each other? Potential follow-up questions • Are departments allowed to share information or knowledge without getting approval from top management? • Are there policies, rules, task descriptions, or procedures used in your company to promote knowledge sharing between different departments? • Does your company organise any social events (e.g. company picnic or party)? • Does your company organise project teams that include people from different departments? • Is there an agreement on the company's vision across all departments? • Do you think these above activities promote knowledge sharing?
Competition	**Key question 3** I have heard some people in the business community say that competition between different departments (e.g. for example, for status, capital, and labour) normally happens in multi-unit companies. What do you think? Potential follow-up questions • Can you describe some situations where there is interdepartmental competition in your company?

Key question 4
Some people say that competition between departments eliminates knowledge sharing between them, and others say that competition promotes knowledge sharing between departments. What do you think?
Potential follow-up questions
- In the presence of competition, how do the departments behave in terms of knowledge sharing?
- Do they want to seek knowledge from each other even if they are competing with each other? Why or why not?

Innovativeness

Key question 5
What do you think about the relationship between cross-functional knowledge sharing and the extent to which your company adapts to new ideas (or willingness to change)? Can you explain your view?

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Market intelligence on business performance: The mediating role of specialized marketing capabilities

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ABSTRACT This study aims to investigate and examine the mediating role of specialized marketing capabilities (SMC) in the relationship between market intelligence (MI) and business performance (BP) on Indonesia retail fashion SMEs. This study used 330 SMEs with maximum assets of 10 billion Indonesian Rupiah (IDR) and a maximum sales turnover of IDR 50 billion per year. We examined the relationship between MI dimensions: market intelligence generation (MIG), market intelligence dissemination (MID), and responsiveness to market intelligence (RMI) with SMC and BP by using a combination of SPSS and SEM with AMOS 22.0. A Sobel test was used to test the mediating role of SMC in the relationship between MI dimensions and BP. The results of the data analysis show that SMC has an important role as a partial mediator in the relationship between MIG, MID, and RMI with BP. This study suggests that owners or managers of SMEs recognize important market intelligence factors in increasing SMC and BP. This helps them make better investment decisions in developing the right combination of SMC to increase BP. This research integrates MI dimensions and one dimension of marketing capabilities, i.e. SMC, into an empirical model to gain a deeper understanding of the relationship between MI and SMC and how these factors form BP.

KEYWORDS Business performance, market intelligence dissemination, market intelligence generation, responsiveness to market intelligence, specialized marketing capabilities

1. INTRODUCTION

Fashion is part of the creative industry that is quite developed in Indonesia and provides a second contribution after the culinary industry. The share of global online revenue in the Indonesian fashion market reached 20% in 2018 and is expected to continue to grow. It is estimated that 35% of the total fashion market revenue will be generated through online sales by 2024. Most of the fashion industry actors are small and medium enterprises (SMEs), defined as a company that has a maximum annual sales turnover of IDR 50 billion and maximum assets of IDR 10 billion (Law on SMEs). This industry is very dynamic because it is related to products or markets that are stylish and tend to survive in the short term (Christopher et al., 2004). Popular culture has a major influence on the formation of fashion trends, thus companies will be successful if they have the ability to respond to rapid changes in fashion trends and interpret them into products sold in stores with the shortest possible time (Bruce et al., 2006). In such industries, business intelligence, competitive intelligence and market intelligence become sources of competitive advantage and superior performance (Pirttimäki, 2007).

Business intelligence (BI) enables companies to be better able to collect, process,

store and present data about customers, competitors, technology, markets, products, and the environment (Kubina et al., 2015); enables managers to work with dynamic data changes, analyze and understand the data to get relevant information and use it efficiently (Nofal and Yusof, 2013); and enables companies to achieve competitive advantage (Pirttimäki, 2007; Adidam et al., 2012; Kubina et al., 2015). Competitive intelligence (CI) is part of BI and serves as a strategic tool to facilitate the identification of opportunities and potential threats (Toit, 2013). CI allows companies to be better able to obtain and interpret competitor information to increase their competence in capturing opportunities in the market (Søilen, 2017). CI also enables companies to be more capable in the process of gathering competitor information in the competitive environment and uses this information for decision making and performance improvement planning (Wright et al., 2009). Hence, CI is an important source of information for strategic planning and other activities because it provides information about current and future competitor behavior (Trong Tuan, 2013). Market intelligence (MI) is an important pillar of BI. MI is designed to meet the four needs of business managers, i.e. identifying opportunities and threats from the market environment, helping managers know more about competitors, helping prevent competitors from becoming active, and helping with effective marketing decision making (Li and Li, 2013). This research is focused on MI and its impact on specialized marketing capabilities (SMC) and business performance (BP).

In the last three decades, there have been many studies focusing on the relationship between MI and BP. For example, they focus on MI as a key process in developing new products (Haverila and Ashill, 2011), as an important moderator in the relationship between marketing mix adaptation and export performance (Navarro-García et al., 2016), which plays an important role in improving supply change performance and company performance (Jermsittiparsert et al., 2019). Such studies, in general, have shown that MI is the key to early success in creating superior BP (Lee et al., 2015; Qu and Zhang, 2015; Takata, 2016). In several studies, MI is an implementation of a market-oriented corporate culture, which seeks information about customers and competitors and inter-functional coordination (Narver and Slater, 1990), or is active in implementing market intelligence generation, market intelligence dissemination, and responsiveness to market intelligence (Jaworski and Kohli, 1993).

Market-oriented culture is essential for business performance because gathering external information about customer needs and competitor strategies, sharing information between departments and using this information to respond to the dynamics of market changes will help companies create superior customer value over time (Slater and Narver, 2000; Kahn, 2001; Calantone et al., 2002; Hughes et al., 2008). The main characteristics of market-oriented companies are developing MI, such as: (1) actively gathering information about the needs and desires of existing and anticipated customers, as well as competitive information and technology; (2) disseminating market intelligence to other relevant organizational departments, and (3) using intelligence to respond to changes in the market environment (Jaworski and Kohli, 1993; Carbonell and Rodríguez Escudero, 2010). In some studies, the three main characteristics are considered to be reflective indicators of market orientation, while other studies describe the three characteristics as disaggregated market intelligence variables (Carbonell and Rodríguez Escudero, 2010).

Market orientation (MO) was initially introduced as a reflective composite, and some researchers have investigated whether or how this single composite is related to other variables such as BP (Dong et. al., 2016). While many studies report a significant direct positive effect of MO on performance (Kirca et. al., 2005; Morgan et. al., 2009b; Qu and Zhang, 2015; Beneke et. al., 2016), other studies revealed insignificant relationships (Langerak et. al., 2004; Huhtala et. al., 2014; Kajalo and Lindblom, 2015). Chao and Spillan (2010) show that two dimensions of MO, namely intelligence generation and intelligence dissemination, are not determinants of business performance in the United States and Taiwan. This difference might suggest mediators that have not been handled properly, measurement tools that are flawed and incorrect, or a variety of data collection or analysis techniques used. It is also possible that these conflicting findings result from the fact that fragmented MO components can be related to BP in a unique way (Dong et. al., 2016).

In addition to the research gap above, several studies have investigated the potential mediators of marketing capabilities in the relationship between MI and BP. For example, Alnawas and Hemsley-Brown (2019) placed several dimensions of marketing capabilities, i.e. branding, customer relationships and service innovation capabilities. Zehir et. al. (2015), Ho et. al. (2017) and Huhtala et. al. (2014) used innovation capability and Murray et. al. (2011) utilized pricing, product development and marketing communication capabilities. Such research is needed to understand the route of MI in affecting BP. From a strategic point of view, it will not be complete if the practitioner does not understand the process flow that explains the sequence of events from MI to superior BP. By explaining the mediator in the relationship between MI and BP, it will provide more detailed insights for managers on how MI works and how it can be useful as a strategic corporate capability. Thus, this research tries to fill this knowledge gap by placing SMC as important mediators in the relationship between MI and BP. This is as suggested by Alnawas and Hemsley-Brown (2019) about the importance of SMC, which mediates the relationship between MI and BP.

SMC is a core element of marketing capabilities for four reasons. First, SMC determine the effectiveness of the marketing strategy decision and marketing strategy implementation (Morgan, 2012; Morgan et. al., 2012). Second, SMC determines superior BP (Morgan et. al., 2009b). Third, SMC is a source of company positional advantages (Morgan et. al., 2004). Fourth, the increasing level of competition, technological developments in the market and shorter product life cycles pressure companies to increase their capacity in developing SMC. Moreover, up to now, research conducted on the impact of MI on SMC in the retail fashion industry is still not widely found. Sometimes, it is found that MI and SMC are only used as independent variables that affect BP (Morgan et. al., 2009b). Now, opportunities are present to advance understanding of the relationship between MI, SMC, and BP. In this study, MI is defined as a set of behaviors, organizational processes or a series of activities related to market intelligence generation (MIG); market intelligence dissemination (MID); and responsiveness to market intelligence (RMI) (Kohli and Jaworski, 1990; Carbonell and Rodríguez Escudero, 2010; Long et. al., 2017).

Two questions that must be answered by this study are: (1) Does SMC act as an important mediator in the relationship between MI and BP? and (2) If it acts as a mediator, is it classified as a full mediator or a partial mediator? Therefore, this study aims to examine the mediating role of SMC in facilitating the relationship of various dimensions of market orientation with BP. The findings in this study are expected to contribute to the development of the strategic management literature, especially those relating to the relationship among market intelligence, marketing capability, and business performance in the retail fashion industry.

2. THEORETICAL FRAMEWORK

2.1 Market intelligence (MI)

Related to integrated intelligence, Calof et al. (2017) explains that for the strong insights of intelligence in all business environments, and collaboration with functional fields and other disciplines, to get a comprehensive picture of the market in current and future conditions, the authors place MI as part of the marketing discipline that contributes to critical decisions that influence and encourage companies to gain competitive advantage. Executive information systems with integrated CI will improve organizational strategy performance (Calof et al., 2017). MI is an important marketing concept foundation for market-focused strategic planning and implementation. The management of generation, dissemination, and organizational response to MI is very important in increasing organizational effectiveness and efficiency (Gebhardt et al., 2019). MI is also defined as a continuous and cyclic process designed to continuously produce knowledge from raw and scattered data and information, and also the ideas about how to apply this knowledge to strategic marketing management for the business sector (Jamil, 2013).

From a behavioral perspective, MI is identical to market orientation, which emphasizes the activities of collecting, disseminating, and using tighter market information to identify customer requests and preferences (Ajay K Kohli and Jaworski, 1990), increasing innovation speed (Carbonell and Rodríguez Escudero, 2010), improving the performance of new products (Carbonell and Rodríguez Escudero, 2010; Najafi-Tavani et al., 2016), and improving company performance

(Panigyrakis and Theodoridis, 2007; Long et al., 2017). Research developments related to MO have suggested that MI should be investigated through a disaggregated approach (Carbonell and Rodríguez Escudero, 2010; Long et. al., 2017).

First, MIG is a dimension of MI related to company activities in gathering primary and secondary information from organizational stakeholders such as competitors, suppliers, intermediaries and market forces such as social, cultural, regulatory and macroeconomic factors (Matsuno and Mentzer, 2000). MIG is a concrete action from company intelligence in gathering market information to monitor and respond to customer needs and preferences, as well as an analysis of how they can be influenced by factors such as government regulation, technology, competitors, and other environmental forces (Long et. al., 2017). MIG is also an activity to collect information related to trends and changes in the market or identify other forces that influence the customer needs and demands (Dong et. al., 2016). Hence, MIG is the process of gathering market information, assessing customer needs/preferences and forces that influence the development of those needs (Kara et al., 2005). According to Long et. al. (2017), companies with good market intelligence generation are at least visible through three business activities. These are meetings with customers at least once a year to find what products or services they will need in the future, when individuals from the service department interact directly with customers to learn how to better serve their needs, and when they conduct end-user surveys at least once a year to assess the quality of product and service offerings.

Second, MID is a dimension of MI relating to the extent to which information is distributed, shared and discussed among relevant users in an organization formally or informally (Moorman, 1995). MID describes communication and transfer of intelligence information to all departments and individuals in an organization through formal and informal channels (Long et. al., 2017). Sharing information openly with all parties involved in the product and market development process will lead to a better understanding of product requirements and the range of capabilities or limitations of each party (Carbonell and Rodríguez Escudero, 2010). Thus, MID is the process and level of market information exchange in an organization both formally and informally (Kara et al., 2005). According to (Long et. al., 2017), there are at least four characteristics of a company with good MID. These are: (a) many informal discussions in the business unit among employees regarding competitors' tactics or strategies, (b) sales force in each business unit spending time to discuss future customer needs with other functional departments, (c) when something important happens in the main customer market, all business units recognized it in a short time, and (d) data about customer satisfaction and/or dissatisfaction is disseminated at all levels in the business unit systematically.

Third, RMI is an action taken in response to intelligence generated and disseminated (Jaworski and Kohli, 1993). RMI is related to the extent to which companies react to market signals and opportunities and potential market threats (Wei et al., 2013). It also deals with corporate-level strategic actions to respond to market information generated from competitors, customers and other sources (Homburg et al., 2007; Wei et al., 2013). Rapid response to changes in the environment (customers and competitors) is a critical success factor for the company. Responses related to competitors are most effectively achieved by designing processes that generate competitive intelligence, and disseminate, analyze, and store information related to competitors, while the response associated with the customer depends on the orientation of values, beliefs, and norms of the customer (Homburg et al., 2007). Long et al. (2017) explained that responsive companies are seen to have at least three characteristics: (a) they are fast in responding to significant changes in competitor pricing structures, (b) when companies find that customers are dissatisfied with the quality of service they get, they immediately take corrective action, and (c) when the company learns that the customer wants to modify the product or service, the department involved makes a joint effort to do so.

2.2 Specialized marketing capabilities (SMC)

Marketing capabilities are an integrative process designed to apply the knowledge, skills and collective resources of an enterprise to market-related business needs, enabling businesses to add value to their goods and services, adapt to market conditions, take advantage of market opportunities and meet competitive threats (Day, 1994a; Vorhies and Morgan, 2005; Kajalo and Lindblom, 2015).

This includes SMC, the capability of the process in supporting the company's marketing strategy related to the concrete elements of the marketing mix, sales and market research (Morgan et. al., 2009b; Merrilees et. al., 2011; Trez et. al., 2012; Kajalo and Lindblom, 2015). SMC concerns specific functional-based processes that are used in organizations to combine and change resources (Vorhies and Morgan, 2005). SMC is usually seen as a process that includes tactical marketing programs that are usually needed to implement marketing strategies (Vorhies and Morgan, 2003). This capability is related to the classic marketing mix of activities related to products, prices, communication, and distribution, and the ability in sales and market research (Hunt and Morgan, 1995; Morgan, 2012).

Product management capabilities involve the process of adapting, maintaining and providing product and service offerings to meet customer needs. In order to be effective, product management efforts must focus on understanding customer needs in targeted segments (Morgan, 2012). Companies with good product management capabilities will be seen from their aggressive activities in developing new products or services, exploiting R&D investments, testing new product or service marketing, successfully launching new products or services, and ensuring efforts to develop products or services responsive to customer needs (Trez et. al., 2012). The capability of managing prices relates to pricing skills and systems to respond to market changes quickly, utilizing knowledge of competing for pricing tactics, performing effective work in determining product or service prices, and monitoring competitor prices and price changes (Trez et. al., 2012). Capability manages relationships related to activities that support the efforts of channel members in developing and maintaining mutually beneficial relationships. Various potential capabilities associated with channel management such as customer companies can develop channel capabilities related to order processing, shipping, reverse processing, and customer service. On the other hand, companies that have channel intermediaries between companies and end-users need broader channel capabilities such as attracting new channel members and adding value to the channel member's business (Morgan, 2012). Marketing communication capabilities are built on fundamental marketing activities such as advertising, personal selling, sales promotion, social media participation, sponsorship, public relations, and corporate image management. Communicating the benefits of the company's new products and services to potential customers, reminding current users about the benefits and availability of products, and strengthening purchasing decisions to reduce cognitive dissonance are important skills that companies must possess to have strong marketing communication capabilities (Lane Keller, 2001).

Selling capability consists of two elements. First, there are personal competencies involved in sales activities (Chakrabarty et. al., 2014), such as analyzing customer needs, providing information, and working with current and potential customers to ensure satisfaction of needs and the development and management of customer relationships. Second, a system and structure capacity is needed to ensure efficient and effective sales force management (Lambe et. al., 2009; Schmitz, 2012), such as orientation and ongoing training of sales force and sales managers, developing control systems such as salesforce call management systems, performance tracking systems and order tracking systems, and developing effective coordination with product/brand and market managers (Morgan, 2012).

Market research capability is related to the company's ability to provide answers to market-related questions set by its managers. The company's market research capability usually involves the ability to translate questions raised by managers into a summary of the research that has been set, design an appropriate research plan, collect the necessary data, analyze the data collection, and communicate the answers needed (Moorman, 1995). Market research capabilities have also been conceptually and empirically connected with company performance (Wei and Wang, 2011).

2.3 Business performance (BP)

Business owners measure BP to track the completion of company goals and objectives, investors use BP to measure certain financial and productivity indicators, management uses BP to analyze past performance and adjust as needed in the future, and employees use BP to track productivity in meeting bonus payment criteria (Lee et al., 2015). Some researchers used growth dimensions to measure BP (Cho and Pucik, 2005; Zhou et al., 2007; Morgan,

Slotegraaf, et al., 2009; Debicki, 2017). This dimension may be more accurate for companies at the level of SMEs (Wiklund and Shepherd, 2005). Based on a meta-analysis, Stam et al. (2014) describe three dimensions to measure BP. These are (a) growth performance, such as sales, profit, employment, and market share growth, (b) profitability such as returns on assets, return on equity, and returns on sales and (c) non-financial performance such as technical advantage, competitive ability, productivity, and export performance. The business performance used in this study is adjusted to the existing conditions and the possibility of respondents to be able to answer correctly based on the data and knowledge they have. The intended business performance is sales growth, customer growth, expansion of sales territory, profit growth, and business capital growth (Hendar et al., 2017).

2.4 Market intelligence (MI) and specialized marketing capabilities (SMC)

MI is an organizational activity that implies market orientation and is the responsibility of all functional departments that play a role in developing the knowledge and skills that connect products with customers (Kahn, 2001). MI—delivered in the form of MIG, MID and RMI—is a source of knowledge and skills to improve SMC, such as in the development of new products, pricing capability, and marketing communication capability (Murray et al., 2011). Companies that collect market information and use other MI capabilities can more skillfully predict future consumer needs and adapt more quickly to variations that occur in the market (Najafi-Tavani et al., 2016). This enables companies to be better able to improve SMC, such as in product development activities, pricing, channel management, and marketing communications, and the sales strategy used. In other words, companies with good MI will have greater opportunities to vary their marketing mix, sales strategies, and market research than other companies that lack information and who make their decisions based on instinct (Navarro-García et al., 2014). Thus, H1 to H3 are proposed:

H1: There is a positive relationship between MIG and SMC

H2: There is a positive relationship between MID and SMC

H3: There is a positive relationship between RMI and SMC

2.5 Market orientation (MO) and marketing performance (BP)

MI is an intangible asset of an entrepreneur that cannot be bought in any market or exchanged with other resources. MO is a culture-related behavior that is firmly rooted in the values and norms of organizational members and is the key to success in the restaurant business (Jogaratnam, 2017), hotels (Vega-Vázquez et. al., 2016), SMEs (Amin et. al., 2016; Long et. al., 2017), and franchises (Lee et. al., 2015). Several arguments support the positive effect of MI on BP. First, through MI, the company will produce codified knowledge from customers and competitor environments that is useful for decision making in terms of improving BP. Second, MI supported by a set of internal mechanisms that are well-established for sharing information in various departments will increase the company's ability to transfer and exploit existing knowledge at the organizational level to increase BP. Third, the use of MI that is focused on responding to changing customer needs and desires, and the behavior of competitors, will make it easier for the companies to create customer value over time.

In many empirical studies in this decade, MI has become an important antecedent of BP. For example, Wei-Shong et. al. (2015) shows that MIG, MID and RMI have a very strong influence on BP. In this context, business performance refers to market knowledge creation, customer satisfaction, and profit performance. Likewise, research by Lee et. al. (2015) shows that the three dimensions of MO have a positive effect on financial and non-financial performance. These findings are consistent with some of the previous studies in the MO literature (Narver and Slater, 1990; Jaworski and Kohli, 1993). By referring to the views of Jaworski and Kohli (1993) who explain MO in the form of MIG, MID, and RMI, hypotheses H4 to H6 are offered:

H4: There is a positive relationship between MIG and BP

H5: There is a positive relationship between MID and BP

H6: There is a positive relationship between RMI and BP

2.6 Specialized marketing capabilities (SMC) and business performance (BP)

In general, the positive effect of SMC on BP has been well documented. For example, in the mediation analysis of export marketing capabilities in the relationship between SMC and the performance of export businesses, Morgan et al. (2012) explain the significant relationship between SMC and the performance of export businesses. Previously, Morgan, Vorhies, et al. (2009) also explained marketing capabilities in specialized forms, and architectural marketing capabilities are important antecedents that determine BP. Other researchers explain companies with good SMC, such as pricing capabilities and product development, determine good business performance (Ju et al., 2011). Therefore, the potential relationship between SMC and BP is very possible considering that superior business performance arguments are only possible when a company has SMC such as the ability to manage marketing mix, sales and market research. First, companies that have better capabilities in managing the marketing mix will be better able to improve business performance. Second, companies that can drive salespeople to be customer-oriented and adapt to the sales environment will be able to improve the performance of salespeople, which will then increase BP. Third, companies that have market research capabilities will obtain valuable market information to increase customer value and business performance at the same time. Thus, H7 is proposed as:

H7: There is a positive relationship between SMC and BP

2.7 The mediating role of specialized marketing capabilities (SMC)

Market-oriented companies that do aggressive MIG, MID and RMI will generally have better capabilities in increasing marketing capabilities (Morgan, Vorhies, et al., 2009; Ngo and O'Cass, 2012; Takata, 2016; Kamboj and Rahman, 2017; Alnawas and Hemsley-Brown, 2019a). Companies with good marketing capabilities will have a better ability to improve business performance (Morgan et al., 2012; Takata, 2016; Kamboj and Rahman, 2017). Ju et al. (2011) used MIG, MID and RMI as indicators to measure MO and these three indicators play an important role in determining marketing capabilities in the form of pricing capability, product development capability, and marketing communication capability. The two marketing capabilities, i.e. pricing and product development capability, lead to improved financial performance and strategic performance. Also, SMC such as product development capabilities, marketing communications, channel management, and pricing, have been tested as important mediators in the relationship between MO and business performance in financial and service organizations in India (Kamboj and Rahman, 2017). This means that marketing capabilities, or specifically SMC, have an important role as a mediator in the relationship between MI and BP. Takata (2016) explains the direct effect of marketing capabilities on stable performance for the three years investigated. This study also found market orientation has an indirect effect on performance through marketing capabilities. Based on these findings, the authors try to place SMC as a potential mediator in the relationship between MI and BP. MI in this context was adapted from the views of Jaworski and Kohli (1993) which consisted of MIG, MID, and RMI. The authors consider that the three constructs are an important part that can explain SMC and BP. SMEs with the characteristics of MIG, MID, and RMI that can increase SMC will have the ability to increase BP. Given that there is a significant relationship between MI and BP as explained before, the authors consider SMC to have potential as a partial mediator in the relationship between the dimensions of MI and BP. Therefore, H8 to H10 are proposed as:

H8: SMC acts as a mediator in the relationship between MIG and BP.

H9: SMC acts as a mediator in the relationship between MID and BP.

H10: SMC acts as a mediator in the relationship between RMI and BP.

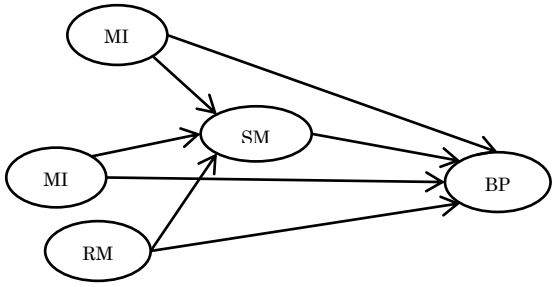

Figure 1 The study's model.

3. RESEARCH METHOD

The population in this study is the owners of fashion retail SMEs in Indonesia, which in 2018 amounted to around 620,276 units (BPS, 2019). Furthermore, in 2019, it is estimated that the data is not very different considering that in this industry it is very easy for actors to enter and exit the market. These SMEs are companies that have a maximum net worth of IDR 10 billion per year and sales of IDR 50 billion (Law No.20/2008, 2008). Hence, the authors used the samples that meet the guidelines of five times the estimated number of parameters (Hair et al., 2010). The maximum number of parameters estimated is 64 items, thus the minimum number of samples needed is 320.

The researchers distributed questionnaires to 558 retail fashion owners or managers of SMEs in Indonesia using the snowball sampling technique. This is a non-probability sampling technique for getting samples through a rolling process from one respondent to another (Noy, 2008). The questionnaire was distributed by research assistants to the owner or manager of the selected retail fashion SMEs. In general, respondents were not immediately able to answer, therefore, researchers allowed two months to collect the questionnaires. After two months of the data collection process, only 432 questionnaires were returned, or about 77.42%. The final evaluation of the questionnaire received after checking the damaged questionnaires and outlier data obtained 330 questionnaires (59.14%) that were suitable for data analysis. The data came from 190 respondents who submitted questionnaires in less than one month and the remaining 140 were submitted after more than one month. The selected respondents consisted of 76.7% women and 23.3% men, aged between 25 years and 50 years. Most of them are owners and managers of retail fashion SMEs are married and have worked for more than three years. Most of their education level (65.1%) is high school or lower, with 10.7% earning a diploma and 24.2% earning a bachelor degree.

4. INSTRUMENT

MIG, MID, and RMI were adopted from Kohli et. al. (1993), which was adjusted for the survey of retail fashion SMEs in Indonesia. The results obtained are six initial instrument items for MIG, six for MID, and seven for RMI. The seven items of SMC were adopted from the views of Morgan et. al. (2012) and Trez et. al. (2012) and five items of BP were adapted from the views of Jogaratnam (2017) and Hendar et. al. (2017). This study used self-reported subjective interpretations of the constructs of MIG, MID, RMI, SMC, and BP. Previous studies provide strong support for the application of subjective measures of MIG, MID, RMI, SMC and BP. A 10-point scale was used to obtain managerial assessments of the five constructs, 1 indicating "strongly disagree" and 10 indicating "strongly agree" for the statements proposed (Hair et. al., 2010). Respondents were then asked to indicate their perceptions of MIG, MID, RMI, SMC, and BP over the past three years (see Table 1).

5. DATA ANALYSIS

Data analysis in this study used a combination of SEM with AMOS version 22.0 and SPSS. The program was used to test a model, specific hypotheses of a model, or a series of interrelated models (Chan et al., 2007). Through the program, confirmatory factor analysis (CFA) was used to test the validity and reliability of latent constructs. The validity of the model was assessed by comparing theoretical measurement models with reality models to see how well the data is aligned (Harrington, 2009). The alignment test of a model was determined by several tools and indicators such as the Chi-square test which was not significant at $\alpha = 0.05$, and popular goodness-of-fit indices, such as the goodness of fit index (GFI) > 0.90, average goodness of fit (AGFI) > 0.90, normal fit index (NFI)> 0.90, comparative match index (CFI)> 0.95, tucker-lewis index (TLI)> 0.95, and root mean square approach approximation (RMSEA) <0.07; and CMIN / DF> 2 (Hair et al., 2010; TEO et al., 2013).

6. RESULTS

6.1 Assessment of normality and multicollinearity

The skewness value is checked to see whether the data meet the assumption of normality (Table 1). The results showed that skewness values of all indicators ranged between -0.417 and 0.174, thus the assumption of normality was reasonable based on the recommendation that both values do not exceed an absolute value of 3 (Hair et. al., 2010). The variance inflation factor (VIF) is used to test multicollinearity between free constructs. All VIFs ranged between 1,264 and 1,315, which is far below the general threshold of 10.0,

indicating that multicollinearity is not a serious problem (Mason and William D. Perreault, 1991). Based on this test, it is reasonable to conclude that the data do not violate the assumptions of normality and multicollinearity (see Table 2).

6.2 Reliability and validity

The initial measurement model produced five items for MIG, MID and BP, and six items for RMI and SMC (Table 1). The selected items are reviewed concerning each theoretical basis and are considered to adequately realize the theoretical constructs that represent the model. Reliability is assessed based on Cronbach's alpha and composite reliability (Fornell and Larcker, 1981). All alpha coefficients exceed the 0.70 thresholds suggested by Nunnally (1978) and composite reliability that exceeds 0.6. Hence, it meets the level of acceptance for the reliability of each construct (Bagozzi and Yi, 1988). Convergent validity is determined by examining the average variance extracted (AVE) for each construct to the other constructs. The AVE, which is greater than the correlation between constructs, shows good convergent validity (Alumran et al., 2014).

All items were found to be significant ($p < 0.001$) on a factor corresponding to a loading factor ranging from 0.612 to 0.787. The AVE values were between 0.807 and 0.897, which is greater than the correlation between constructs and shows good convergent validity. Also, the AVE values that exceed 0.50 indicate that the majority of variants are explained by constructs, not by measurement errors. This is under the recommended threshold of Bagozzi and Yi (1988) and is an indication of good construct convergent validity (see Table 2). Besides, the square root of the AVE for each construct is greater than the correlation between constructs, thus it confirms the validity of discriminants between constructs (Fornell and Larcker, 1981; Hair et al., 2010). In short, all tests used have supported the use of this research's scale.

Table 1 Items, fit indices, composite reliability (CR), average variance extracted (AVE) and standardized loadings. *** Significant at $p < 0.001$ (two - sided). *Fit statistics: chi square = 349.77; prob = 0.080; GFI = 0.928; AGFI = 0.913; NFI = 0.910; TLI = 0.989; CFI = 0.990; RMSEA = 0.019; CMIN/DF = 1.114.*

Constructs and Instruments	λ	Skew
MIG Market intelligence generation (Cronbach's Alpha= 0.838, CR = 0.840 / AVE = 0.854)		
MIG1 Continuity in meeting customers	0.727***	-0.112
MIG2 Continuity in interacting with customers	0.707***	-0.233
MIG3 Continuity in gathering customer information	0.696***	-0.132
MIG4 Speed in detecting customer tastes	0.715***	-0.158
MIG5 Continuity in gathering competitor information	0.732***	0.015
MIG6 Speed in detecting changes in the industry	--	--
MID Market intelligence dissemination (Cronbach's Alpha= 0.804, CR = 805 / AVE = 0.807)		
MID1 Continuity in discussing competitor strategies	0.655***	0.031
MID2 Continuity in discussing market developments	0.728***	-0.038
MID3 Continuity in discussing future needs of customers	0.674***	-0.069
MID4 Speed in informing changes in tactics and strategies of major competitors	0.688***	-0.102
MID5 Intensity in communication between parts of the organization	0.612***	0.018
MID6 Speed in providing important information to all parts of the organization	--	--
RMI Responsiveness to market (Cronbach's Alpha= 0.856, CR = 0.857 / AVE = 0.866)		
RMI1 Continuity in responding to changes in competitor prices	0.740***	-0.150
RMI3 Continuity in paying attention to changes in product or customer service needs	0.710***	-0.105
RMI4 Speed in responding to competitors' actions that harm the company	0.694***	0.046
RMI5 Continuity in responding to customer complaints	0.675***	.174
RMI5 Accuracy in implementing marketing plans	0.698***	0.178
RMI6 Speed in reacting to changes in competitor prices	0.721***	-0.117
RMI7 Speed in taking action when customers are not satisfied	--	--
SMC Specialized Marketing Capabilities (Cronbach's Alpha= 0.857, CR = 0.857; AVE = 0,866)		
SMC1 Ability to manage products	0.710***	-0.417
SMC2 Ability to manage prices	0.643***	-0.303
SMC3 Ability to manage distribution channels	0.666***	-0.150
SMC4 Ability to manage marketing communications	0.754***	-0.217
SMC5 Ability to manage sales	0.755***	-0.229
SMC6 Ability to manage market research	0.710***	-0.372
BP Business Performance (Cronbach's Alpha= 0.876; CR = 0.876; AVE = 0.898)		
BP1 Sales growth	0.787***	-0.298
BP2 Customers growth	0.782***	-0.229
BP3 Expansion of sales area	0.767***	-0.334
BP4 Increased profits	0.732***	-0.366
BP5 Venture capital growth	0.760***	-0.257

Table 2 Construct reliabilities, correlations and AVE. [a]Factor reliabilities are on the diagonal (italic bold). [b]Correlation Coefficient of Exogenous Construct **P < 0.01; * P < 0.05.

N = 330	1	2	3	4	5
1. Market Intelligence Generation (MIG)	***0.839[a]***				
2. Market Intelligence Dissemination (MIG)	**0.418[b]**	***0.805***			
3. Responsiveness to Market intelligence (RMI)	**0.460[b]**	**0.432[b]**	***0.857***		
4. Specialized Marketing Capabilities (SMC)	0.404	0.411	0.415	***0.857***	
5. Business Performance (BP)	0.402	0.429	0.418	0.415	***0.876***
AVE	**0.852**	**0.807**	**0.856**	**0.867**	**0.897**
VIF	***1.302***	***1.264***	***1.315***	***1.270***	--

6.3 Hypothesis test

Two types of regression analysis are used to estimate the impact of the dimensions of MI on SMC and BP. The first regression illustrates the effect of MIG, MID and RMI on SMC used to test hypotheses 1, 2 and 3. The second regression describes the relationship of MIG, MID, RMI, and SMC on BP used to test hypotheses 4, 5, 6 and 7. The test results show that all hypotheses are accepted (Table 3).

The mediation test of SMC in the relationship between the dimensions of MI with BP refers to the suggestion by Baron and Kenny (1986). First, the independent variable must influence the mediator. Second, the independent variable must be shown to influence the dependent variable. And third, the mediator must influence the dependent variable. That means the dimensions of MI, i.e. MIG, MID, and RMI, must influence SMC and BP, and SMC must also affect BP. The Sobel Test is then used to calculate the estimated indirect effect of the independent variable on the dependent variable through a mediator (Sobel, 1982). Mediation tests help identify the existence of a significant intervention mechanism of SMC in the relationship between the three dimensions of MI with the dependent variable of BP. Mediation tests can describe the effects possessed by a set of independent and mediator variables on the dependent variable into direct and indirect effects (Jogaratnam, 2017). Mediation analysis involves partial mediator and full mediator. Partial mediator occurs when there is a direct relationship between the independent variable and the dependent variable, in addition to an indirect relationship through mediation variables. Full mediator occurs when there is no direct relationship between the independent variable and the dependent variable, while the indirect relationship through the mediating variable is significant (Rucker et. al., 2011; Jogaratnam, 2017).

The mediation test procedure proposed by Sobel (1982) was adopted to test the mediating effect of SMC (Table 4). Multiple regression analysis was carried out to assess each condition in relation to the proposed mediation model. The p-value is determined as a measure of the significance of the relationship between the two variables. A p-value less than 0.05 indicates a significant relationship between the two variables. Furthermore, two regression models are set. First, SMC was found to be significantly affected by MIG (ß = 0.45, t (330) = 5.80, p-value = 0.001), MID (ß = 0.45, t (330) = 5.80, p -value = 0.001), and RMI (ß = 0.45, t (330) = 5.80, p-value = 0.001). Second, BP is explained by MIG (ß = 0.45, t (330) = 5.80, p-value = 0.001), MID (ß = 0.45, t (330) = 5.80 , p-value = 0.001), RMI (ß = 0.45, t (330) = 5.80, p-value = 0.001) and SMC (ß = 0.45, t (330) = 5.80, p -value = 0.001).

Table 3 Parameter estimated for the path: Direct effects. Post-hoc analysis: mediator

Hypothesis	Regression	Beta	B	SE	CR	p-value	Sig.
H1	MIG → SMC	0.226	0.252	0.083	3.056	0.002	Accepted
H2	MID → SMC	0.218	0.231	0.078	2.957	0.003	Accepted
H3	RMI → SMC	0.213	0.281	0.097	2.897	0.004	Accepted
H4	MIG → BP	0.179	0.207	0.084	2.474	0.013	Accepted
H5	MID → BP	0.164	0.181	0.079	2.288	0.022	Accepted
H6	RMI → BP	0.197	0.270	0.099	2.737	0.006	Accepted
H7	SMC → BP	0.193	0.200	0.071	2.822	0.005	Accepted

Table 4 Parameter estimated for the path: indirect effects (Sobel Test). Note: * p < 0.05; **p < 0.01.

Path					Unstd B	S.E.	c.r.	p-value
MIG	-->	SMC	-->	BP	0.054	0.024	2.065	0.039*
MID	-->	SMC	-->	BP	0.046	0.023	2.004	0.041*
RMI	-->	SMC	-->	BP	0.056	0.029	2.019	0.049*

Concerning the test of H8, the SMC acts as a partial mediator in the relationship between MIG and BP. The direct effect of MIG on SMC is explained by Unstd ß 0.252, S.E 0.083 and c.r 3.056 so that it is significant at α 0.05. The direct effect of SMC on BP is explained by Unstd ß 0.200, S.E 0.071 and c.r 2.822 so that it is significant at α 0.05. The indirect effect of MIG on BP through SMC is explained by the Unstd coefficient ß 0.054 (0.252 x 0.200). The Sobel Test results show the value of c.r 2,065, S.E 0.024 and p-value 0.039 so that it is significant at α 0.05. The total effect of MIG on BP through SMC is 0.261 (0.207 + 0.054) which is greater than the direct effect (0.207). It indicates that SMC has a very important role as a partial mediator in the relationship between MIG with BP and becomes an important alternative in increasing BP. Therefore, this study accepts H8.

Related to the test of H9, the SMC acts as a partial mediator in the relationship between MID and BP. The direct effect of MID on SMC is explained by Unstd ß 0.231, S.E 0.078 and c.r 2995 so that it is significant at α 0.05. The direct effect of SMC on BP is explained by Unstd ß 0.200, S.E 0.071 and c.r 2.822 so that it is significant at α 0.05. The indirect effect of MID on BP through SMC is explained by the Unstd coefficient ß 0.046 (0.231 x 0.200). The Sobel Test results show the value of c.r 2.004, S.E 0.023 and p-value 0.041 so that it is significant at α 0.05. The total effect of MIG on BP through SMC is 0.227 (0.181 + 0.046), which is greater than the direct effect (0.181). It indicates that SMC has a very important role as a partial mediator in the relationship between MID with BP and is an important alternative in increasing BP. Therefore, this study accepts H9.

Regarding the test of H10, SMC acts as a partial mediator in the relationship between RMI and BP. The direct effect of RMI on SMC was explained by Unstd ß 0.281, S.E 0.097 and c.r 2.897 so that it was significant at α 0.05. The direct effect of SMC on BP is explained by Unstd ß 0.200, S.E 0.071 and c.r 2.822 so that it is significant at α 0.05. The indirect effect of RMI on BP through SMC is explained by the Unstd coefficient ß 0.056 (0.281 x 0.200). The Sobel Test results show the value of c.r 2.019, S.E 0.028 and p-value 0.049 so that it is significant at α 0.05. The total effect of RMI on BP through SMC is 0.326 (0.270 + 0.056), which is greater than the direct effect (0.270). This indicates that SMC has a very important role as a partial mediator in the relationship between RMI with BP and becomes an important alternative in increasing BP. Therefore, this study accepts H10.

7. DISCUSSION AND MANAGERIAL IMPLICATIONS

The purpose of this study is to examine the role of SMC in the relationship between the dimensions of MI (i.e. MIG, MID, and RMI) with BP in the context of retail fashion SMEs in Indonesia. Based on the supporting marketing research arguments adopted, this research hypothesized that MIG, MID and RMI cultures implemented in retail fashion SMEs will provide opportunities to increase SMC and BP. The results of this research confirm that all dimensions of MI are not only important drivers of SMC but also BP. Under the same conditions, SMC is an important driver for increasing BP. This is in line with the findings that emphasize the role of marketing capabilities in increasing BP (Takata, 2016).

Theoretically, this research contributes to the development of strategic marketing science by examining the direct and indirect effects of MIG, MID, and RMI on BP that is transformed through SMC. Specifically, it was found that SMC is partial mediator because it has a direct positive effect of MIG, MID, and RMI on BP. In the view of marketing dynamic capability, competitive advantage or positional advantage results from the capability of the organization to increase resources. This study is based on this perspective and found that MIG, MID, and RMI can be considered to be strategic resources that can be used to improve SMC in the fashion industry. This is very possible because the fashion industry is related to products or markets that are stylish and tend to survive in the short term (Christopher et. al., 2004).

Popular culture has a major influence on the formation of fashion trends, so companies will be successful if they can respond to rapid changes in fashion trends and interpret them into products sold in stores with the shortest possible time (Bruce et. al., 2006). This requires continuous market information that can be used to develop SMC and BP. The findings of this research confirm the view of Murray et. al. (2011) that marketing capabilities mediate the effect of MI on performance. Therefore, MI is an important part of increasing SMC and hence, it has a positive impact on BP.

This study contributes to the MI literature in three ways. First, we overcome gaps in the literature by examining the dimensions of MI (i.e. MIG, MID, and RMI) in non-western cultural contexts, especially in Indonesia. Second, while most of the MI studies on business have used large companies, this study investigates SMEs in Indonesia. Third, this study combines the role of MI in developing SMC and BP in Indonesia retail fashion.

Based on empirical findings, we offer some insight into the market-oriented activities of retail fashion SMEs in Indonesia. First, retail fashion SMEs in Indonesia used MI strategies to develop SMC and increase BP. Secondly, western marketing ideas, such as MIG, MID, and RMI, provide opportunities for retail fashion SMEs in Indonesia to create a clear roadmap in developing marketing capabilities, maintaining business, and continuing to improve business performance.

The further results of this study show that SMC and BP can be facilitated by maintaining characteristics associated with MIG, MID, and RMI. MIG culture can be built by getting used to meeting customers to interact, get information, detect customer tastes, and get information about competitors' strategies. MID culture is built by, discussing the competitors' strategies, market developments, and customers' future needs, as well as speeding up the process of sharing information related to the changes in competitors' tactics and strategies, and increasing the intensity of communication between organizational members, such as employees and owners. While RMI culture can be developed by accustoming company owners, managers and employees to respond to the customer complaints, responding to changing product or customer service needs, responding quickly to changes in competitor prices, and implementing marketing plans that are in line with changes in the marketing environment. Cultivating such a culture can inspire the initiative of owners, managers, and employees in increasing the capability of managing products, prices, distribution channels, marketing communications, sales, and market research.

8. MANAGERIAL IMPLICATIONS

This study suggests that to build a strong SMC, retail fashion SMEs must proactively develop effective MI culture through serious activities in MIG, MID, and RMI. Thereby, they can take advantage of business and market opportunities in developing countries. Market knowledge gained from these activities can be used to reconstruct resources and carry out cross-functional processes in product development and various price management activities, channels, marketing communications, sales, market research, and customer relations. In other words, the owners or managers of SMEs must increase the integrated marketing mix, manage sales, and carry out continuous market research in order to grow and survive in a very competitive market (Takata, 2016).

Because the application of MI leads to an increase in SMC and BP, the awareness of owners or managers towards changes in the market is very important. They must build a culture by applying MI elements effectively. MI provides the owners or managers of SMEs with a better tool to understand customer needs and desires, mechanisms to identify opportunities, and information that can minimize the risks involved in the decision-making process. This can reduce unnecessary risks in the marketing environment (Jogaratnam, 2017; Long et al., 2017).

9. LIMITATION AND FUTURE RESEARCH

As many other studies, this study also has limitations. First, the research model is tested in one country only, i.e. Indonesia. Thus, future research can expand the generalization of findings by examining the relationship of hypotheses with samples from other countries. Second, this research model used the mediating variable of SMC in the relationship between MI and BP. Hence, future research can examine the mediating effects of other capabilities such as architectural marketing capabilities, brand management capabilities, CRM capabilities, and new product

development capabilities. Third, although this research has explained the role of dimensions of one of the company's orientation strategies, i.e. the relationship among MI, SMC and BP, it does not yet involve other orientation strategies, such as organizational orientation, innovation orientation, and entrepreneurial orientation. The involvement of these three constructs in the development of this research model is likely to be needed in the future. Studying the effects of other strategic orientations such as organizational orientation, innovation orientation and entrepreneurial orientation on SMC and BP is needed to see how they affect this capability variation. Fourth, this study focused on retail fashion SMEs operating in highly fragmented and mature industries. Future research can broaden these findings and improve generalizations by conducting studies on SMEs in other industries, such as manufacturing and services at small, medium and large scales.

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Implementation of business intelligence considering the role of information systems integration and enterprise resource planning

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ABSTRACT The aim of this research is the implementation of business intelligence, considering the role of information systems integration and enterprise resource planning on it. According to the objectives of this research, it is practical research, and the work process is based on descriptive, survey, and exploratory research. The study population of the qualitative part of this research includes experts (information technology and communications managers from Tehran Stock Exchange companies and professors). Twenty-five interviews were performed by a non-random and targeted method, until a theoretical saturation of the questionnaire was reached. The study population of the quantitative part includes all the personnel of 167 companies where business intelligence is implemented in their organizations. Two questionnaires were used for gathering the required data for evaluating and measuring the studied variables. Validity is confirmed by experts' opinions. Finally, seven issues of structural factors, behavioral factors, environmental factors, processes, output, consequence, and the effect and their subcomponents are identified as effective items in business intelligence success. Regarding the outcome, importance, and the model coefficient of the main factors, the processes have the most impact on the results. So, organizations should pay more attention to their working processes to improve business intelligence success. Overall, the results regarding the effective factors on successful implementation of business intelligence reflect best practices of firms that have successfully implemented BI systems and provide insights for BI stakeholders that may increase the chances of successful implementation. This study shows the value of integrated information systems and enterprise resource planning in the success of business intelligence implementation. The findings of this study provide an opportunity for other researchers to study a cost optimization approach. It also suggests it is time to investigate suitable approaches by a focus on the appropriate factors for successful business intelligence implementation and by comparative analysis of ways to boost business intelligence preparation. This study also found further factors, in addition to enterprise resource planning and information systems integration, that can be used to select and rank more factors of business intelligence implementation. Furthermore, a model that examines the integration of business intelligence and the other information systems in the company is proposed for future research.

KEYWORDS Business intelligence, enterprise resource planning, information and communications technology, information systems, integrated systems

1. INTRODUCTION

With the improvement of technology, organizations should consider new technologies like business intelligence as an inevitable necessity for survival. In today's ever-changing world of business, organizations have to be competitive and innovative in order

to supply value to shareholders (Blenkhorn & Fleisher 2007). The business intelligence systems provide a tool to reply to the information requirements of an organization appropriately. One way that organizations can achieve this is to extract the maximum possible value from their internal data assets by using techniques like interactive graphical data analysis, data mining and predictive analytics. These techniques and tools are part of a discipline referred to as business intelligence (Hawking &Sellitto 2010). Business intelligence is a suitable approach to reply to the mentioned problems. Business intelligence (BI) is a modern information technology that helps organizations to gather, manage and analyze structural or non-structural data (Lin, Tsai,Shiang, Kuo, & Tsai, 2009) (Nyblom,Behrami,Nikkilä, & Solberg Søilen, 2012). The main objective of BI is to help the company to improve its function and upgrade its competitive advantage in the market. BI helps companies in their decisions and through this evaluation the activities and functionalities may result in the improvement of the companies. Now, business managers need useful and related realities to make decisions. But often there is a gap between the required information of the business managers and the volume of data that the business unit gathers every day. Business units invest in order to fill the gap for the extension of BI systems that convert raw data to useful information.

The most effective work of BI systems is providing the possibility of accesses, processing a large volume of data, and delivering related subsets of data to the companies' managers instantly. Decision making and analysis based on the reality of BI affect all organizations. We live in a world that is saturated with information and technology (Pall and Ogan 2018). Today, companies focus on their improvement, and businesses are expanding. Availability of high quality and correct information is one of the advantages of BI. In spite of the amount of inappropriate data, irrelevant data, and sometimes contradictory data, new technologies can help decision-makers of organizations use the created added value to find the useful information. Some companies help their decision-makers by producing related and precise information that is presented in easy and understandable formats. These companies use the advantages of BI well and the effect is seen in the companies' operational advantages. Successful BI can help organizations to make the most effective decisions at the most effective time through integrating and analyzing data with decision support systems (Muntean, Gabriel, Cabau & Rinciog 2014).

Receiving correct information at the correct time is the basis of successful decisions and survival of the organization. Successful BI provides the proper information to the proper people throughout the organization to boost strategic and tactical decisions (Li, Shue, Lee, 2008). But always there is a gap between the information required by the managers and the information gathered by the operations of the company in different sections. The tools of BI provide a perspective of the past, present, and future. Implementation of BI approaches removes the gap between intermediate managers and senior managers from the information communication point of view and provides the managers the required information in each level at each instance, and with high quality (Moro et al. 2015). Enterprise resource planning (ERP) may be regarded as a fundamental method for BI, in particular to collect and incorporate data into a central database. Some believe that successful ERP can act as a spinal column for BI at an organization because it is able to give managers an integrated approach of inside processes of BI (Nash, 2000; Parr and Shanks, 2000). This system triggers time reductions in processes and knowledge sharing within the organization, so the company can adapt to the evolving needs of customers (Lee et al., 2010). Some of the information is provided from outside of the operational systems, even out of the organization through market information and competitors. The highest benefit resulting from BI is the possibility of direct access to data by decision-makers at all levels of the organization so they can interact with the information and analyze it. Hence, they can manage the business, improve efficiency, detect the opportunities, and perform their tasks with higher efficiency.

The companies that are members of the Tehran Stock Exchange have tried to improve their organizations' functions in different ways, such as personnel training and optimal use of resources. This was not successful and the companies are now investigating suitable approaches by focusing on external factors. It seems BI is a suitable approach for the improvement of the organizations' functionality. Managers need a way to get good information. One method to support business

activities is BI (Elbashir, Collier& Davern, 2008). This study addresses how the implementation of BI considers the role of information systems integration and enterprise resource planning.

2. THEORETICAL BASICS

2.1 Business intelligence

The term business intelligence was identified in 1989 by the Gartner group. It includes concepts and models presented to improve decision making in business environments. Based on the Gartner definition, BI is an interactive process for structured detection and analysis of specific information to detect the process, or the patterns through which it can gain a specified view or results.

BI refers to the selection, incorporation, analysis, and presentation of business information technology, applications, and practices. BI is meant to help effective business decision-making. BI systems are basically a data-driven decision support system. Often BI is used interchangeably with brief articles, reporting and review methods and the executive information system.

BI may be a solution that may improve the method of gathering and processing data, along with higher cognitive processes (Sacu and Spruit, 2010). Now, BI is one of the issues that information technology has fast development in this field (Chen et al. 2012). BI is a collection of abilities, technologies, tools, and approaches that helps managers to understand business conditions. BI involves the tools and processes that turn data into knowledge that help make decisions (Kandogan, et al., 2014). Moreover, experts and analyzers can improve their activities using simple facilities and receive better results. The most important benefit of using BI systems is increasing the effectiveness increment in decision making. The main objective of BI is converting data to knowledge for the improvement of decision making. The most important tools of BI include data storage, extraction, transmission, load, online analysis process, data mining, and reporting (Ngai and et al. 2011).

Generally the aims of this new approach are 1) determining the business orientation of the organization that results in focus of the organization on big and basic goals without wasting time, cost, and energy in other ways, 2) making market predictions that allow for new marker benefits for the organization before competitors take over the market, 3) efficiency enhancement of the organization on internal issues and transparency in key process trends, 4) standardization and creation of compatibility among the organization structures, 5) facilitating decision making as one of the main objectives of BI, and 6) early detection of risks and identification of business opportunities (Wang, 2015).

2.2 Integration of information systems

In the past, for each process or task a separate systems (island system) provided many benefits, but resulted in some problems such as an inability to connect systems. To address this, network engineers found another solution to provide the objectives to the organization. The resulting integration of information systems gave a high capacity for information propagation throughout the organization. It helped facilitate better decision making based on complete information (Zhou et al. 2018).

The specific advantages of information system integration are improvements in efficiency, better decision making, costs decrement, income increment, and integrated services. Integration of information systems is an indicator for the measurement of availability of the generated information of one of the information components by other components. Integrated information systems include integrated manual and computer components that are designed for gathering, processing, controlling, and storage of information and to ensure of the accuracy of information flow in the organization, and the ease of the operational functionalities to support management information in decisions (Shao et al. 2012). Pragmatic objectives of integrated information systems in the organization are a) performing main and repetitive activities in an intelligent manner with ease of operational functionalities, b) applying internal controls of the main activities in an intelligent manner, c) quick access to categorized information for decision making, d) creation of the field of continuous and on-time reporting in the organization and creation of the cultural background of economic discipline, and e) saving time of information processing (Yun et al. 2018).

2.3 Enterprise resource planning

Enterprise resource planning (ERP) is a system designed for the creation of an appropriated base for complete management of a company. Using this system, communication

possibilities among units of a business and commerce company are provided, and the company's manager can monitor all the company's issues including financial, personnel, and production issues. This system allows all parts of a company and its operations to gather in a computer system. The system meets all the needs of the company's management (Nolz et al.2016). ERP is one of the systems that creates integrated processes by using joint database and sharing information (Chung and Snyder, 2000; Dredden and Bergdolt, 2007). The main advantages of the system that are not in the nonintegrated organizational system include organizational integration of standardization of organizational processes, re-engineering of the organizational processes, faster installation, and the possibility or ease of extension of the new systems and technologies. With the advent of ERP in production, all productive systems are covered. Different sections, processes, and tasks such as quality control, maintenance and repair, accounting, and finance are connected to productive systems, and ERP is identified as the distance between supply chain management systems and communication with customer management (Arun and Derrick 2012).

Many studies have explored critical factors that affect the successful establishment of ERP systems. These include problems that originated in ERP and are from special issues and problems in the running of the system, to behavioral and functional problems and organizational changes after running the system (Jones et al., 2016).

The functional costs of reduction of ERP software for the integration of business processes in an organization and its sub-sections is designed through an information system. The main advantage of the ERP system is the improvement of coordination among different sections of the organization and increment of the process's efficiency. The first advantage that is expected from the ERP systems in a short time and after execution is functional cost reduction, such as the costs of the inventory control, production costs, marketing, and support costs (Chwelos et al. 2014).

2.4 Literature review

The results of Popovič et al. (2019) present useful views for managers and solution providers to help to understand the effect of different factors on increased effectiveness of the processes after utilizing BI in small and big companies.

Pall and Ogan (2018) explain that administration managers make technology, data, and analysis as the conversion force of the business. Hence, most organizations implement BI technologies and analysis to support reporting and decision making.

Torres et al. (2018) explain that technical infrastructures, management ability, and expert orientation result in the improvement of change capabilities, administration, and functional performance of the organizations, and BI leads to improvement in the total performance of the system.

Rabbani and Khalesi (2018) explain that BI and customer relationship management affect organizational success.

Avhadi and Khayyam (2018) explain that there is a meaningful relationship between the existence of a BI team and infrastructures of BI. Also, the observations show that infrastructures of BI and the BI team impact operational capabilities BI. Moreover, they affect strategic capabilities of BI. Other results of their research show the operational and strategic capabilities of BI affect operational and strategic business value.

Bagheri and Alikhani (2018) explain that BI affects the performance of the organization and business processes. The business processes impact the performance of the organization, and they are mediators between BI and organizational performance. Moreover, data mining, analytical storage, and organizational dashboard are effective in the performance of the organization.

Jalali and Khademi (2018) explain that because of the competitive environment, the countries and corporations for decision making and taking competitive strategy don't confine the limited internal resources of the organization or the random information. Indeed, correct, effective, and updated information from the environment is one of the powerful tools at the level of the corporation and internationally.

Fink et al. (2017) propose and test a model of value generation of BI with the aim of removing the gap between the proven research in the field of value generation for information technology and new researche in BI. They hypothesize about the ways that the properties and capacities of BI make business value, analysis of the view based on the resources, and conceptualization of organizational training are performed.

Hasani and Neshat (2016) explain in their paper that BI and organizational performance questionnaires are used for gathering information. The results show BI doesn't affect organizational performance.

The results of Faridi et al. (2015) show the effect of different variables on the organizational effectiveness of an insurance company include the establishment of a BI system gives a 92.7%, investment return rate, 72% sales volume, 69% investment management and 75% inventory turnover.

Kubinaa et al. (2015) explain BI systems are designed to support the decisions of the main workers of the company. According to them, the information infrastructures, technical equipment, and the personnel of the company are expensive. To ensure optimal use of these systems, presenting a fixed program and plan, and performing new orientations in the development and use of the systems is essential. In this paper, the possibility of improving the efficiency of the business systems in the company is explained.

Ghazanfari, Jafari, & Rouhani, (2011) presented an expert tool to judge BI competencies of Iranian enterprises and identified six factors for their evaluation model: analytical and intelligent decision-support, access to related experimentation and integration with environmental information, optimization and recommended model, reasoning, enhanced decision-making tools, and finally, stakeholder satisfaction. Their view of BI competencies is proscribed to BI specification. Their study isn't about organizational level competencies, but they mention some competencies like stockholders' satisfaction that in this research is recognized as an organizational dimension.

3. METHODOLOGY

This research is descriptive, using a survey, and exploratory research, according to its goals of using applied research in terms of the process. The study population of the qualitative part is the experts familiar with the subject of research (information technology and communication managers of Tehran Stock Exchange companies and professors). The 25 interviews were performed by a non-random and targeted method until the theoretical saturation of the questionnaire was reached. Its purpose was to extract and collect qualitative data (variables) that formed the basis for the design of the research questionnaire. Two questionnaires are used, first for evaluating and measuring the data and then for gathering the studied variables. The first questionnaire includes open questions, and the second one includes closed questions using the Likert five-point range. Its validity is confirmed by expert opinions, and its reliability is gained and confirmed by a 0.82 Cronbach's alpha. The analytical approach of qualitative content and structural equations are used for data analysis, applied in the software Amos.

Tehran Bourse or The Tehran Stock Exchange (TSE) is Iran's largest stock exchange, which first opened in 1967. The TSE is based in Tehran. TSE, which is a founding member of the Federation of Euro-Asian Stock Exchanges, has been one of the world's best performing stock exchanges in the years 2002 through 2013. TSE has over 325 listed companies, of which 167 companies utilize BI. The study population of the quantitative part consists of all IT managers of the 167 companies utilizing BI. Considering the limited study population, all the 167 IT managers by the census method are selected as the statistical sample.

4. RESULTS

The content analysis approach is used to implement a BI model considering the role of integration of information systems and enterprise resource planning in TSE companies. According to previous research and experts' opinions, seven issues are identified in the structural factors, the behavioral factors, the environmental factors, the processes, the output, and the effect of the subcomponents of them. According to Table 1, each of the open issues according to the concept of the expression is identified by the pivotal code that is the subcategory of each of the determined categories. They can affect implementation of BI that investigates the experts' opinions consensus by the Delphi approach. The third round of Delphi determines that the consensus between experts' opinion about the components and the indicators is more than 94%.

Table 2 shows the highest average of the dimension is for the output variable (4.9854) with a standard deviation of 0.3983. Moreover, the lowest average is related to structural factors (2.8764) with a standard deviation of 0.5674.

Table1 The results of the third round of Delphi.

The Factors	Sub-factors	Response Avg	Response SD
Structural factors	Organizational structure	3.56	0.45
	Delegation of authority	3.43	0.34
	Optimal division of tasks	3.55	0.65
	Monitoring and control	3.65	0.67
	Multiplicity of working components	4.23	0.71
	Management style	4.11	0.65
	Organizational communications	4.32	0.40
	Democratic structure	3.98	0.74
	Informal organization	3.45	0.47
	Appropriate career path	3.65	0.54
Behavioral factors	Experience	3.46	0.61
	Training	3.21	0.48
	Learning	3.78	0.46
	Individual talent	3.23	0.43
	Work ethics	3.55	0.67
	Individual proposals and critics	3.24	0.43
	Human relationships	3.56	0.46
Environmental factors	Common view	3.44	0.45
	Accepting customer governance	4.21	0.65
	Rules and regulations	4.34	0.74
	Beneficiaries demand	3.54	0.89
	Economic management	3.56	0.58
	Government policies	3.21	0.73
	Competitiveness	3.67	0.83
	Management of environmental changes	4.32	0.74
	Along with globalization	4.34	0.93
	Social responsibility	3.54	0.64
	Customer care	3.23	0.71
Processes	Modifying business processes and workflow	3.54	0.65
	Systematic thinking	3.78	0.45
	Team creation	3.23	0.38
	Empowerment	3.56	0.36
	Technology establishment	3.44	0.65
	Performance evaluation	3.67	0.39
	Access to information	3.24	0.88
	Providing the resources appropriately	3.65	0.74
	Research and development	3.54	0.45
	Process orientation	3.23	0.46
	Attention to motivation	3.65	0.54
	Organizational knowledge	3.78	0.76
	Creativity	3.54	0.67
	Customer appreciation	3.21	0.45
	Change readiness	3.67	0.34
	Clarification	3.24	0.56
	Training needs assessment	3.54	0.67
	Focus on operations	3.23	0.63
Output	Structural cohesion and flexibility	3,56	0.72
	Quick replication	3.34	0.45
	Comprehensive communications	3.65	0.42
	Self-evaluation	4.12	0.56
	Teams with performance	3.43	0.71
	Customer orientation	3.42	0.33
	Evolutionism spirit	3.54	0.71
	Worth oriented organization	3.25	0.43
	Management information systems	3.11	0.78
	Individual responsibility	4.23	0.37
Consequence	Value creation for the customers	4.54	0.45
	Innovation	4.33	0.65
	Self-controlling	3.21	0.34
	Behavioral and ethical character	3.45	0.61
	Pyramid structure reduction	3.65	0.45
	The proportion of responsibility and authority	3.21	0.78
	Informal communications	3.76	0.43
	Motivating	2.45	0.23
	Efficient management		0.81
	Existence of official health	3.24	0.43
Effect	Increase shareholders benefit	3.67	0.54
	Structural resilience	3.89	0.32
	Increase action freedom	3.42	0.72
	Command unity	3.62	0.34
	Low horizontal level	3.54	0.32
	Competent members and synergistic	3.67	0.66
	Talent finding	3.24	0.81
	Existence of customer management system	4.11	0.77
	Collaborative leadership	2.81	0.34

Table 2 Study of the average and standard deviation of the model dimensions.

The model dimensions	Average	Standard deviation
Structural factors	2.876	0.5674
Behavioral factors	3.543	0.6543
Environmental factors	3.2875	0.7222
Processes	3.662	06722
Output	4.9854	0.3983
Consequence	3.9855	0.3655
Effect	3.8272	0.4993

The main components analysis method with orientation and Erimax for analysis of the exploratory factor is used for exploratory factor analysis. Seven dimensions for the model that were extracted along with their subcomponents are studied in this section. Generally, these seven dimensions explain 89.07% of the total variance. The measure of indicator selection for the factors has a special value of more than 1 and the factorial load of 0.7 shows that the final selected indicator is 75. Each of these indicators, the related factors, and the amount of their factorial load are presented in Table 3.

One of the evaluation methods of this validity is the Fornell-Larcker Test. Table 4 shows the results for the research model dimensions. It shows that the structures are completely separated. That is, the main diameter values for each hidden variable are more than the correlation of that dimension with other reflective hidden dimensions.

The redundancy investigation indicator and determination coefficient are used to study the quality of the model. The positive values show the appropriate quality of the model. The main measure for evaluation of the structural model is the determination coefficient. This indicator shows the percentage of the changes in the dependent variable is performed by independent variables. Table 5 shows 77.6% of the model changes are predicted by independent variables (the model dimensions). If the redundancy indicator is more than 0, good observed values are reconstructed, and the model has the ability of prediction. In this research, this indicator value for the considered model is higher than 0.

After determining the conceptual model, suitability of the sample volume, and the effectiveness of all the recognized dimensions in the model, the model is quantified by partial square technique and bootstrapping t test. Figures 1 and 2 show that all the coefficients for the dimensions of the model are positive and all the values of t are more than 1.96 in the Z table. Based on the results, the model is meaningful, and the results are can be cited.

According to Table 6, the amount of the effects of all the structural, behavioral, and environmental factors on the processes is 0.83, with the t value of 12.45. The effects of all the structural, behavioral, and environmental factors on the obtained results is 0.75, with the t value of 10.34. Moreover, the effects of all process dimensions (management of the processes, information technology, and manpower improvement) on the results is 0.87 with the t value of 12.67. So, it can be said that the accuracy of the causal relationships of the model is verified, and it is an appropriate model.

Table 3 The results of the exploratory factor analysis. Struct. = Structural. Behav = Behavioral. Environ. = Environmental. Cons. = Consequence

Subcomponents Factors	Struct.	Behav.	Environ.	Process	Output	Cons.	Effect
Organizational structure	0.741						
Delegation of authority	0.798						
Optimal division of tasks	0.893						
Monitoring and control	0.704						
Multiplicity of working components	0.799						
Management style	0.733						
Organizational communications	0.801						
Democratic structure	0.755						
Informal organization	0.706						
Appropriate career path	0.731						
Experience		0.755					
Training		0.789					
Learning		0.744					
Individual talent		0.765					
Work ethics		0.733					
Individual proposals and critics		0.799					
Human relationships		0.751					
Common view			0.790				

Subcomponents Factors	Struct.	Behav.	Environ.	Process	Output	Cons.	Effect
Accepting customer governance			0.766				
Rules and regulations			0.833				
Beneficiaries demand			0.705				
Economic management			0.762				
Government policies			0.833				
Competitiveness			0.850				
Management of environmental changes			0.765				
Along with globalization			0.865				
Social responsibility			0.888				
Customer care			0.823				
Modifying business processes and Workflow				0.877			
Systematic thinking				0.898			
Team creation				0.744			
Empowerment				0.987			
Technology establishment				0.766			
Performance evaluation				0.844			
Access to information				0.846			
Providing the resources appropriately				0.836			
Research and development				0.866			
Process orientation				0.847			
Motivating				0.832			
Organizational knowledge				0.785			
Creativity				0.766			
Customer appreciation				0.790			
Change readiness				0.754			
Clarification				0.794			
Training needs assessment				0.766			
Focus on operations				0.733			
Structural cohesion and flexibility					0.854		
Quick replication					0.866		
Comprehensive communications					0.845		
Self-evaluation					0.791		
Teams with performance					0.754		
Customer orientation					0.768		
Evolutionism spirit					0.833		
Worth oriented organization					0.765		
Management information systems					0.784		
Individual responsibility					0.743		
Value creation for the customers						0.854	
Innovation						0.867	
Self-controlling						0.783	
Behavioral and ethical character						0.833	
Pyramid structure reduction						0.875	
The proportion of responsibility and authority						0.733	
informal communications						0.856	
Motivating						0.865	
Efficient management						0.834	
Existence of official health						0.754	
Increase shareholders benefit							0.786
Structural resilience							0.744
Increase action freedom							0.743
Command unity							0.856
Low horizontal level							0.867
Competent members and synergistic							0.811
Talent finding							0.755
Existence of customer management system							0.956
Collaborative leadership							0.866
The total primary special values	4.76	5.11	3.76	4.55	4.93	4.83	4.32
Variance percentage	21.77	16.76	28.36	11.54	6.39	2.34	1.91
Variance cumulative percentage	21.77	38.53	66.89	78.43	84.82	87.16	89.07

In the structural equations for the evaluation of the designed model, Amos software is used with the indexes of Chi-2 to the degrees of freedom, fitting index, fitting adjustment index, mean of the squared residuals, smoothed fitting index, non-smoothed fitting index, increasing fitting index, adaptive fitting index, and the second root of estimation of the approximation error variance. Table 7 shows the range of the fitting indexes. The resulting values are more than the desired value.

It is determined that with a reliability level of 95%, all the values are significant. Thus, the main triple dimensions and the related components are verified by the proposed model

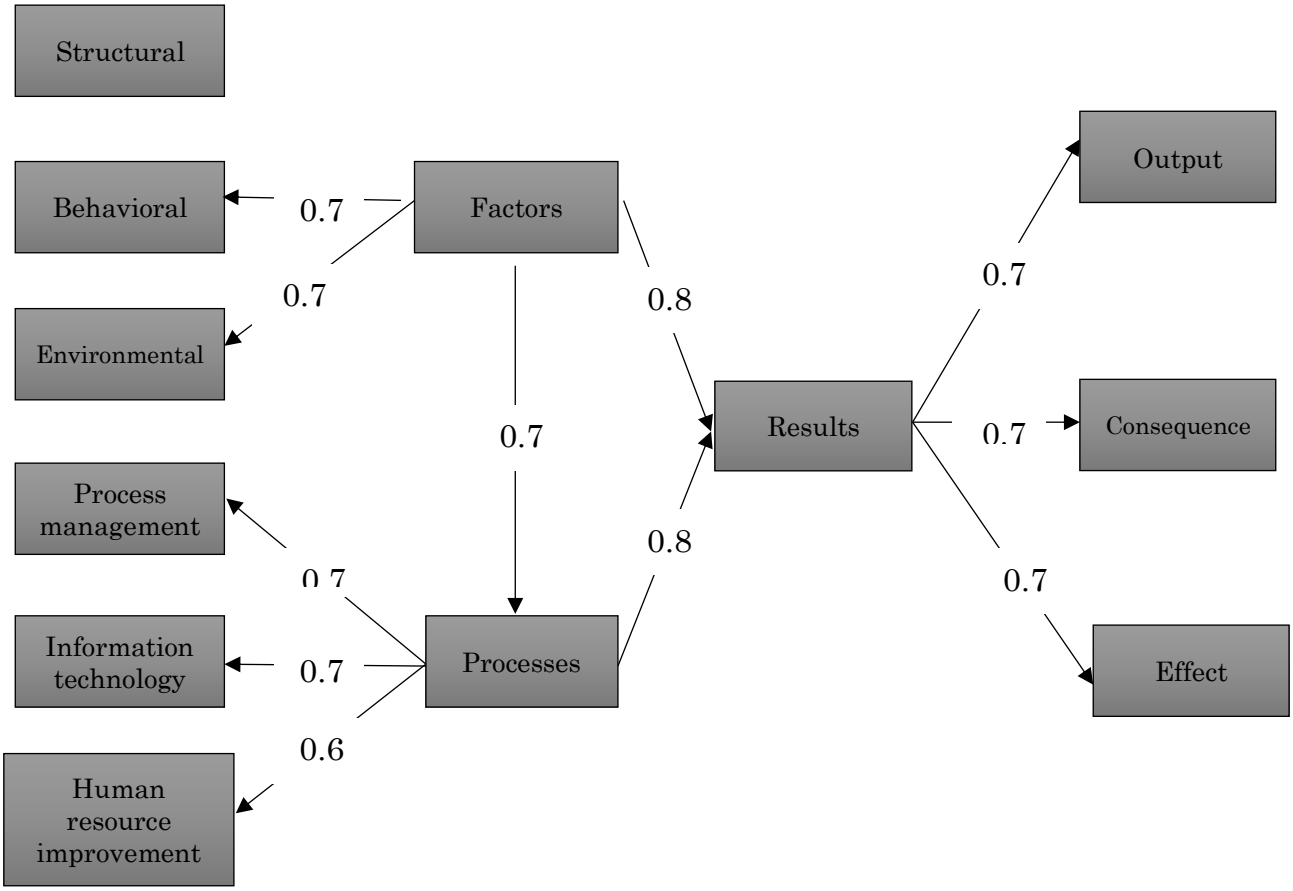

Figure 1 Causal relationships among the model variables in the state of standard estimation.

and are presented in the final and operational model, Figure 3.

Overall, the results regarding the effective factors on successful implementation of BI reflect the best practices of firms that have successfully implemented BI systems and provide insights for BI stakeholders that may increase the chances of successful implementation. In addition, the case studies' qualitative results serve as a framework for deriving information from real-world, BI-based organizations.

Table 4 Fornell-Larcker indicator to study the diagnostic or divergent validity indicator. Struct. = Structural factors. Behav = Behavioral factors. Environmental factors. = Environmental. Cons. = Consequence.

Dimension	1	2	3	4	5	6	7
Structur.	1						
Behavior.	0.655	1					
Environ.	0.764	0.755	1				
Processes	0.894	0.654	0.433	1			
Output	0.677	0.465	0.344	0.355	1		
Cons.	0.322	0.655	0.654	0.766	0.765	1	
Effect	0.544	0.590	0.544	0.465	0.455	0.366	1

Table5 Indicators of the model quality investigation. Det. Co. = Determination coefficient. Red. = Redundancy.

Model	Det. Co.	Red.
Business intelligence implementation considering the role of information systems integrity and its enterprise resource planning	0.766	0.632

5. DISCUSSION AND CONCLUSION

The aim of this research is the implementation of BI, considering the role of the information systems integration and ERP on TSE companies. The research literature was surveyed, and the questions for interviews were designed. Then, seven issues of structural factors, behavioral factors, environmental factors, processes, output, consequence, and the effect and their subcomponents were identified. According to the Delphi Technique, all the factors were effective in BI. Then using the Structural Equations' Technique, the model was quantified, and it was determined that the model fitting was appropriate.

The literature review provided a number of research studies that proved theories for understanding success factors in BI that are

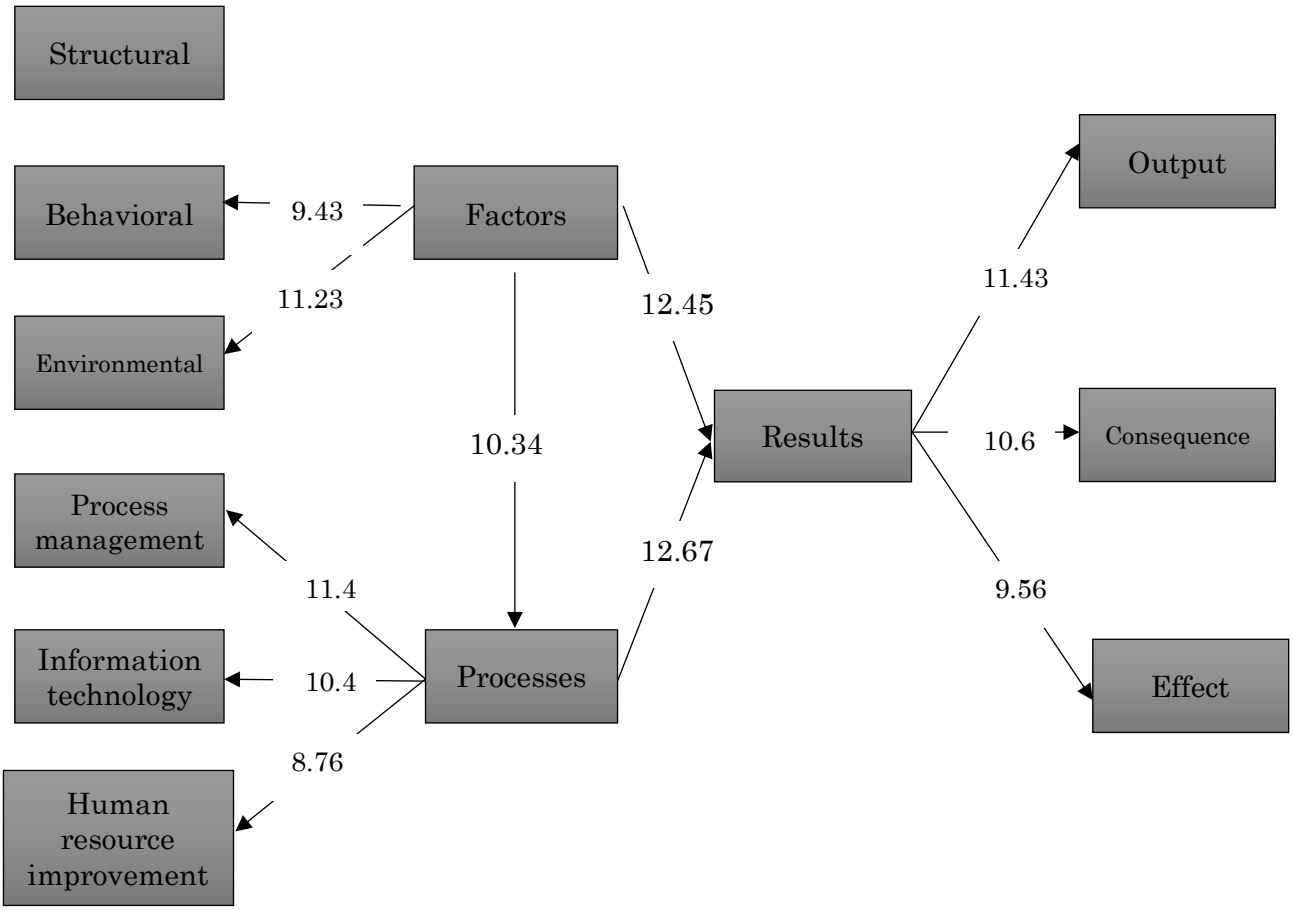

Figure 2 Causal relationships among the model variables in the state meaningful estimation.

still underdeveloped. There is plenty of space for research in this field, which was not considered before. Some of the studies investigated these questions. Most recent researches didn't mention to integration of information systems and ERP on implementing BI. The approach is unique in demonstrating the dynamic relationships between the identified dimensions. This is the first study that discussed BI implementation issues in the context of TSE companies in Iran.

In the structural factors dimension, experts try to direct organizational structure to become organic, and to reduce the pyramid structure by considering subcomponents such as non-pyramid structures, appropriate communications, and management style. It results in the increased use of BI in the organization. Brijs (2013) concluded that established bureaucratic structure is incompatible with advanced BI and strategic knowledge exchange. In the behavioral dimension, paying attention to training, learning, nurturing talents, and ethics results in the improvement of the working and non-working behavior of personnel and helps the organization to meet its requirements. An innovative organizational culture which treats knowledge sharing as a problem-solving strategy is considered to promote employee engagement (Hoegl, et al., 2004).

In the environmental dimension, beneficiaries including customers, governments, and personnel try to achieve better BI utilization by considering environmental subfactors such as rules and

Table 6 Path test results. CSP = Coefficients of standard path. T. = T Statistic. Results include output, consequence, effect. Processes include management of the processes, information technology, and manpower improvement Var. = Verified.

From	To	CSP	T	Result
Structural, behavioral, and environmental factors	Results	0.83	12.45	Var.
Structural, behavioral, and environmental factors	Processes	0.75	10.34	Var
Management of the processes, information technology, and manpower improvement processes	Results	0.87	12.67	Var

regulations, and management of environmental changes along with global developments (Ramakrishnan et al., 2012). It is recommended that companies facing competitive challenges and environmental uncertainty "commit themselves to more awareness and quest" practices in order to better understand their internal and external components. Business environments are constantly evolving (Hoppe, 2013), highly competitive, and increasingly unpredictable (Banerjee & Mishra, 2015) such that the strategies for organizations to escape bankruptcy rely on good BI (Ranjan, 2008). In the processes dimension, paying attention to the management process, technology utilization, and human resources improvement to perform activities has a significant role in the organization's processes improvement to implement BI. The key advice for organizations implementing BI is to consider BI not only as a technology but, in particular, as the overall management of information, the application and use of which involves clearly specified processes as well as skilled personnel and includes formal and informal section for promotion. In addition, it is a highly sophisticated technology on its own (Nemitko, 2019). All the factors provide a situation with the output, consequences, and effects that are effective on organizational coherence, quick response, creativity and innovation enhancement, customer orientation, and making the beneficiaries satisfied. Hence, all results make BI implementation interesting in the organization.

Table7 Fitting values of the proposed model and desired values. Des. = Desired value. Res. = Resulting value.

Fitting index	Des.	Res.
χ^{r}df	<3.00	1.22
Goodness of Fit Index (GFI)	>0.90	0.93
Adjusted Goodness of Fit Index (AGFI)	>0.90	0/94
Root Mean square Residual (RMR)	<0.05	0.03
Normed Fit Index (NFI)	>0.90	0.93
Non-Normed Fit Index (NNFI)	>0.90	0.91
Incremental Fit Index (IFI)	>0.90	0.93
Comparative Fit Index (CFI)	>0.90	0.91
Root Mean Square Error of Approximation (RMSEA)	<0.08	0.083

According to Figure 3, the effect of the structural, behavioral, and environmental factors on the processes and the results are 0.83, with a value of 12.45 t and 0.75 with a value of 10.34 t respectively. Moreover, the effect of all the process dimensions (management of the processes, information technology, and manpower improvement) on the results is 0.87, with a value of 12.67 t. It can be said that causal accuracy relations are verified in the research model, and it is an appropriate model.

Regarding the results, importance, and the model coefficient, we can say that from the main factors the processes have the most impact on the results. So, organizations should pay more attention to their working processes to improve BI success. These processes are summarized in three main categories: management of the processes, information technology, and manpower improvement to perform the activities related to the processes. The studied companies should identify all their organization's activities through the outline of the working processes. Then according to information technology approaches they should try to systemize all the processes using tools such as re-engineering, reverse engineering, and value chain to remove all inefficient, unnecessary, and excess activities, or merges them. This results in shortening the process flow and increasing the speed and precision of the work performance. Then according to new processes, they should train manpower, and evaluate the personnel operation, and through a training need assessment present periodic training and monitoring. Moreover, based on the changes in the processes, it is expected that the structural, behavioral, and environmental factors of the organization's effect on the processes should be matched with new processes. Also, the required changes in the design of the organizational structure should pay attention to the kind of management, how to empower the personnel, pay more attention to environmental changes for consistency, and the evolution is the result of replying to the beneficiaries including personnel, customers, and other dependental institutions. Finally, it can lead to results in the short, medium, and long-term that give organizational coherence, increased consistency with environmental changes, enhancement of personnel creativity, customer satisfaction increment, and institutionalization of BI in the organization.

The results of the final model and the results of different research are studied in

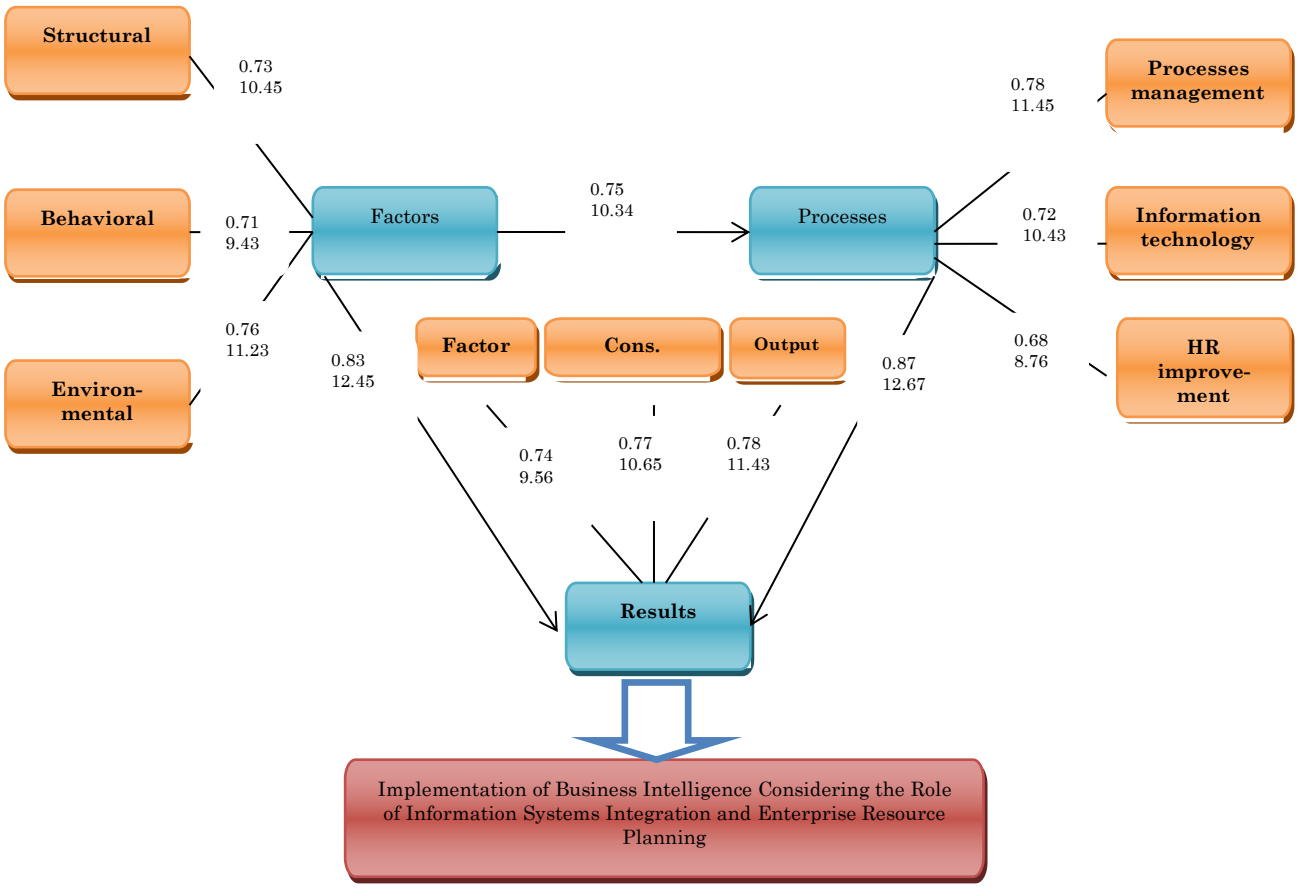

Figure 3 The operational model.

different dimensions (structural, behavioral, and environmental), processes, and results (output, consequence, and effect). The results are consistent with the previous research in different subcomponents. This includes organizational structure and authority delegation subcomponent as in Pall and Ogan)2018), optimal division of tasks and monitoring and control as in Torres et al. (2018), multiplicity of working components and management style as in Nespeca et al. (2018), organizational communications as in Fink et al. (2017), correction of working processes and workflow as in Nofal and Yusef (2013), systematic thinking and process functionality as in Rabbani and Khalesi (2018), and correction and repeat of design and organizational diagnose as in Avhadi and Khayyam 2018). As well as structural cohesion and flexibility and structural resilience as in Bagheri and Alikhani (2018), comprehensive communications, pyramid structure reduction, command unity, low horizontal level, experience, training, learning, beneficiaries demands, and government policies as in Jalali and Khademi (2018), action freedom increment and the proportion of responsibility and authority as in Hasani and Neshat (2016), unofficial communications, clarity of the roles and tasks, access to information, and research and development as in Faridi et al. (2015), and collaboration, team creation, the personnel empowerment, and educational content as in Popovič et al. (2019). All of these studies concluded that the considered subcomponents are effective in BI implementation, as is verified in our research. In addition, the analytical results in this research serve as a framework for helping BI practitioners to better understand and handle what usually is a complex implementation of BI regarding the role of the information management and ERP integration. Some of our suggestions include that:

- The companies, in addition to official communication, should pay more attention to the reinforcement of virtual communications in their organization. One of the current trends is using online social networks to share knowledge in the organization.
- The companies pay attention to the suggestions and critics of their personnel and customers as an information resource.

- The companies should develop rules and regulations such as: create clear career paths, future orientation and strategic goal to enhance the culture of technology use in the organization.
- The companies should utilize updated and localized technologies in the organization to increase the speed and precision of information exchange and working issues, and try to use the latest technologies and the best existing in the market.
- The companies, along with software and hardware infrastructures of BI implementation, should pay attention to their organizational culture.
- The companies should pay attention to the success increment of BI implementation by specialized training for the users. That means formulating and implementing truly knowledge-based strategies because intelligent business is leveraged by networks of people who work together.
- The companies should help with the improvement of the effectiveness of BI by monitoring the implementation process and utilization of BI in the organization and receiving feedback.

This paper shows the value of integrated information systems and ERP in the success of BI implementation. The findings of this study provide an opportunity for other researchers, through a cost optimization approach, to investigate suitable approaches by focusing on the appropriate factors for successful BI implementation.

There are limitations to the research activities that affect the research results and reduce its reliability and generalizability. The study population in this research is limited to the companies that are members of the TSE, and our information is gathered through the questionnaires in companies where the respondents may be affected by the environment. Moreover, according to the importance of the subject, we suggest that more dimensions are considered in addition to ERP and information systems integration to implement BI. Also, recognized factors can be ranked to determine their importance and priority. Furthermore, comparative studies of ways to develop the readiness of BI could enhance future research to show which approach is best. Also, providing a model that examines the integration between BI and other information systems in the company would be useful in future research.

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How will AI change intelligence and decision-making?

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ABSTRACT The world is facing a rapid pace of changes with a heightened sense of uncertainty, ambiguity, and complexity in both government and business landscapes. New threats and major changes in the world order are creating an external environment that demands closer monitoring and greater anticipatory and predictive skills. Deeper analysis and speed of action are becoming more important for agile organizations and governments. The needs to upgrade the capabilities of intelligence analysts, mostly in strategic intelligence, have been known for quite a long time. Scholars who are looking into intelligence failures[1] and other major national security[2] and business[3] events when decision-makers were not warned in time, seek expert tools and methodologies to avoid these failures[4]. Management is constantly concerned, aspiring to receive better decisions by relying on solid analysis in order to better understand the challenges ahead[5]. The current direction is in the same direction, while new emerging technologies enable theory and practice to move forward. Artificial intelligence (AI) capabilities definitely are jumping two stairs up. It looks that through new AI tools, the value of humans will not become redundant but rather improve its outcomes by relying on better intelligence for their decisions.

KEYWORDS Artificial intelligence (AI), competition, competitive advantage, decision-making, intelligence failures, prediction, strategic surprises

1. INTRODUCTION

Many corporations are allocating significant resources to gathering and analyzing massive amounts of information about their rivals and disruptive phenomena in business. Nevertheless, too often these companies face strategic surprises, usually when their competitors make moves that were not anticipated. Such surprises frequently force corporate senior management to react under intense pressures, often leading to poorly informed, hurried and sub-optimal decisions[6]. It happens similarly in governments' decisions on national security in events of military surprises or other national threats like the recent COVID-19 pandemic.

Numerous inquiry commissions in Western democracies[7] have pointed towards the phenomenon of governments' looking to make

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improvements on intelligence failures. Different programs have been established to address this challenge, mainly by actions such as further training of analysts, team building efforts, diversity of analysts, and using expert tools. There is also a need to train decision makers on how to collaborate with intelligence and strategic units for better intelligence outputs. It looks as if using AI can help to make a change[8].

In this paper, there will be an attempt to predict the new direction of AI in influencing decision-making, and mostly on the prospects for it to lead to better analytical capabilities, which can have an immediate impact on the quality of management judgment.

2. ABOUT AI

According to a PwC report[9], it is widely accepted that AI technologies will be the most disruptive phenomenon over the next decade. Growing interest in AI is reflected in the PwC Global CEO Survey, which found that 85% of CEOs agreeing that AI will significantly change the way they do business in the next five years, even if AI's penetration into the senior echelon of companies is not yet impressive. One definition of AI is that it is "a collective term for computer systems that can sense their environment, think, learn, and take action in response to what they are sensing and their objectives."[10] Another definition is that AI "…is Intelligence displayed by machines, in contrast with the natural intelligence (NI) displayed by humans and other animals."[11] According to McKinsey, "AI is typically defined as the ability of a machine to perform cognitive functions we associate with human minds, such as perceiving, reasoning, learning, and problem solving".[12]

There are already new tools in use that offer an AI-enabled solution that tracks over 200,000 online sources on competitors, customers, and industry segments. It enables users to collect, curate, and share information across the organization.

These capabilities make AI a powerful tool, which can radicalize decision making and completely change the way we do business. The same may happen to decision making in national security issues, that are also in need of better analysis capabilities to be shared with the decision makers.

3. THE MANNER OF DECISION MAKING

However, it looks like actually there is no change, and no further significant progress has been made so far in the analysis of information to become intelligence. Intelligence manuals and a few good books[13] on intelligence analysis are not helping to change the course while do not embed AI into the process of absorbing information to become useful intelligence. The best information obtained is not the key to the best analysis and to be able to create significant insights. Always there will be a gap between the need to know and the information in hand, so the assessments remains the core of the problem. It is a mistake to put all the responsibility for failures of analysis on the analysts' shoulders[14]. It is time to consider that the quality of analysis will become a shared responsibility of the senior managements both in business and in government. For example, regarding one of the well-known failures of intelligence analysis was that the Israeli intelligence did not correctly assess Egypt's intentions before the Yom Kippur War (1973). There are scholars[15] who call for the responsibility of the heads of the Israeli state who could have assessed the situation differently based on the information they had and not solely on the heads of the military intelligence.

Since the recent progress of AI, it looks as if new opportunities are coming up. Using the latest capabilities of AI seemed to be an outstanding opportunity to upgrade the quality of analysts' reports and thus to better support the decision-makers.

AI capabilities that can provide intelligent learning algorithms, analyze data, draw some conclusions and even recommend the best solutions are already part of our reality.

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[8] Colson, E. "What AI-Driven Decision Making Looks Like", *Harvard Business Review*, July 08, 2019

[9] PwC, "Artificial intelligence may be a game changer for pricing", 2019

[10] Ibid.

[11] Russell, Stuart J.; Norvig, Peter (2003), *Artificial Intelligence: A Modern Approach* (2nd ed.), Upper Saddle River, New Jersey: Prentice Hall, p. 4.

[12] Chui, Michael and McCarthy Brian, "An Executive Guide to AI", *McKinsey*, October, 2018.

[13] Pherson, K. and Pherson, R. *Critical Thinking for Strategic Intelligence*, CQ Press, 2017.

[14] Bar-Joseph, U. & Kruglanski, A. (2003). "Intelligence Failures and the need for cognitive Closure: On the Psychology of the Yom Kippur Surprise", *Political Psychology* 24: pp. 75-99.

[15] Shalev, A. *Israel's Intelligence Assessment before the Yom Kippur War: disentangling deception and distraction*, Sussex Academic Press, Australia (2010).

Another goal is to provide predictions based on incomplete information. For instance, predictive analytics can be used to map a complex decision tree of all possible outcomes, which will then simplify human decision-making. AI can already perform tasks such as identifying patterns in the data more efficiently than humans, enabling businesses to gain more insight out of their data.

Intelligence agencies in the US, UK and Israel have already started to look carefully into these new AI opportunities. However, officials say they will not lose sight of the importance of the human analyst. "As we're looking at algorithmic analysis, artificial intelligence, machine learning, we're finding [that] we're having to examine what the role [is] of the human and the analyst," Melissa Drisko, the Defense Intelligence Agency's deputy director added: "It's kind of scary … but what's the role, what do we look like in 10 years … and even as we try to define it does that make [the role of the analyst] obsolete."[16]

Dawn Meyerriecks, the CIA's deputy director for science and technology, says regarding the use of AI: "What do I need in order to make a really good assessment on the back-end because that tells me what sort of collection I need to raise confidence to go address national leadership?"[17] She added that: "The CIA currently has 137 pilot projects directly related to artificial intelligence".

What are the expectations of these intelligence organizations in the coming age of AI? In April 2020, there were 40 AI start-ups in Israel, with a few focused on information for decision making[18]. As can be seen from this list, a few Israeli start-ups will develop the use of AI in the intelligence analysis, both for business and government, based on the information gathered. It can give a strong support to predict future moves by competitors and enemies, and significantly improve analysis of information if the outputs produce better intelligence reports presented to the decision-makers.

Senior executives desperately need new tools to help them systematically analyze their own and other players' competitive positions in hypercompetitive markets as well as in global changes in the aspects of security and threats. Often, they need a fast, yet reliable, way of capturing changes that were emerging in the market so they could finalize a strategy quickly.

It is already possible to foresee a circumstance when decision makers are more beneficial with the help of the new AI capabilities entering the markets, becoming valuable. This can be a real breakthrough.

4. HOW MUCH WILL THE DECISION MAKERS BENEFIT?

The buzz around AI has grown loud enough to penetrate the C-suites of organizations around the world, and for a good reason. Investments in AI tools are growing and are increasingly coming also from organizations outside the tech space[19]. However, so far, very few senior executives think practically about how AI will impact their decision-making performance.

It's hard to say how much of a leader's success comes from know-how and how much comes from a combination of expectations, accumulated experience, and access to information and tools that aren't readily available to subordinates.

It looks as if AI will become a supplement and enhance human thinking and help to avoid human cognitive biases. If this is the direction, we must start discussing its possible effects on how companies and other organizations such as governments operate and, just as importantly, on how they're run. When high-quality information and tools for decision-making will be accessed at every level within the business and in government, top executives will be under increasing pressure to use AI solutions to deliver extraordinary value.

It is already visible that CEOs will leverage the ability of AI to turn massive amounts of information into answers to complex strategic questions. AI will let them ask questions that they didn't even know to ask. As other top executives also turn to AI to inform their input into corporate strategy, the effect will be amplified across the entire senior executives' teams.

It appears as if CEOs will need to combine strong strategic thinking skills with increasingly sophisticated analytic tools to help them run the organization. They will have to learn carefully, first what the right questions are. Senior executives who use instinctive leadership skills or past successes to make decisions, will have to become evidence

[16] Goldstein, P. "Why Intelligence Agencies Are So Interested in AI?" *Fedtech Magazine*, Oct. 13(2017),
[17] Tucker, p. "What the CIA'S Tech Director Wants from AI", *Defense One*, September 6, (2017),
[18] "Top 40 AI startups in Israel", April 2020
[19] Bughin, J., Chui, M. and McCarthey, B. (2017). "How to make AI work for your business", *Harvard Business Review*, August.

enthusiasts, as AI tools will influence strategic thinking to emphasize inquiry over gut thinking. This can be a major change in their set of activities and routines, and they will have to be informed about the capabilities of AI in order to use them effectively.

Still, AI is a long way from even approximating the human ability to solve problems that aren't well defined. One can't simply inquire of an AI platform: "What is the next move of my key competitor?", "Predict decisions of my strategic customer", or alternatively, "What is the decision DNA of my competitor's management?" CEOs or their close assistants especially in strategy and intelligence must teach the algorithm all the criteria to use to define performance, capabilities and intentions of competitors such as M&As decisions, new-product introductions, and entering into new disruptive technologies. The same goes for customers. Once it knows what it's looking for, though, AI is excellent at identifying patterns in masses of data and using those patterns to build the kinds of complex insights humans can use to inform their decisions.

Companies invest significant resource in business intelligence and other data gathering systems.

However, without identifying the "cognitive algebra" of how these competitors make decisions on M&As, tenders, new technologies, and new product introductions, data and information alone almost always lead to errors in decisions and predictions. "Cognitive algebra" considers some of the interrelations between attribution theory and theory of information integration. Both integration theory and attribution theory have been concerned with personal perception, but there has been little interaction between them. [20]

This has had huge financial consequences for companies. By doing "reverse engineering" of a series of decisions by your competitor or rival in a particular area (for example, marketing, sales, M&As, tenders) it is possible to identify the decision rule of each decision. Analyzing these rules supports the process of identifying a dominant pattern of the decision of your competitor. The outcome can provide the improvement of understanding of how your competitor/rival not only makes decisions, but the way it arrives to a choice.

Most senior management decisions aren't one-offs: they recur over time. And as they do, AI will compile a vast amount of past data that will inform decisions about critical issues in business, like competitive intelligence, strategic planning, finance and supply chain optimization and also in governmental intelligence. For example, today's heads of marketing are waiting weeks or months for the marketing department to field and analyze a customer survey before accurately learning about the success of a new product. With AI constantly monitoring inputs such as purchase data, search traffic, and social media, CMOs will be able to track and respond to customer sentiment in real time. This is a major competitive advantage.

It can similarly work promptly in government and especially in intelligence agencies, especially when they are looking into strategic issues. AI will also be highly practical when the need is for timely and relevant data analysis. Many intelligence organizations struggle with long lead times for analyzing data as demands for fast decisions increase or conducting analysis based on partial information as a result of needs to supply quick responses. AI is also capable of giving key factors indicators that place that metric into different contexts so management and analysts can see what is happening, what might happen and what has happened? Then it is possible to act on those intelligence vectors.

AI may be used to help anticipate what will happen in the future and thus help decision makers to shape the company's actions accordingly.

Companies will need to identify and provide AI with all the relevant variables, as well as guidance on how to prioritize and rank those variables to determine which option is best. Otherwise, it risks results that tell the company its best choice is to do what it has always done and get the same outcome it has always had. It's not always possible to know whether a question that can be addressed by AI is worth asking. As AI becomes more available and sophisticated, though, these inquiries will become possible in many more cases. CEOs and senior managements in business and in government will be able to ask more questions that were once too complex to answer and to determine questions that might not previously have been answerable in the "old" world.

[20] Anderson, N. (1974). "Cognitive Algebra: Integration Theory Applied to Social Attribution", *Advances in Experimental Social Psychology* 26:1-101.

Once we understand the "cognitive algebra" of our competitors' and rivals' decisions, it will be able to better predict, using AI algorithms, their next move or decision. This gives a tremendous advantage in a competitive environment. These AI products are designed for top executives to de-bias their important decisions, by giving them objective understanding of their key competitors and rivals. It is quite similar to the use of newly non-invasive technologies in medicine, enabling doctors to treat patients successfully without using surgical systems. When senior management has improved tools, they will have to learn how to better use them. This will be different than what they are used to with the frequent use of AI tools.

Most large corporations have functional units (strategic planning, competitive intelligence) that monitor the external environment, including capturing intentions and actions of their competitors. Most of these companies, even Fortune 500s, use simple tools, primarily designed to gather information. Such tools analyze competitive information, primarily from open source intelligence (OSINT) and from internal information (through internal strong IT tools, known as business intelligence), but the resulting analysis and the added value are quite limited. There is an urgent need to find the next layer that will enable companies to generate insights tailored for strategic forecasting by utilizing technology that was specifically designed to analyze available competitive information. Such insights are invaluable assets for senior managers who are facing vital decisions regarding the strategic direction of their companies or of their governments.

AI that uses past data to make recommendations about possible alternatives will let top managers and others on lower levels test many different scenarios and determine how best to adapt business processes to manage risk across functions for any or all of those potential outcomes. It is hard to say yet what the precise added value of AI at the executive level will be. Until it is implemented, we won't know what new patterns it will uncover in existing data or how those patterns might lead to improved data analysis and thereby decisions. It looks as if in quantity issues like productivity, greater efficiency, or cost savings, the contribution of AI will be easier to trace.

However, AI will likely influence almost any decision a decision maker can make. It won't just deliver more data and informed predictions about how new initiatives might influence the organization. It will let senior executives see how those AI capabilities might have a more positive impact. Far from simply being another layer of technology, AI tools will guide in a new era of leadership. Leaders and other decision-makers and also analysts working closely with them will need analytic skills rather than just accumulated knowledge. They'll need an ability to inspire rather than control and they will use AI-driven inputs to create a long-term vision and purpose for the organization rather than a short-term strategy. We'll start to see a move towards a trend of relying on AI capability where what matters most is not the individual responsible but what all senior executives can do with the information at their disposal, with the close support of their strategic and intelligence teams.

It is possible that in the near future, measuring the quality of AI tools, organizations using it will be measured as a capability which will identify if companies are effectively aligned and allow organizations to achieve their objectives. Maybe AI capability needs to be added to the key internal elements in the famous McKinsey 7-S model that analyzes a firm's organizational design by looking at seven key internal capabilities: strategy, structure, systems, shared values, style, staff and skills, in order to identify if they are effectively aligned and allow an organization to achieve its objectives. [21]

5. TO WHAT EXTENTS WILL AI MAKE A DIFFERENCE?

It is possible to assume that AI will be valuable to upgrade the quality of analysis. However, it is worth remembering Porter's[22] views that a robust strategy requires a tailored value chain—it's about the supply side as well, the unique configuration of activities that delivers value. Strategy links choices on the demand side with the rare choices about the value chain (the supply side). You can't have a competitive advantage without both. So, there are other difficulties with the capabilities of analysis

[21] McKinsey & Company, "Enduring Ideas: The 7-S Framework", March 2008,

[22] Margretta, J. (2011). *Understanding Michael Porter: The Essential Guide to Competition and Strategy*, Harvard Business Press.

either by analyst who delivers them to decision makers or while the latter are actively involved in the analysis process, especially in the AI era.

Another challenge is how to avoid overestimating strengths, as we are aware there is an inward-looking bias in many corporations. It is also similar with overestimation of strengths over enemies that often are later found to be wrong. Senior executives might perceive their customer service as a strong area. So that becomes the "strength" on which they attempt to build a strategy. But how you reach to such conclusions? What is the basis for them? A real strength for strategy purposes has to be something the company can do better than any of its rivals. And perceiving being "better" is because you are performing different activities than your key competitors perform, because you've chosen a different configuration than they have. All these are often based on cognitive biases rather than analysis.

These difficulties lead to the conclusion that in order to make the right decision, senior executives will need to analyze not only their competitors' moves and other alarming changes in the external environment, including their future goals, but also to look carefully into their own performance. Although Porter[23] gives priority to the following capabilities to know better what is the right direction: future goals, assumptions, current strategy (of your competitor) and (their) capabilities, this still is not sufficient. Clearly, although better intelligence, through AI, of a competitor's goals can identify disruptive trends and technologies to support the prediction about the likelihood, the competitor will change its strategy, so there is a still a critical need to develop AI capabilities inside the corporation systems as not to be mistaken by biases that give outputs on a company's own capabilities. This is related to a company's products, distribution, marketing, overall costs and other capabilities.

So, the other side of the equation is to be able perform an excellent estimation of the competitors' reactions to a company's move and be able to ensure that this will give a sustainable competitive advantage. Here we expect to use AI, based on data gathered from multiple sources and stored internally. Corporations are not there yet but are starting to develop these new capabilities. Using AI capabilities for analyzing both the external environment together with the internal area are expected to give great value.

6. CONCLUSIONS

It is quite difficult to expect senior executives to dive into the nature of AI tools. It will be more reasonable to assume that they are more concerned with how to decide better and what the added value of AI is, if any. Regarding the future of AI in Israel, both in corporations[24] and the security establishment[25], it looks that there are a lot of expectations but organizations are still unsure of how much it is relevant for better decision making. This is also my perspective, after discussing this issue with numerous Israeli directors in senior positions. For example, it is possible to see the advantage of AI in running and optimizing many scenarios regarding "go to market" decisions instead of just the typical handful of scenarios, usually leaving them unimpressed. Discussing applications of AI in retail, i.e. marketing and sales, was more promising, especially demonstrating marketing forecasting and expected customer behavior. Senior executives who realized the potential of AI may be starting points for implementing it systematically. In the future, AI will be highly significant for analysis and predictions in advance of competitors' moves and in delivering early warning signals of threats in national intelligence.

Research looking into the interrelations between decisions to avoid strategic surprises in governments and business shows that usually businesses are leading in absorbing new tools and technologies before governments[26]. It appears that as intelligence communities have an urgent need for better tools to prevent emerging terror threats, they implement these highly advanced AI tools for these needs more quickly than businesses, and lessons will be drawn from this and extended into business.

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[23] Porter, M. (1998). *Competitive Strategy: Techniques for Analyzing Industries and Competitors*, Free Press.

[24] Solomon, S. (2019). "Israel needs national vision for AI or risks falling behind, tech authority says", *the Times of Israel*, 14th. January

[25] Israel, D. (2017). "The Future of Artificial Intelligence in the IDF", *Israel Defense*, 2nd. July

[26] Barnea, A. (2020). "Strategic intelligence: a concentrated and diffused intelligence model", *Intelligence and National Security*, DOI: 10.1080/02684527.2020.1747004