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Drivers of Business Intelligence-based Value Creation: The Experts' View

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DRIVERS OF BUSINESS INTELLIGENCE-BASED VALUE CREATION: THE EXPERTS' VIEW

Research full-length paper

Track N°1 Big Data and Business Analytics Ecosystems

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Abstract

The field of business intelligence (BI) has become increasingly important in both research and practice in recent years. However, research on the business value of BI is still scarce. This study investigates the factors influencing how BI creates business value. Through an exploratory study, we conducted interviews with 16 BI experts from different industries. The experts highlighted four significant drivers of BI-based business value creation: (1) building a business case, (2) formulating a BI strategy, (3) data governance, and (4) organizational adaptability. In addition, this study outlines how BI creates business value. Research gaps and suggestions for future research are also presented.

Keywords: BI value, business case, BI strategy, data governance, organizational adaptability.

1 Introduction

Most top organizations around the world use data for decision-making. They have shifted their focus to data rather than depending on business acumen alone. In today's competitive, knowledge-based economy, organizations are struggling to make sense of the fast-increasing volume, velocity, and variety of data (IşıK et al., 2013). This has resulted in growing pressure to provide better and quicker responses to customers (IşıK et al., 2013). Moreover, it is widely recognized that information plays a crucial role in the success or failure of organizations (Citroen, 2011).

Business intelligence (BI) is used to collect, analyze, and disseminate data so that organizations can make informed decisions (Hedgebeth, 2007). Coined by the Gartner Group in 1990s, the term *BI* came to embrace a variety of information technology (IT)–based tools and approaches that help organizations make better use of the increasingly vast amounts of data accumulated from both internal and external sources (IşıK et al., 2013). Therefore, many organizations have turned to BI applications as a means of improving organizational decision-making (IşıK et al., 2013). BI is currently the largest area of IT investment in organizations and has been rated as the top technology priority of CIOs worldwide for many years (Arnott et al., 2017). It has emerged as one of the critical applications in companies not only to support decision-making, but also to provide useful insight and drive organizational performance (Cruz-Jesus et al., 2018). BI has thrived in almost every industry including retail, financial services, manufacturing, utilities, and telecommunication services. Hence, both practitioners and researchers have created enormous demand for employing BI (Ali et al., 2018).

The information systems (IS) literature has shed light on the positive impact of BI-derived information on decision-making (Popovič et al., 2012). In addition, BI has gained popularity by having the ability to shape the way an enterprise conducts its business. Although BI research is a growing trend in IS research, research on the business value of BI is still scarce (Elbashir et al., 2013). Moreover, whether and how organizations achieve business value on the basis of their BI investments remains unclear.

Therefore, it is crucial to understand how BI creates business value and to identify what the most relevant drivers for BI-based business value creation are.

The main purpose of this paper is to improve the understanding of the drivers of BI-based business value. We conducted exploratory research on 16 BI experts from different industries to investigate the drivers affecting BI-based business value creation. More specifically, the paper will address the following research question: What are the factors influencing the BI business value creation process? The paper is organized as follows. Section 2 presents the research background of this study. We then describe the method used for data collection in Section 3. After reporting on the findings in Section 4, the discussion and implications are presented in Section 5. Finally, limitations and conclusions are discussed in Section 6.

2 Background

As a concept, BI is not novel. Since BI was first mentioned by the pioneer of information science, H.P. Luhn, in 1958 (Luhn, 1958), it has been defined in a myriad of ways, and the concept is still evolving. Forrester typically defined BI as a set of methodologies, processes, architectures, and technologies that transform raw data into meaningful information, which is then used to enable more effective strategic, tactical, and operational insights and decision-making (Evelson and Nicolson, 2008). BI is also often used as the umbrella term for large-scale decision support systems in organizations (Arnott et al., 2017). The Data Warehousing Institute defines BI as the processes, technologies, and tools needed to turn data into information, information into knowledge, and knowledge into plans that drive profitable business action (Loshin, 2012).

The concept of BI has attracted substantial attention from both practitioners and academics. Due to today's competitive environment, organizations require the assistance of BI to make informed decisions, which results in increased demand for BI. Therefore, BI has been a popular topic among researchers and scholars in the field of IS and strategic management (Ahmad et al., 2016). Hence, an extensive literature on BI has emerged.

Deploying BI is a complex, time-consuming, and expensive undertaking, because these software applications are high-risk/high-return projects (Ahmad et al., 2016). Improper implementation of BI may lead to failure and in turn render organizations data rich and information poor. Therefore, BI is highlighted as one of the most risky IT investments, requiring collaboration among IT and business executives to generate business value (Wagner and Weitzel, 2012). Many practitioners have thought that BI evolved from being a reporting tool and has gone far from being only a part of IT departments (Vizgaitytė and Rimvydas, 2012). Moreover, BI has penetrated all decision levels, from strategic and tactical down to operational level support. Strategic decision support typically involves the analysis of a large amount of data that must be "sliced and diced" in various ways. Tactical decision support often requires repeatedly accessing only a limited amount of data for short-term decisions (Watson et al., 2006). By contrast, operational decision support often introduces the need to make faster decisions based on both an organization's current state and details of its recent history (Wynn et al., 2007).

In general, the most important research questions in the field of IS involve measuring the business value of IS (Melville et al., 2004). Business value is also predicted to remain one of the major research topics for IS researchers (Schryen, 2013). Although the BI market appears vibrant and the importance of BI systems is more widely accepted, how organizations achieve business value on the basis of BI has yet to be fully investigated (Elbashir et al., 2013). Whether and how organizations obtain business value from BI is still unclear. As one of the fastest developing business application areas, BI has created a trail of confusion regarding its potential as a source of value creation (Vizgaitytė and Rimvydas, 2012). Therefore, both practitioners and researchers have continued to investigate the business value of BI (Trieu, 2017). For these reasons, it is more critical to understand the drivers of BI-based value creation to ensure the success of this promising, yet risky and costly, technological innovation.

Few studies have addressed the business value of BI. A study by Elbashir et al. (2013) discussed the role of shared knowledge and assimilation as a way to enhance the business value of BI. They argued that BI systems' assimilation and the need for shared knowledge among the strategic and operational levels are the drivers of BI-derived business value. A study by Trieu (2017) reviewed the IS literature to shed light on the processes by which organizations obtain business value from BI. Trieu's work presented the three processes on the framework of how BI creates value as shown in Figure 1.

First, the BI conversion process includes the link between BI investment and BI assets. BI investment consists of investments on BI related hardware, software, and technical infrastructure, human resources and management capabilities. BI assets consist of BI technology, human resources, and application portfolios. BI investment results in better performance and is a necessary but insufficient condition for BI assets. Second, the link between BI assets and BI impacts involves the BI use process. BI impacts refer to a state in which enterprises have attained benefits from BI, such as improved operational efficiency of processes, new/improved products or services, and/or strengthened organizational intelligence and dynamic organizational structure. According to the literature, high-quality BI assets are a necessary but insufficient condition for achieving BI impacts. Lastly, the link between BI impacts and organizational performance depends on the competitive process. Organizational performance includes measures of successful goal accomplishment, satisfaction of constituents, and the ability to gain valued inputs from scarce resources. However, BI impacts are important and necessary but are insufficient to result in improved organizational performance. Further, we have utilized Trieu's framework to illustrate BI-derived value creation.

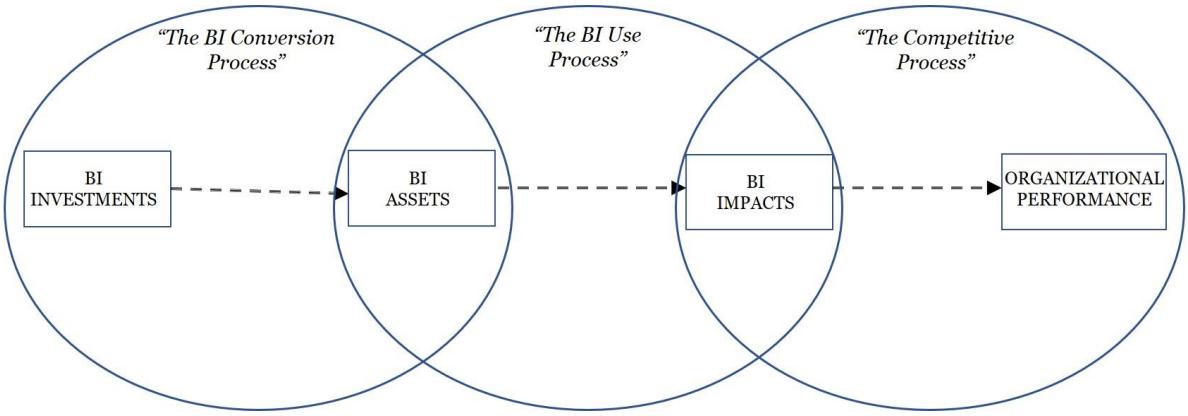

Figure 1. BI value creation (adapted from Trieu (2017)).

3 Method

In this study, we used the expert interview technique developed by Meuser and Nagel [21]. The data were collected from 16 semi-structured interviews with BI experts from different Norwegian industries. The experts were identified using LinkedIn based on their appropriateness as informants for this study. An overview of the informant's roles is presented in Table 1. Each interview took 30 to 45 minutes and was digitally recorded. In the interviews, the informants were probed for information regarding what, according to their experience, BI, BI business value, and BI technologies are.

NVivo was used to transcribe and analyze the interviews. This study used thematic analysis guidelines developed by Braun and Clarke (2006) for data analysis. The guidelines comprised six phases of analysis. In the first stage, researchers familiarize themselves with their data. In this phase, the data were read and reread, while taking down initial ideas. The second phase is generating initial codes. In a systematic fashion, the interesting features of data across the entire data set were coded, and the data relevant to each code were collated. The third phase is searching for themes. The codes were collated into

potential themes, and all the data relevant to each potential theme were gathered. In the fourth phase, all the themes were checked in relation to the coded extracts from the first phase and the entire data set from the second phase. The fifth phase is defining and naming themes. The overall analysis was reviewed to generate clear definitions and names for each theme. Finally, a report of the analysis, which is presented in the findings section, was presented. All the data were analyzed by the first author.

Position	**Industry**	**Company Size**
BI Advisor	Consulting and Advisory Services	Small
Senior BI Advisor	BI Software Provider	Small
Senior BI Advisor	IT Consultancy	Large
Data Manager	Banking	Small
BI Project Manager	IT Consultancy	Large
Data Scientist	IT Consultancy	Large
BI Developer	IT Consultancy	Large
BI Developer	IT Consultancy	Small
Senior BI Architect	Banking	Small
Senior BI Architect	IT Consultancy	Large
Head of BI	IT Consultancy	Large
Head of BI	Agricultural	Large
Head of Analytics	IT Consultancy	Medium
Head of Analytics	IT Consultancy	Large
Head of Analytics	Consulting and Advisory Services	Large
Data Governance Leader	Insurance	Large

Table 1. The informant's role, industry domains, and company size.

4 Findings

This section presents the findings of the interviews. First, we discuss how the informants defined the business value of BI and how BI creates business. We then present the four important drivers of BI-based business value creation.

4.1 Business value of BI

The informants emphasized three business values of BI: automation, business insight, and decision support. The informants emphasized that automation was the easiest way to achieve business value from BI. They explained that with automated reporting, organizations can use business data to produce reports much faster, with less effort, and without further analysis. One of the informants noted that *"if we start by the lowest hanging fruit it would be automation of collecting, integrating, and making data available. Provided that they already produce that stuff manually, one key value would be automating it because that results in cost-reduction."* Therefore, most informants maintained that most organizations are adopting BI for ease of use in exploring data, as well as scalability in automating reports. Another informant stated that *"automating reports is reducing the cost of creating reports. And what you actually reduce are two things: you reduce the manual effort of collecting and putting together data, and you also reduce the effort of providing reports to end users. So, I would separate it into data collection, preparation, and distribution. Distributing reports is a big job, especially if you have a bigger organization."*

Another aspect of automation that most informants mentioned is automated decision-making. Most of them argued that the business value of automated decision-making is easy to quantify. As one of the

informants noted: *"The business value of automated decision is mainly due to reduced need for human workforce, which is usually the highest expense and the increased speed of the decision making."* In addition, several informants mentioned that in automated decision-making, the type of decision is crucial. They explained that the type of decision that is typically automated is operational decisions, possibly tactical but probably not strategic decisions. The operational decisions have the kind of volume that justifies automation and they tend to be highly repeatable. Tactical decisions may also be automated if they are complex enough and reasonably high in value, but the informants typically found that they did not want to automate the entire decision so much as to support or guide it. One informant illustrated this point: *"I think most decisions you don't want to automate, a process can be automated if the decision is generally rule-based, then you need to find out all the different conditions and the outcome when we make those decisions? But if it's a decision that a person needs to make based on experience, based on something that it's not possible to write down in a set of rules, then you can't automate that using machine learning."*

Many informants also pointed out that having business insight is a business value derived from investing in BI. By utilizing a BI application as a single data repository, the whole organization can analyze the same version of the numbers and work from a single factual source to gain information and valuable insights. As most informants explained, a simple connection among multiple data sources and the easy creation of reports and dashboards using simple BI tools, such as Power BI and Tableau, will allow organizations to get what they need and get on with their job, with little or no help required from IT. They also mentioned that with business insight, organizations can monitor their performance in the light of history, goals, and peers to keep it focused and on track. One of the informants explained the business value of having insight: "*So you can actually get the insights to all your workers. So, for instance, you know facility services, instead of being a manager telling them what to do all the time, they can have the insight themselves about which part of the building has been in use, how many people have been at the toilet, how many people have been in the canteen, so they can better plan their own day, so they can be more efficient without a manager."* Moreover, several informants pointed out that having a BI system in an organization would offer the same version of the facts or a single version of truth. One of the informants noted that: "*If you have a data warehouse, you get to gather information from several sources and you also clean the data, make the data unified. It saves you quite a lot of energy and you will have one single truth which is quite important because you see that all department people gather for quarterly reports or monthly reports."* He further argued that the advent of data warehousing enables company to retain, clean, load, and integrate vast amounts of data from various sources into a single and standardized repository, allowing them to have the same version of facts as business value.

Finally, most of the informants emphasized that decision support is the most significant business value of BI. They mentioned that BI is built to support decision makers at all levels of an organization with facts that help them make better and more informed decisions. This is illustrated by the following quote from one informant: *"We used BI to make the decision-making process easier and less based on gut feelings. So, it's kind of the end game, so it doesn't matter if you're talking about the data warehouses or data analytics, or machine learning or the internet of things, the whole point of doing anything BI related is to make the decision-making process more secure, easier, and based on facts and not on gut feelings."*

Most informants argued that the classical business value of BI is making decisions based on facts instead of gut feelings. Another informant explained the business value of decision support: "*If the BI solution provides the information needed to be aware of what needs to be improved, the main part of the value gained from this improvement should be credited to the BI solution and not only the action performed as a result."* However, one informant argued that business insight and decision support are two sides of the same coin: *"When you have insight, you can use this insight to give value to the organizations. The insight will first of all be used for decision support. But it can be decision support on all levels, it can be for operational decisions, tactical decisions, and strategic decisions."* Further,

most informants emphasized that BI should be the foundation of all decisions, regardless of discipline or business area.

4.2 Drivers of BI-based business value creation

The informants emphasized four important drivers of BI-based business value creation: building a business case, having a BI strategy, data governance, and organizational adaptability. Table 2 presents definitions of each driver according to the informants and the literature.

Drivers	**Definition according to experts**	**Definition according to literature**
Business Case	An evaluation of the cost of implementation and maintenance. It is used to financially evaluate and identify tangible and measurable benefits.	The underlying arguments or rationales supporting or documenting why the business should accept something (Carroll and Shabana, 2010).
BI Strategy	A roadmap to help organizations measure their performance and identify competitive advantages.	A strategy that deals with people, process, technology and methodology for BI excellence (Boyer et al., 2010).
Data Governance	A business matter that deals with data quality, data architecture, and data ownership issues.	A collection of capabilities or practices for the creation, capture, valuation, storage, usage, control, access, archiving, and deletion of information over its life cycle (Tallon et al., 2013).
Organizational Adaptability	The ability of an enterprise to cope with new problems, new technologies or methodologies to gain competitive advantage.	The capacity to make crucial change in order to respond proactively to dynamic environments (Dolata, 2013).

Table 2. Definitions of the drivers of BI value creation.

According to most informants, building a business case is normally used to get funding for BI projects or to gain the executive's approval. They also mentioned that they had in fact started a BI project without developing a business case. Typically, a business case is built to identify the problems or opportunities that are being addressed, according to most informants. Tangible and measurable benefits of BI investment are financially evaluated, whereas intangible benefits and positive effects of BI for the entire organization are defined in a qualitative manner. A business case also includes an evaluation of the cost of BI investment and its maintenance. One of the informants stated that *"business case is just kind of how to describe what you're doing and why you're going to do it. You kind of need to build a business case to get the funding for your project. So, the business case is just the executive talking to the IT department. And they agree that we do this for the next two weeks."* Another informant also described the importance of business cases in value creation: *"You need to have a business case, if a data scientist finds something in a real world, then you need to show and tell the business value of it to the managers, or the managers' manager. They need to see where's the money? And where's the value? Because they are always looking for what's in it for them? Is it to improve customer retention? Is it to improve the sales?"*

One informant, a BI vendor, explained the importance of building a business case for small enterprises. He explained that business cases help clients set up key performance indicators (KPIs) together with the decision makers and align them with the strategy. KPIs vary from company to company; for instance, some of their clients wanted to focus on increasing their sales to have better control of sales, profit, or customer lifetime value. Another informant, a client of this BI vendor, argued that business cases have helped them understand the value derived from their BI investment. And they are currently expanding the BI investment across the whole organization. Because they have realized the value derived from BI by looking at the business case they built at the beginning of the project, it was easy for them to decide to invest more. Several of the informants from the large enterprises explained that

business cases are not as important for them. They argued that when an organization is planning to execute a BI project with its own resources, the business case is less important. In addition, they mentioned that depending on the culture of an organization, some would just build a business case and present only high-level and intangible benefits. This is because the top management believes that it is obvious that a BI investment will pay off. This is illustrated by the following quote from one informant: *"We never looked at business case again because in the first place we only build the business case to convince the C-level to invest in the project."*

The next factor that influences how BI creates business value is having a BI strategy. Several informants highlighted the importance of BI strategy. They explained that having a BI strategy serves as a roadmap to help organizations measure its performance and identify competitive advantages. Ultimately, they argued that BI strategy gives BI investment and BI assets a goal and direction. One informant stated that *"strategy in general, any kind of strategy is about finding where you are, what's the current situation, and then you define where you want to go, your goals and targets, and then you define how you get there, what are the actions to get there. […] It's good to have a BI strategy because it creates awareness of the value of BI solution, BI capabilities and stakeholders' commitment."* He argued that a BI strategy begins at the top; it requires executive participation. If the leader of an organization is not fully onboard, then a BI strategy will be a watered-down approach. In addition, a BI strategy gives an organization's BI a goal and direction. A BI project without a goal will certainly provide insight to an organization; however, it will not lead the organization to any destination. According to most informants, in order to get the most insight out of the data, the organization must have a clear BI strategy in place.

Another factor that influences BI value creation is data governance. Most informants explained that data governance is not an IT matter, but a business matter. They argued that the people who build the data warehouse have a technical mindset and that they therefore treat the data issues as technical issues. One of the informants noted that *"the IT should own the solution where the data is modeled but the business side should own the business rules and the meaning of the data. So, each business unit should have data governance that has control over the business rules and the data modelled in the data warehouse."* He argued that when the business side views data management as an IT issue, they always fail to realize that they are in fact part of the data quality problem and do not feel the responsibility to help in solving the data quality issues. According to most informants, data governance is still a new profession, and that is why most organizations still fail to see the need for it. Several informants emphasized the importance of data governance in any BI project. As one informant observed, "*data governance is important. And if you can compare it to data quality, data quality is just one of the issues in a governance project. What governance really means is that you have a rule set for handling your data. And in regards of data quality, it's in regards of data architecture, it's in regards of data ownership. The governance will kind of fall and do all of those things that will help you utilize your data better and maintain your data strategy better."*

Most informants explained that many BI projects fail due to data quality issues—and data quality is one of the main issues exposed by BI. In addition, they mentioned that many organizations discover their data quality issues only when they begin using their BI assets. When the dashboards do not look as nice or useful as they expected, the data quality issues become apparent. One informants said that: *"Data quality, I guess that's the biggest problem with the BI implementation. That we're ready even for production and the data quality is still poor, and it can be very difficult to make the management support or invest in data governance initiatives because it's a very new role. […] You need that to make sure the quality of your data. Today, data is getting more valuable. That's why you need to have a data governance function in place in order to get this value from BI solutions.*

Finally, most informants considered organizational adaptability an important factor in BI-based business value creation. They defined organizational adaptability as the capacity of an enterprise to cope with new problems, technologies, or methodologies in an effort to gain competitive advantage. Organizational adaptability is the willingness of an organization to look for new opportunities, ideas, and

technologies that may improve organizational performance. However, most informants mentioned that this is difficult to achieve and very challenging. According to most informants, many organizations continue to resist change. As a result, the informants found it very challenging to change the company culture. However, several informants presented some ideas on how to improve organizational adaptability. First, most informants underscored the importance of having executive sponsorship or BI ambassadors for a BI project. One of the informants said, *"The challenge is that you need to have the organization behind you, the top management need to be the BI ambassadors for you, and if you find some new insight that you have to go in your market then they need to know how to apply the actions based on your insight."* Second, several informants mentioned that making the organization understand the need to change to leverage BI assets can improve organizational adaptability. The third idea was to provide a BI asset that can improve their business process. For example, one informant stated that *"the most important [thing] is to give the user something that is much better than what they used to have. That's how simple it really is. If the user of the BI gets something that is better, more intuitive, takes less time than what they used to do, and trustworthy then you'll win."* Fourth, informants observed that setting up goals supports the change. Most informants argued that goals should be as specific as possible to help set everyone's sights on the same prize. Lastly, informants emphasized the importance of simply sticking with the process of change. As most of the informants explained, every organization needs to understand that the change needed for a successful BI takes time.

5 Discussion and Implications

In this section, we discuss the most significant findings of the study. Our findings revealed four drivers of BI-based business value creation: building a business case, formulating a BI strategy, data governance, and organizational adaptability.

First, most of the informants emphasized the importance of building a business case. Like any other investment, BI investment should be commercially viable in the eyes of management. A business case is used to demonstrate that BI is worth the investment. Although most organizations need to justify and get approval for IT investment, our interviews revealed that some organizations can still embark on a BI project without building a business case. We also found that in order to ensure that BI can support the strategic objectives of an organization, a business case should be part of the business strategy and have a clearly defined purpose. According to Hočevar and Jaklič (2010), estimating the value of BI requires answers to at least two questions: What are the costs of implementing BI? What are the benefits conferred by implementing BI? Our interviews revealed that these issues are addressed when building a business case. Therefore, we contend that building a business case when embarking on a BI project influences the business value creation derived from BI. However, we found little studies on business case (Dyllick and Hockerts, 2002, Carroll and Shabana, 2010). We propose that further studies should address this issue.

The informants also stressed the importance of formulating a BI strategy. Creating a BI strategy involves identifying where you are currently, where you want to be in the future, and how you plan on getting there. It is important to identify the business reasons for investing in BI, the strategic goals, and application goals of the planned solution (Hočevar and Jaklič, 2010), because a thorough formulation of business objectives and IT must be established for an organization to derive value from BI (Williams and Williams, 2010). Few studies have addressed the importance of formulating a BI strategy (Ramamurthy et al., 2008). Therefore, future studies should focus on this issue.

The informants believed that data governance is a driver of successful business value creation. BI can be very expensive if the information it provides is not accurate or does not match information needs (Hočevar and Jaklič, 2010). Successful BI should use correct, valid, integrated, and in-time data as well as the methods that will transform the data into decision information (Zeng et al., 2006). As Larcker and Lessig (1980) indicated, that information will be used if it is perceived as being sufficiently significant and usable for the decision-making process. According to previous studies, there is a positive relationship between the quality of information and information use (Petter et al., 2008,

Citroen, 2011). Data governance can help improve the data quality. Therefore, we contend that data governance can enhance this positive relationship, which can result in a BI-based business value creation. However, few studies have addressed the importance of data governance. A recent study by Janssen et al. (2017) argued that data governance can influence the quality of big data. Moreover, Tallon et al. (2013) discussed the structures and practices used to govern information artifacts. Tallon et al. argued that once an organization adopts data governance, it can boost the organization's performance, because data governance can unlock the value of the data in the organization. We conclude that data governance is a critical driver of BI-based business value creation. Therefore, how data governance influences BI needs further investigation.

The interviews also showed the importance of organizational adaptability in BI-derived value creation. According to Mott (1972), an effective organization displays two characteristics simultaneously: efficiency and adaptability. An efficient organization follows well-structured, stable routines to deliver intelligent products and service. Mott argued that in a changing world, organizations also need adaptability. Most informants mentioned that adaptability is the willingness of an organization to look for new opportunities or ideas that may improve organizational performance. They also explained that adaptability also allows the organization to cope with changes like new problems or technologies. In addition, organizational change is vital if an organization wants to leverage the full BI (Hribar Rajterič, 2010). As mentioned above, the relationship between information quality and information use are two dimensions of successful business value creation. However, Popovič et al. (2012) stated that the attitude towards information use must also be taken into account. We argued that this attitude can be highly influenced by organizational adaptability. We conjecture that improving organizational adaptability will result in better BI-derived business value. However, few papers have discussed organizational adaptability (Motta et al., 2014, Dolata, 2013). Therefore, further studies on how to improve organizational adaptability and how it affects the BI-value creation should be conducted. Furthermore, how BI investment and organizational performance may also be affected by organizational adaptability needs further investigation.

Figure 2 illustrates the four drivers of the BI value creation. First. we argue that business cases influence both the BI conversion process and the BI use process. Building a business case is the first step towards proving the worth of a BI investment. In the business case, the total cost of ownership, expected BI impacts such as return of investment, and cost of risk are discussed to gain executive sponsorship. In addition, both tangible and intangible BI impacts are evaluated. Therefore, business case is used for securing the BI project funding. Further, having a business case will help guide the transition from the old processes to the new BI enhanced processes to achieve the BI impacts.

Second, we believe that the formulation of a BI strategy will affect the entire process of value creation. BI strategy is about knowing the organization's current and future positions and identifying the actions needed to reach the latter. BI strategy supports the planning of software, hardware, human resources, and management capabilities (BI investments) and choosing the right tools, technology, and human resources (BI assets), thus supporting the BI conversion process. BI strategy further supports how BI assets will help to achieve the identified benefits of BI, such as new products/services or better decision-making (BI impacts), thus supporting the BI use process. BI strategy also supports the competitive process. For instance, when an organization have achieved a BI impact to analyze their customers better, this will result in a better ability to target customers. Hence, this contribute to competitive advantage, which through the competitive process may lead to better organizational performance.

Third, we argue that data governance is also an important driver of the BI value creation. Enabling organizations to identify who is responsible for the data is crucial. As stated by most informants, setting policies, creating explicit agreements about how data will be used and determining the impact when data is changed are important in any data management/BI project. In short, data governance is the who, what, how, when, where, and why of data management. It maintains the reliability, validity, integrity and accountability of data that results in a better information quality. In decision-making, quality information is the evident for quality decision (Ali et al., 2018). When BI becomes the vital

resource for quality information, then organization will consider BI as the reliable aid for decision-making. In addition, the selection and adoption of BI assets depends on its data environment (Trieu, 2017). Thus, data governance supports the BI conversion process.

Finally, the organizational adaptability influences the BI use process. As mentioned above, the organizational adaptability will influence the attitude of an organization towards the use of BI. Organizations with a higher organizational adaptability will be more able to do the necessary organization adaptation in order to utilize the BI assets. Thus, organizational adaptability is important for the BI use process.

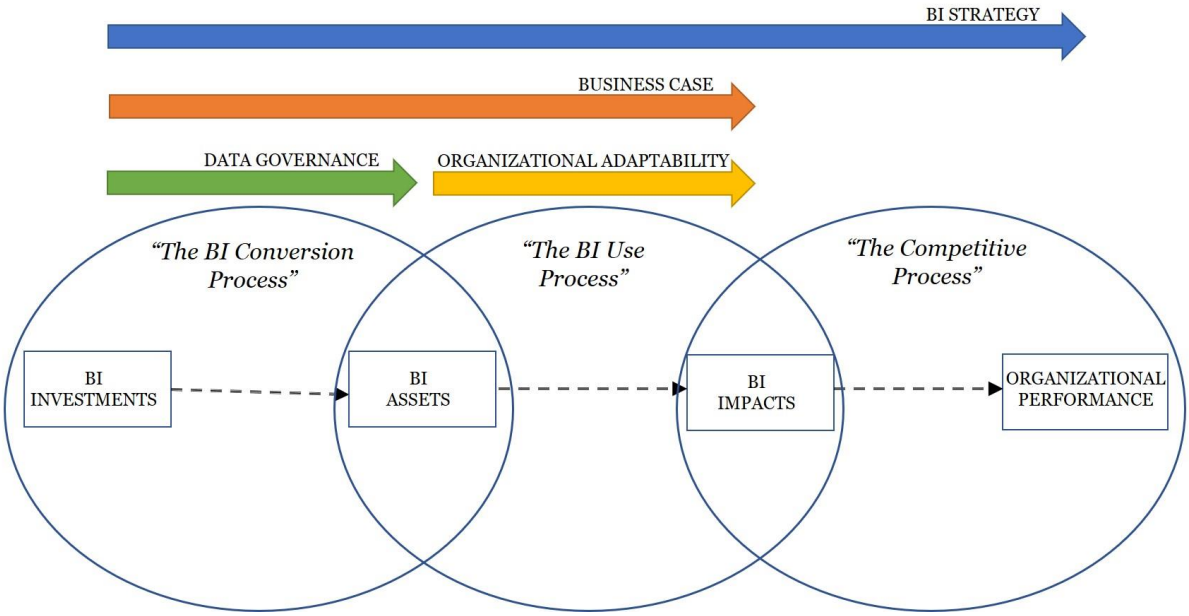

Figure 2. Framework of how BI creates business value (adapted from Trieu (2017)).

Further, we found that the experts believed that automation (automated reporting and automated decision-making), business insight, and decision support are the main business values of BI. They argued that from these, the organization will achieve revenue optimizations, cost reductions, risk reductions, and the ability to enter new markets and develop intelligent products and services. BI impacts have been a main focus of BI studies over the last 15 years; however, the BI literature has been silent on how these BI impacts complement other internal and external factors to create business value (Trieu, 2017). Therefore, we propose that further studies should address this issue.

6 Conclusion

In this exploratory study, we investigated the factors influencing how BI creates business value. We interviewed 16 BI experts from different industries and identified four drivers of BI-based business value creation: building a business case, formulating a BI strategy, data governance, and organizational adaptability. Building a business case is critical, because it influences the BI conversion process and the BI use process. Formulating a BI strategy affects the entire process of BI-derived value creation. Data governance plays a significant role in the BI conversion process. Finally, organizational adaptability influences the BI use process, which is vital to establishing a successful competitive process. The findings of this study can serve as a guide to practitioners embarking on a BI project and can help researchers engage in more BI business value research. However, this study suffers from an important limitation: it was performed in only one country. It would be interesting to determine whether the findings of this study are generalizable to other countries, both developed and developing.

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