Learning by the use of Business Intelligence

A case study made from an Organizational Behaviour Management perspective

MIKAELA NORDÉN – 2012
ACKNOWLEDGEMENTS

First of all I would like to express my gratitude and appreciation to my supervisor at Skanska Sverige AB, Pontus Wadström, you have been a great support both as a discussion partner and in giving good advices throughout the work with this thesis. I would also like to thank my supervisors Jan Lindvall and Göran Nilsson, Uppsala University for being very helpful whenever questions and problems have arisen. Finally, I would also like to express my greatest appreciation to all operational managers at Skanska Sverige AB, who have devoted your time in interviews and answering of the questionnaire. You have provided me with essential information and perspectives that came to be the groundwork for this study.

Uppsala University
May 2012

Mikaela Nordén
ABSTRACT

Researchers claim that to improve business and really make an impact on the market it is critical to develop organizational capabilities and create organizational learning. Business Intelligence (BI) has during the latest years gained lots of attention among organizations for being a tool that can help improve the business. However, even though organizational learning is critical at the same time as BI has become a main tool to improve the business the linkage between these two concepts has not been a topic for research. This thesis is taking an Organizational Behaviour Management (OBM) perspective when analyzing whether BI-tools create the right conditions for learning. A case study was made at Skanska Sverige AB where their three largest BI-tools were analyzed. The study was made in three steps; by an individual analysis of the tools, a questionnaire sent to all operational managers who uses the tools and by interviews with nine of these managers. The analysis of the tools indicated that the BI-tools at Skanska Sverige AB do not currently create the right conditions for learning. Few actions are taken because of the information in the tools.

Keywords: Organizational Behaviour Management (OBM); Organizational learning; Business Intelligence (BI); BI-tools
1. INTRODUCTION............................................................................................................. 6
  1.1. The possible link between BI and organizational learning.................................... 7

2. LITERATURE REVIEW .................................................................................................. 8
  2.1. Act and then think to create organizational learning.............................................. 8
    2.1.1. How change of behaviours can create learning............................................... 9
      2.1.1.1. Antecedents – what comes before a behaviour .................................... 10
      2.1.1.2. Consequences – what comes after a behaviour ................................... 10
      2.1.1.3. Positive reinforcers maximize performance ........................................ 11
    2.2. BI a new way of looking at data ........................................................................ 13
      2.2.1. The functionality and opportunities with BI ............................................... 13
      2.2.2. Strategic purposes increase importance of BI ........................................ 14
    2.3. How to use BI to create learning organizations .............................................. 15

3. METHODOLOGY ......................................................................................................... 16
  3.1. Data collection ....................................................................................................... 16
    3.1.1. Identification of key variables ...................................................................... 17
    3.1.2. Construction of questionnaire and operationalization ............................... 17
      3.1.2.1. Respondents of the questionnaire ....................................................... 19
    3.1.3. Individual analysis and interviews with users ......................................... 20
  3.2. Data analysis ......................................................................................................... 21
  3.3. Methodological limitations ................................................................................ 21

4. LEARNING IN SKANSKA SVERIGE AB´S BI-TOOLS .................................................. 23
  4.1. Skanska Sverige AB ............................................................................................ 23
    4.1.1. Skanska Sverige AB´s BI-tools ................................................................ 23
  4.2. How users perceive the information in Skanska´s BI-tools .................................. 24
    4.2.1. Immediate .................................................................................................... 24
    4.2.2. Specific ....................................................................................................... 26
    4.2.3. Personal ..................................................................................................... 28
    4.2.4. Certain ....................................................................................................... 31
    4.2.5. Sincere ...................................................................................................... 32
1. INTRODUCTION

According to many researchers the specification of goals and business objectives as well as values and missions of organizations, summarized in a strategy, has become a winning formula (e.g., Galbraith, 1995; Chandler, 1963). It is argued that it is hard to reach the top of an industry if being imitative and that few organizations can show off with the concept of luck and good fortune of being on the right market at the right time with the right product (Thompson, Strickland & Gamble, 2010, p. 17). However, even if the intentions of a certain strategy initially are good, things change and flexibility and adaptability is required from organizations (De Wit & Meyer, 2004, p. 53, p. 108-109). This is why Bartlett and Ghoshal (1994), and other researchers with them, argue that less emphasis should be placed on follow a clear strategic plan or formal structural design. To succeed it is claimed that organizations need to shape their actions along the way. It is therefore critical to continuously develop organizational capabilities and create organizational learning, or else they might fail to achieve their business objectives and make an impact on the market (Bartlett & Ghoshal, 1994; De Wit & Meyer, 2004, p. 110-121; Senge, 1990: A).

The question is how organizations can create learning and be able to make a change? A behavioural scientific research area that explains why people act like they do and how learning arises is Organizational Behaviour Management (OBM) where researchers argue that learning comes from the change and improvement of behaviours. The ideas within OBM is not something new, but are based on the well-reputed researcher B. F. Skinner. It is proposed that an antecedent causes a behaviour that is followed by a behavioural consequence. It is argued that this is the basic idea for how learning is created and it is therefore important to understand how these three interacts (Daniels, 1989, p. 13, 26, 64; Andersson & Klintrot, 2009, p. 4, 26). If this is understood it might help organizations knowing how to take corrective actions, but foremost to design work environments where high performance can occur. An antecedent alone, for instance in the shape of a formulated policy, goal or strategy, do, according to researchers within OBM, not change behaviours. These researchers claims that focus need to be on the behavioural consequences, which controls the behaviour and therefore determine the change or improvement of it, thus if organizational learning will be created or not (Daniels, 1989, p. 14; Braksick, 2007).

So, how can organizations ensure that focus is kept on the behavioural consequences? From an OBM perspective it is of importance that consequences are delivered in the right way, or else these might not be effective (Daniels, 1989, p. 14). It is about deliver information upon which analysis can be made and further learning can be created. A tool that, during the latest years, has gained lots of attention among organizations for its ability to deliver actionable information is Business Intelligence (BI) (Negash & Gray, 2003). Many working with it perceive BI as a strategic necessity to understand how to continuously improve the business (Williams, 2004; 2011). Some would even argue that it currently is exceptional to have a successful business without using BI (Chaudhuri, Dayal & Narasayya, 2011).
LEARNING BY THE USE OF BUSINESS INTELLIGENCE

In its simplest form BI is a data-driven decision support system (DSS) that gathers, manage but also integrate data in one place (Negash & Gray, 2003), in the so-called BI-tool. Management no longer needs to make use of data from several systems to make decisions in their daily work. A one single truth could instead be presented in the BI-tool and simplify analysis of the information. Hopefully it improves management's decision (Cukier, 2010) by deliver the information at the right time, right location and in the right form (Negash & Gray, 2003).

1.1. The possible link between BI and organizational learning
For an organization it is important to create learning, or else the possibility to make an impact on the market might fail. Information is, from a behavioural scientific perspective, essential to create learning. It is the information about performed behaviours, the behavioural consequences, that controls the change and improvement of behaviours and are thereby also essential for learning to take place. BI-tools have the potential to deliver this requested information about the business and therefore there should be a possibility to learn from the information received in the organizations’ BI-tools. However, the link between BI and organizational learning has not been a topic for research¹, by analyzing this possible link further insight about BI’s opportunities in business can be brought to the BI-literature. BI’s scope could hopefully be more than just integrating, managing and gathering data; it could also be a tool that enable creation of learning in the organizations and provide new opportunities to make an impact and succeed on the market.

To ensure learning focus, according to researchers within OBM, needs to be on the behavioural consequences, which in turn must be delivered in the right way to truly affect and change behaviour. However, the question is whether current BI-tools do deliver behavioural consequences in the right way to ensure creation of learning? The purpose of this study is therefore to, from an OBM perspective, investigate and analyze BI-tools and see if these create the right conditions for learning. The study does not aim to analyze all opportunities and functionalities that BI could provide; focus is only put on BI as a phenomenon that might facilitate organizational learning.

¹ After have made a thorough literature research on the concepts of Organizational learning and BI on EBSCO Host no publications were found where both concepts were mentioned. Nor the Journal of Organizational Behaviour Management (JOBM), which is the only professional journal devoted to behaviour management in organizations (JOBM, 2012), brings up BI as a concept to support learning.
2. LITERATURE REVIEW

The literature review consists of three parts. The first part individually discusses the concept of learning from an OBM perspective and the second part the concept of BI. The aim with the third part is then to present the possible relationship between learning and BI and provide a model to analyze whether the investigated BI-tools create the right conditions for learning or not.

2.1. Act and then think to create organizational learning

To achieve business objectives it is argued that organizations continuously need to develop their capabilities and adapt to changed circumstances (De Wit & Meyer, 2004, p. 53, pp. 108-109). Consequently they need to create learning to make an impact on the market (Simons, 2000, pp. 33-35).

Traditionally, organizational learning consists of two types of learning: single- and double-loop learning\(^2\) (e.g. Argyris & Schön, 1974; Kuwada, 1998; Senge, 1990). The main idea is that double-loop learning creates a deeper understanding of the work and work processes by asking questions such as “what causes the patterns of behaviour?”, people question and reflects upon what has happened. Single-loop learning is created by the repetition of processes without any deeper reflection, which means that problems will not be fully corrected and people will keep on working in the same direction as before. Since single-loop learning does not make people reflect on what happens and also not discover the underlying causes double-loop learning has, among researchers, become preferable prior to single-loop learning (Argyris & Schön, 1974; Argyris, 1976; Kuwada, 1998; Senge, 1990).

Double-loop learning can be compared to what Mintzberg and Westley (2001) refers to as rational learning, or “think first”. When a specific problem is defined causes should be diagnosed so to design possible solutions and make a rational decision on how to tackle a problem. Further Mintzberg and Westley (2001) mention that learning also could come from watching others, “see first”. However, neither “think first”, which has been respected among researchers (e.g. Argyris & Schön, 1974; Kuwada, 1998; Senge, 1990), nor “see first” is, according to Mintzberg and Westley (2001), always possible to use. It is not sufficient to think and then act in all situations; it would be too time-consuming (Damasio, 1994, pp. 197-200) and may in fact discourage learning rather than increase it (Mintzberg & Westley, 2001). To watch someone else might not be possible since there is not always someone before who knows how to do it. Mintzberg and Westley (2001) instead claims that learning should come from “doing first”; by finding a solution through experimentation or trial and error. People need to act and then think to create learning, which means that insights and organizational learning is claimed to come from the actual actions organizations take (Simons, 2000, p. 36; De Wit & Meyer, 2004, p. 109). Therefore, if organizations take actions they hopefully create opportunities to make impact on the market and achieve their business objectives. However,

the question of how to build organizations in which continuous learning occurs is asked over and over again (Senge, 1990:A).

2.1.1. How change of behaviours can create learning

To get a deeper understanding of how learning arise in organizations and why learning comes from “doing first” it is according to Daniels3 (1989; 2000; 2009), essential to understand human behaviours. Organizational Behaviour Management (OBM) is the application of behavioural principles to individuals and groups in various business settings (Wilder, Austin & Casella, 2009). By using models of OBM organizations can explain why people act like they do, how to affect results through the control of behaviours and how they can change behaviour if a change is needed (Andersson & Klintrot, 2009, p. 64; Daniels, 1989, p. 4). However, the creation of learning not necessarily comes from the absolute change of one behaviour to another, but also from the shaping of behaviours; by the successive improvement to prompt desired behaviours4 (Alberto & Troutman, 2006; Cooper, Heron & Heward, 2007; Daniels, 1989, p. 90). The shaping of behaviours is usually something that is required in the learning of new behaviours (Daniels, 1989, p. 207).

The basic idea within OBM is based on B. F. Skinners (eg. 1966; 1969); that a behaviour, which is defined as any observable and measureable act, can only be changed or improved in either two ways; by affect what comes before the behaviour, the antecedent, or affect what comes after, by the behavioural consequence (Daniels, 1989, p. 13; Wilder, Austin & Casella, 2009; Damasio, 1994, p. 208). Thus, researchers within OBM, claims that the antecedent prompts a behaviour that is followed by a behavioural consequence, which is also referred to as the “Three-term contingency model”. In turn the consequences affect future behaviours and if the behaviour is changed learning has been created (Daniels, 1989, pp. 32-33; Daniels, 2000, p. 25). Therefore, study and understand how the antecedents and behavioural consequences interacts with a specific behaviour make it possible to analyze performance problems and determine how to take corrective actions to prevent these (Daniels, 1989, p. 13; Poling & Brats, 2001; Mager & Pipe, 1997, pp. 1-2).

---

3 Aubrey Daniels has had and still has a huge influence on the field of OBM through the many publications he has been writing, as an editor for Journal of Organizational Behaviour Management (JOBM) and through the consulting firm ADI that he is a founder of (Wilder, Austin & Casella, 2009). Daniels is therefore a central part in this literature review. For more information please visit http://aubreydaniels.com/.

4 From here on the “change” of behaviours could imply either a change from one behaviour to another, or a successive improvement of a certain behaviour.
2.1.1. Antecedents – what comes before a behaviour

Every behaviour has an antecedent, which makes these constantly present in the work environment. Although the word antecedent will be used in this thesis there are many alternative expressions that explain the same, such as signal, cue or trigger. An antecedent could be a person, place or a thing, that precedes a certain behaviour and encourages performance of this behaviour (Daniels, 1989, p. 14). Examples of this are task clarification, equipment modification, goals, policies, strategic plans, procedures and training (Daniels, 1989, p. 14; Wilder, Austin & Casella, 2009). Also, behaviours of other people could constitute an antecedent when influencing people in their surrounding (Daniels, 1989, p. 15).

According to Daniels (1989, pp. 15-17) antecedents have some distinguishing characteristics. As mentioned, they always precede the behaviour they influence. They communicate information about the behaviour as well as the consequences of the behaviour. To be powerful antecedents should describe clearly the expectations and desired performance. However, it is important to remember that antecedents induce behaviours, but only consequences have the power to maintain it. An example of this is that many organizations use quality and safety programs with focus on antecedents, for instance job-descriptions and procedures, but forgets about the consequences such as the use of controlling- or feedback systems. Further, antecedents emerge because of certain past consequences5, if not being paired with a consequence the effectiveness of antecedents will decrease and only have short-term effects. If behaviours want to be kept it is therefore argued that the plan on how to deliver consequences must be set (Daniels, 1989, pp. 15-19; Braksick, 2007, pp. 44-54).

2.1.1.2. Consequences – what comes after a behaviour

Within OBM research consequences refer to behavioural consequences, events that succeed behaviours and change the probability that a behaviour reoccur. Every behaviour has a consequence that cannot be seen before hand, therefore learning should come from “doing first”. The consequences ensure that people take actions and both influences and controls the behaviours of people. For this reason consequences are the single most effective tool managers’ posses to increase employee performance. Irrespective of whether consequences are intentional or not they do affect performance. For that reason; consider and continuously work with behavioural consequences has a large gain (Daniels, 1989, pp. 23-24; Skinner, 1969; Mager & Pipe, 1997, p. 43; Poling & Brats, 2001; Damasio, 1994, pp. 206-207).

According to Daniels (1989, p. 29-30), Mager and Pipe (1997, p. 43) and Poling & Brats (2001) consequences will affect behaviour one of two ways, either by increasing or decreasing the frequency of it. Positive reinforcers are defined as a consequence which increases the probability that a behaviour will occur more often in the future; people will continue a behaviour since they get something they want. Possible positive reinforcers are for instance a smile or a “thank you”. With negative reinforcers people also continue a certain

---

5 See Picture 1 – The three-term contingency model
behaviour, but the reason they do it is because they want to avoid an undesired consequence. For instance, gym visits can reduce potential consequences of health condition anxiety. However, both positive and negative reinforcers are defined by its effects. If a reinforcer is delivered, but the behaviour still not change, it implies that it was not a reinforcer for this particular individual (Daniels, 1989, p. 29-30; Mager & Pipe, 1997, p. 43; Poling & Brats, 2001). The consequence of missing the bus one day should be a negative reinforcer of avoiding the same thing the next day. If still missing the bus the very next day, the negative reinforcer was not a reinforcer for this specific person and learning has not been created. This implies that all behaviours have a consequence, in this case missing the bus, but not all consequences are reinforcing so to change the behaviour.

Punishment or extinction is claimed to decrease behaviours. An unwanted consequence will be perceived as a punishment, making the behaviour less likely to reoccur. Just as reinforcers, punishment is defined by its effects. Punishing consequences are not always intentional, a reason why managers often punish behaviour they in fact would like to encourage. What also decreases behaviours is extinction, which refers to when people do not receive a consequence at all. Extinction is a frequent problem in many organizations where people who perform well do not get the attention they need to keep perform. Many performance problems actually does not occur because of what we do, but because of what we do not do (Daniels, 1989, pp. 31-33; Andersson & Klintrot, 2009, pp. 125, 128-130; Poling & Brats, 2001).

2.1.1.3. Positive reinforcers maximize performance

According to Daniels (1989, p. 33) and Callahan and Nolan (2001) the most effective way to enhance performance in organizations is by the use of positive reinforcers. Positive reinforcement maximizes performance while negative reinforcers only produce a certain level of performance to escape or avoid punishment. If focus is kept on positive reinforcement, negative behaviour should eventually fade out. Positive reinforcers are to a large extent available in work places and are generally cheap to apply, both in terms of time and money. This can be the reason why organizations that are aware of and apply positive reinforcement are effective in creating learning and high performing cultures (Daniels, 1989, pp. 33-34). However, to become one of these organizations that truly works with and knows how to apply behavioural principles it is beneficial to understand how positive reinforcers should be delivered. The fact that reinforcers should fulfill the request of PIC, being Positive, Immediate and Certain, is among researchers a consistent view (eg. Daniels, 1989, p. 49; Braksick, 2007, pp. 67-71; Andersson & Klintrot, 2009, p. 57). However this is not enough, reinforcers also need to be specific, personal, sincere and frequent (eg. Daniels, 1989; Johnson, Dakens, Edwards and Morse, 2008; Olofsson, 2010; Braksick, 2007, p. 67)

- Immediate is important because a slightest delay will weaken the reinforcers association to the behaviour and reduce the effectiveness. Therefore, the most effective reinforcers occur while work is conducted. The longer delay between performance and reinforcer,
the less impact the reinforcer will have on the performance. This implies that an immediate reinforcer cannot be delivered for results; an immediate reinforcer should be received on the way to the result. If not reinforcing immediately there is a risk that the wrong behaviour is reinforced (Daniels, 1989, p. 26; Johnson et al, 2008, p. 59; Braksick, 2007, p. 67; Olofsson, 2010, p. 155).

- **The certainty** that a reinforcer will follow a specific behaviour also determines if it will influence the behaviour or not. The higher the certainty of a positive reinforcer the greater impact it will have. If a reinforcer always follows a behaviour the certainty is high. Certain reinforcers are the most effective to maintain or increase a behaviour (Daniels, 1989, p. 76; Johnson et al, 2008, p. 59; Braksick, 2007, p. 67).

- **Specificity** in both what and how things are said is important when reinforce. If reinforcement cannot be made immediately it should be specific. People need to know exactly what they did right. The use of data helps being specific, data also ensures that reinforcement will not be delivered to everyone for everything. Specificity is even more important when teaching a new skill. However, the more immediate a reinforcer is, the less specific it has to be (Daniels, 1989, p. 77; Johnson et al, 2008, p. 60; Braksick, 2007, p. 67; Olofsson, 2010, p. 157).

- Positive reinforcers should be personal, meaning that they should feel personal for the individual or these possibly will not get through. Efforts should be put on explanations and descriptions of why people did a great job. Reinforcers should be delivered in different ways each time. Especially, if reinforcers are delivered to several persons, these should vary so every person feel unique (Daniels, 1989, p. 76). People appreciate different reinforcers, therefore the very same reinforcer can be positive or negative dependent on what motivates the specific person (eg. Braksick, 2007, pp. 83-90; Damasio, 1994, p. 207; Daniels, 1989, p. 26; Mager & Pipe, 1997, p. 55; Poling & Brats, 2001; Johnson et al, 2008, p. 59; Olofsson, 2010, p. 154).

- If not being sincere reinforcers can easily be perceived as punishing. For instance overdoing reinforcement is more often perceived as negative rather than positive. It makes people feel uncomfortable. Unearned compliments are practically never reinforcing (Daniels, 1989, p. 78; Johnson et al, 2008, p. 60; Braksick, 2007, p. 67; Olofsson, 2010, p. 153).

- The more frequent a certain behaviour is reinforced the stronger performance there will be. It is hard to say how often this is, but there is a tendency that reinforcement is generally needed much more than people think. It takes many reinforcers to change a habit. Therefore the change of work habits can be very difficult and must be reinforced many times before a change comes (Daniels, 1989, p.79; Johnson et al, 2008, p. 59; Braksick, 2007, p. 67).
LEARNING BY THE USE OF BUSINESS INTELLIGENCE

There are many things that need to be considered to create a foundation for organizations in where behavioural factors are considered and learning can be a part of daily work. To succeed with the creation of organizational learning Davenport and Prusak (2000) argues that it must be handled in a more careful and systematic way. Organizations must tackle this challenge and researchers’ suggestion is that if organizations manage to structure people, technology and knowledge in appropriate ways these can achieve remarkable results (Davenport & Prusak, 2000).

2.2. BI a new way of looking at data

A fairly new concept among both academics and practitioners, which was first introduced in the early 1990’s is BI. BI is “a system combining data gathering, data storage, and knowledge management with analytical tools to present complex and competitive information to planners and decision makers” (Negash & Gray, 2003; 2008). The price of both computing and storage of data has, during the previous years, fallen rapidly and BI has become mainstream (Cukier, 2010). Currently it is even exceptional to have a successful business without using BI (Chaudhuri, Dayal & Narasayya, 2011). Systems are more and more linked and BI can gather and transform the data and show the complete picture and truth of operations, which enables organizations to operate more efficiently (Cukier, 2010). It has changed the way of how organizations look at data (Bollier, 2010) and how they can structure their data to extract useful meaning from it. Data analysis methods are unlimited (Hand, 2007, p. 114) and it is according to IBM (2010) of outermost importance to know how to assess this new technology to improve results.

2.2.1. The functionality and opportunities with BI

BI has many beneficial functionalities, such as business responsiveness, information sharing and flexibility (Williams & Williams, 2003), but foremost a potential to improve decision making (eg. Simons, 2008; Negash & Gray, 2003; Watson, Wixom, Hoffer, Anderson-Lehman & Reynolds, 2006). However, the main idea for all BI-tools is to provide decision makers with actionable information at the right time, right location and in the right form (Negash & Gray, 2003). BI-tools most often include a reporting tool that provides the ability to create interactive and scalable reports scheduled as users demand. The interaction with users by the use of dashboards and intuitive displays is also central for BI-tools (Hagerty, Sallam & Richardson, 2012). The revolution is, according to Williams (2011) that actionable information no longer needs to be based on people’s intuition, but on available data and real facts. However, to be able to accelerate growth, outperform competitors and drive meaningful change Bazerman and Moore (2009, pp. 4-5) argue that organizations need to find a balance and identify what situations real facts are preferred and in what situations intuition can be good enough.

BI can eliminate time-consuming ad hoc searches for information and can also release people from producing data since they hopefully get reports more quickly and to their liking. A consequence of that should be that focus can be switched to analysis of
targeted data and how operating processes can be improved (Williams, 2004). The use of BI should provide management with an understanding about the optimal solution to their problems and enable them to quickly take actions (Simons, 2008; Williams, 2004; Jaspersoft, 2011). By the use of interactive pictures and charts numerous aspects of data can be displayed. The so-called Online Analytical Processing (OLAP) enables users to analyze data by slice and dice through the information. Analysis is also enabled by the use of predictive modeling that are based on advanced mathematical techniques but simplified by BI developers into more simple models in the BI reports, dashboards or scorecards (Hagerty, Sallam & Richardson, 2012).

BI provides the opportunity to manage and integrate data in better ways and by making data more visible and transparent it can unlock sources of new economic value and get new and fresh insights to the business (Cukier, 2010). Simons (2008) and Williams (2004) argue that every part of the organization will analyze and look at data in the same way, creating one single truth. This is fulfilled since all tools in the BI-platform use the same security, administration, portal integration and query engine and also share the same look and feel. BI should offer a robust way to search, capture, store and also reuse information. To enable this BI-tools should be able to assign and track events that belongs to specific users, which is often made by integrating BI with separate portals or workflow tools (Hagerty, Sallam & Richardson, 2012).

2.2.2. Strategic purposes increase importance of BI

As seen, BI can be used to various degrees of simplicity; from the use of standard- and ad hoc-reports, query and alerts to the more complex form of BI such as statistical analysis and predictive modeling (Negash & Gray, 2008). In the evolution of BI the primary focus was to provide information for planning and controlling productivity and efficiency in organizations. This role has changed and previously focus is on the use of BI for strategic purposes (Williams, 2004). Williams and Williams (2003) claim that it is a strategic necessity for organizations to assess how they can use BI to improve results. Strategic alignment is very important and organizations should go beyond technical implementation to catch real business values, matching planned BI investments with specific critical business processes (Williams & Williams, 2003; Williams, 2011). The traditional view is that BI must fit organizational strategy, which implies that strategy is first developed and determines how BI should be designed. However, this view has changed towards that strategies emerge through trial and error, also referred to as learning by doing, and ad hoc processes, which are influenced by an organizations BI. BI is a tool that supports businesses in reaching organizational objectives and thereby influences the direction of organizational change (Thucker, Thorne & Gurd, 2009). If not succeeding to sufficiently develop and administrate the organizations capabilities within BI, organizations will be both left behind and lost in the big data world (Manyika, Chui, Brown, Dobbs, Roxburgh & Hung Byers, 2011).
2.3. How to use BI to create learning organizations

To make an impact on the market researchers claim that it is critical to develop organizational capabilities and create organizational learning. As seen in the previous literature review organizational learning, from the perspective of OBM, comes from the change of behaviours. Learning need to come from “doing first” and by taking actions learning will come from the consequences of these actions. It is therefore important how information, in the form of consequences, is delivered. Many of the largest organizations currently make use of BI to deliver the right information at the right time and thereby facilitate analysis of the organization’s operations. BI has traditionally been used for planning and controlling productivity and efficiency, but this role has changed and nowadays it is rather used for strategic purposes – to improve results. The OBM-literature illustrates that to improve results and make an impact on the market learning needs to be created. For this reason there should be an opportunity to maximize the use of the information in the BI-tools and create learning from the information. However, even though most of the largest organizations currently make use of BI, the link between BI and how it could be used to create organizational learning does not seem to have been reviewed in the literature.

According to researchers within the field of OBM positive reinforcement is the major way in which learning is created and for it to be effective it is essential to consider how it is delivered. Thus, the information in the BI-tools needs to fulfill the same demand as positive reinforcers if it should be able to contribute to the creation of learning. Consequently, if the information is in compliance with e.g. Daniels (1989), Braksick (2007), Johnson et al (2008) and Olofsson (2010) being immediate, specific, personal, certain, sincere and frequent it should enable organizations to change behaviours and take actions. Data about the actions will then be reported into the BI-tool to be the foundation for new learning.

Picture 2 – How learning could be created in a BI-tool
3. METHODOLOGY

The research was conducted in a case study at Skanska Sverige AB where operational managers of the organization provided their view upon how the information was delivered in their previous BI-tools. Quantitative data was collected in the shape of a questionnaire sent to all the users. The data from the questionnaire was strengthened by an individual analysis of the tools and interviews with nine of the users.

3.1. Data collection

In the end of the literature review an attempt was made to link the concept of organizational learning and BI, based on the author’s own interpretation from the studied literature. To analyze whether this link could be confirmed or not a case-study was made, just in line with Yin (2003) who claims that if this link could be confirmed by a case it should increase the validity of the concepts and their relationships. If the linkage is disconfirmed it would provide an opportunity to refine the theory (Yin, 1994; Flyvberg, 2004). Further, a case-study research provide in depth-knowledge, which can be hard to obtain in any other way (Collis & Hussey, 2009, p. 82). In line with these arguments and to be able to present an adequate picture of the reality both quantitative and qualitative data was collected in a case-study.

The case-study took place at Skanska Sverige AB where their three largest BI-tools was analyzed; namely Vägvisaren (VV), Ekonomisk Analysportal (EAP) and BI HR. Even though the research was conducted on only specific case, the study might still have a broader theoretical significance. Both Saunders, Lewis and Thornhill (2009, p. 335) and Flyvberg (2004) claims that this is possible if the findings are related to existing theories. The proposition was grounded in the reviewed literature, which should make the findings applicable to other organizations that use similar BI-tools and further have implications for all managers who use these tools.

When research concerns peoples’ behaviours, attitudes, experiences or understanding of a specific topic it is, according to Hartman (1998), preferable to use questionnaires and interviews. To find out whether the BI-tools in Skanska Sverige AB deliver information in the right way, an examination of how the users experienced the tools were made. To reduce bias in the collected data and increase the validity and reliability different methods of data collections was triangulated, in line with Collis and Hussey (2009, p. 85). Quantitative data was collected in the shape of a questionnaire. The findings from the questionnaire added breadth to the study since the whole population had the opportunity to view their opinion. The qualitative data was collected in an individual analysis of the three BI-tools, but also in interviews with sampled users. Together the individual analysis and the interviews offered depth to the findings. Altogether this provided a rich picture of how the information in the tools was experienced, which strengthened the empirical findings. The study was consequently made in four main steps;

1) Identification of key variables upon which data was needed. These variables were in focus in the questionnaire, individual analysis and in the interviews.
LEARNING BY THE USE OF BUSINESS INTELLIGENCE

2) Construction of questionnaire, which was sent to all the users in the population.
3) Individual analysis of the BI-tool out of the identified variables - to establish an opinion about how the information was structured in the tools.
4) Structured following up interviews with sampled users who was contacted in the questionnaire study - to provide them the opportunity to further explain how they perceived the information in the tools.

3.1.1. Identification of key variables
The author had previously made an internship at Skanska Sverige AB and therefore gained access to the organization. Since the access was favorable there was an imminent risk to be overflowed by information and also that the scope would continue to grow and make the author subjective about the received information. For this reason the variables upon which data was needed was identified. The variables were a support to delimit and keep focus on the purpose of the study. It was out of these variables that the questionnaire and topics for interviews were created. Lots of data was received and the use of the same variables facilitated the comparison of the data when it came to the analysis of the empirical evidences.

As seen in the literature review; antecedents prompt behaviours, but what maintains behaviours are the consequences, and foremost the positive reinforcers. The antecedents for BI-tools was delimited from this study firstly to keep the scope down but also since it is the positive reinforcers that are the most important when studying whether learning is created or not. The variables chosen derived from Daniels (1989; 2009) of how reinforcers need to be delivered to be effective, which is that a reinforcer should be; immediate, specific, personal, certain, sincere and frequent. However, these variables are all common in the OBM-literature and therefore correspond with other researchers in the field eg. Braksick (2007); Andersson & Klintrot (2009), Johnson et al (2008) and Olofsson (2010).

3.1.2. Construction of questionnaire and operationalization
The proposition made in the end of the literature review was that for organizations to make impact on the market and improve their business by the use of BI, the information in the BI-tools need to fulfill the variables of Daniels (1989). The questionnaires first part was related to these variables.

The research-object for the study was Skanska Sverige AB’s three largest BI-tools. To not overlook possible differences within the tools questions about how the information was perceived was asked for each of these. The aim was to find out whether the BI-tools fulfilled the criteria of how information should be delivered to create learning. The scales on which the questions were answered was constructed in the Likert-style, which according to Saunders, Lewis and Thornhill (2009, p. 378) is the most frequently used rating scale, ranking from “strongly agree”, “agree”, “disagree” and “strongly disagree”. To avoid respondents

---

6 A more detailed description about the variables is found in the literature review chapter 2.1.1.3. Positive reinforcers maximize performance.
7 The questionnaire as a whole is found in Appendix 1.
ticking in the middle box an even number of alternatives was used. The following questions were asked:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Question</th>
<th>No. of question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immediate</td>
<td><em>you can, along the way to results, follow how you perform compared to business objectives</em></td>
<td>1,7,13</td>
</tr>
<tr>
<td>Specific</td>
<td><em>the information is detailed enough for you to understand what has affected the operations</em></td>
<td>2,8,14</td>
</tr>
<tr>
<td>Personal</td>
<td><em>the information are presented from your specific needs</em></td>
<td>3,9,15</td>
</tr>
<tr>
<td>Certain</td>
<td><em>you can expect all actions to be registered in the tool</em></td>
<td>4,10,16</td>
</tr>
<tr>
<td>Sincere</td>
<td><em>the information reflects your operations in a correct way</em></td>
<td>5,11,17</td>
</tr>
<tr>
<td>Frequent</td>
<td><em>the information are updated sufficiently enough for you to take actions on it</em></td>
<td>6,12,18</td>
</tr>
</tbody>
</table>

*Table 1 – Question 1-18 in questionnaire*

If information in Skanska Sverige AB’s BI-tools was delivered in this way, the proposition was that learning should be created, which should affect the actions taken in organizations. Therefore the second part of the questionnaire consisted of questions of whether managers *took actions* because of the information they had received from the BI-tools. The actions that Skanska are focusing on are the actions that are connected to their business objectives, which are divided in six categories; Employees, Safety, Productivity, Customers, Green and One Skanska. Since actions connected to these are the most important for Skanska it was also these actions that were in focus in the questionnaire. This study did not measure the business objectives per se and whether Skanska fulfill these or not. The study only measured whether actions connected to these objectives was taken or not, actions that hopefully also create learning. Information about the requested actions could in some cases be found in only one of the investigated BI-tools, but sometimes also in several. The questions asked were therefore not connected to a specific BI-tool. In this part respondents only had to tick in the box if they agreed and leave the box empty if they disagreed. Examples of actions follow below.

<table>
<thead>
<tr>
<th>Business Objective</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employees</td>
<td>allocate new and challenging assignment for your co-workers</td>
</tr>
<tr>
<td>Safety</td>
<td>follow up on measures that concerns the working conditions in your operations</td>
</tr>
<tr>
<td>Productivity</td>
<td>take measures that decrease the costs of your operations</td>
</tr>
<tr>
<td>Customers</td>
<td>call your customers</td>
</tr>
<tr>
<td>Green</td>
<td>analyze what customers prioritize green building</td>
</tr>
<tr>
<td>One Skanska</td>
<td>interact with other regions or districts within Skanska</td>
</tr>
</tbody>
</table>

*Table 2 – Examples of question for each and every Business Objective*
LEARNING BY THE USE OF BUSINESS INTELLIGENCE

To make sure the right information was retrieved from the questionnaire much emphasis was therefore put into formulating and testing the questionnaire before it was sent out. One of the variables that were toughest to operationalize was the variable of sincerity. To what extent the information in the BI-tools is sincere or not can be seen as a bit fuzzy and therefore this needed to be more concrete. To what extent the information reflected their operations in a correct way therefore became a synonym for the sincerity. The questionnaire was checked twice with the supervisor of the thesis and several times with the supervisor at Skanska Sverige AB. The questions were further developed and simplified to better fit the perspective of the users and the specific situation at Skanska Sverige AB. Further, the questionnaire was sent to two selected users of the tools, for them to provide their feedback of the questions and their opinion about the completion time of the questionnaire. This feedback was considered even more valuable since they were the ones who possessed insights into both the tools and how much time they, as a manager, could set off to answer a questionnaire like this. After considered the feedback from these two the questionnaire was sent to the whole population of the study; operational managers who had used the tool during the last year.

3.1.2.1. Respondents of the questionnaire

Skanska Sverige AB is divided into 3 business categories; Building, Civil and Asphalt & Concrete. These are further divided into 22 regions, 100 districts and 3000 projects. For each business category there are five levels of managers; the Executive Vice President (EvP), Regional Managers (RM), District Managers (DM), Project Managers (PrM) and Production Managers (PM).

There are several categories of users of the three BI-tools in Skanska Sverige AB. For instance, accountants and controllers have access to the information in EAP and people working on the HR-department have access to BI HR. However, only EvP, RM and PM have access, and make use of the data from VV and therefore make use of all three BI-tools. In addition VV has been in use for the longest period of time, why it was of interest to include in the study.

There are three EvP’s, 19 RM’s and approximately 120 DM’s in Skanska Sverige AB. Present statistics over the use of the BI-tools, which was achieved from the project managers of the tools, showed that during 2011 47 of these had used the BI-tools; 1 EVP, 10 RM and 36 DM. Since the aim when analyzing the tools was to investigate how managers perceive the information and not what information they use in the tools, the result should not be dependent on what level the managers are in the organization. Therefore all 47 managers who used the tools were chosen as the sample for the study.

---

Picture 3 – Organizational Hierarchy
3.1.3. Individual analysis and interviews with users

The questionnaire was only the first step to determine whether the information delivered in the BI-tool created organizational learning or not. To support and complement the findings an individual analysis of the tools were made. However, before the individual analysis was made the author read the project document for the tools to get a first glimpse of the tools. These documents described what, why and how the tools were implemented. A one-hour meeting with the project manager for VV and EAP was also arranged to further understand the intentions with these two tools, concerning BI HR the author believed these intentions was understood just by reading the project documents.

The individual analysis was also made out of the six variables mentioned above. The author was, by clicking around in the tool, taking notes of how the variables of effective information were fulfilled in the three tools. This first analysis provided a first picture of how the tools can be used, but foremost it facilitated the next step. It prepared for the interviews with the users of the tools.

The last step in collecting empirical data was to conduct interviews with the users. The sample was initially ten users, however one of these interviews was cancelled after have rescheduled the time two times and a new appointment was hard to find. Out of the remaining interviews three used the tools more often than others. The three “frequent users” were picked for interviews since they hopefully could provide a deeper review of how they perceived the tools. To complement these opinions six of the other users were chosen as well, since they belonged to the so-called normal users of the population. When the choice of these six interviewees was made it was taken into consideration that these should belong to both the Building- and the Civil business, and also to different regions. The nine interviewees were therefore both frequent and normal users, belonged to both the Building- and the Civil business and further worked in eight different regions. The distribution among the interviewees hopefully assured that the interviewees picture were as general and right as possible.

The initial contact with interviewees was made by email and if no answer was received they were contacted by telephone to book an appointment. Since the managers belonged to different regions a choice could have been to conduct interviews in the same regions on the same days. However, the managers’ schedules were quite full and it was hard to coordinate it in this way. Eight of the interviews were therefore made on the phone. This was in accordance with Saunders, Lewis and Thornhill (2009, p. 349) who argue that when it is impractical or the time is short it is beneficial to conduct interviews on telephone rather than face-to-face. One interview could be arranged in the area of Stockholm.

All interviews were semi-structured, which means that a list of themes or variables was to be covered during the interviews (Saunders, Lewis & Thornhill, 2009, p. 320). The variables where the same as used in the questionnaire and the individual analysis; whether

---

A complete list over the interviewees is found in Appendix 2
the information fulfilled the demands of being immediate, specific, personal, certain, sincere and frequent. After a request from some of the interviewees the general subjects to be discussed was sent to all the interviewees in advance⁹. The interviews lasted between 45 and 120 minutes, depending on how much time the interviewee could set off. The author had, in line with Saunders, Lewis and Thornhill (2009, p. 320) just a few questions connected to the variables to hold on to, to steer the interviews in the right direction. The focus was then to collect information about these variables and try to make the interviews talk as much as possible around these variables.

3.2. Data analysis

Of the 47 in the population 35 answered the questionnaire, which was a response rate of 74%. The falling-off was almost the same for RM’s and DM’s, 20 and 25%, the distribution among the respondents were therefore equally spaced. This also applied to the usage of the tools where both users who had used the tools for a longer period of time and users who had just used the tools a couple of month answered the questionnaire. The results from the questionnaire were analyzed by the use of descriptive statistics. The main reason to carry out a questionnaire was to add extra breadth to the study, in this case Collin & Hussey (2009, p. 221) argue that descriptive statistics is enough. It discerns patterns that are not obvious in the raw data (Lovie, 1986, p. 165) and it also complemented the data from the interviews.

All interviews were recorded to enable analysis of the results. After each and every interview the recorded interviews were checked several times to pick out relevant information, in line with the set variables, and organize it in an excel-sheet. It provided a good overview of what annotations the interviewees had in common. It also enabled determination of what information was in need in the following interviews.

3.3. Methodological limitations

The choice of interviewees might have had implications for the results of the study. The relationship between how many RM’s respectively DM’s who used the tools and how many of these who were picked for interviews was not equal. In the choice of interviewees focus was on getting some managers from the extreme users rather than on what specific position they had. Further, according to the user statistics of the tools, no managers from the Asphalt and Concrete business use the BI-tools and they were therefore not included in the study. It can therefore be claimed that not the whole Skanska Sverige AB was the research object for the study, only the Building and the Civil business.

The results from the questionnaire displayed that a large part of the managers at Skanska Sverige AB only uses the tools a couple of times a month or even less regularly. This might also have had implications for the results; the managers might not have had the desired knowledge to answer the questions in the questionnaire adequately. Even though the questionnaire was checked several times with users, tutors and supervisors at Skanska there

---

⁹ Subjects for interviews are found in Appendix 3
were differences in the results between the questionnaire, the interviews and the individual analysis. Generally the results from the questionnaire were overly more optimistic than the findings from the interviews and the individual analysis. The managers answered the questionnaire out of the knowledge they have about the tools, knowledge that is based on an irregular usage, which might have created a distorted view. A further reason the results differs might also be because questions in the questionnaire are not put in the right way. As mentioned the variables are, to some extent, a bit fuzzy and not hands-on and may have impinged the results.

A last limitation with this study could be that learning is an oblivious process; learning might be created even though individuals do not know about it. This might especially have affected the managers’ answers, in both the questionnaire and the interviews, about what actions they take because of the information in the tools. They might actually have taken actions, even though they do not know that it is because of the information in the BI-tools.
LEARNING BY THE USE OF BUSINESS INTELLIGENCE

4. LEARNING IN SKANSKA SVERIGE AB’S BI-TOOLS

The construction industry has long been known for their low productivity and efficiency, compared to other industries (SOU, 2002; Statskontoret, 2009). Only 20-40% of a handyman’s daily work is value adding, the rest of the time is spent on for instance waiting and error-corrections (Josephson & Saukkoriipi, 2005). The information in BI-tools could make these problems visible and enable people in the organization to create learning that affects future actions and hopefully increase efficiency of the operations.

4.1. Skanska Sverige AB

Skanska Sverige AB is the third largest in the construction industry in Sweden (Maskinentreprenören, 2011). The corporate group of Skanska is one of the world’s leading projects development and construction groups, employing 53,000 employees in their selected home markets in Europe, US and Latin America (Skanska, 2012). The research for this study has been delimited to the case of Skanska Sverige AB headquartered in Solna, Stockholm, Sweden. Even though the findings in the future might be applicable on the corporate group, the BI-tools previously used in Skanska Sverige AB are not coordinated to be used on a corporate level.

4.1.1. Skanska Sverige AB’s BI-tools

Skanska Sverige AB has several BI-initiatives going on. These have been implemented in the organization for different periods of times and have different categories of users. However, the managers in Skanska mainly use the three largest BI-tools; VV, EAP and BI HR. All tools were in a phase of development, why the findings could be input to the following work and development of these. It is VV, EAP and BI HR that provide Skanska’s managers with the information they need to make the right decisions in their daily work. These are built on the same platform; Oracle BI.

The purpose with VV is that it should simplify for every region and district to achieve established goals and targets. Simply a tool to make sure that the business is going in the right direction. It is visualized as a scorecard and provides information about what particular regions or districts perform well and what can be improved. The tool also provides prerequisites to share and take part of others experiences within Skanska.

The aim with EAP is to gather all economic reports in one system and create a common way of working with those. The information in the report is the same as before EAP was introduced, but data sources are now linked and gathered in one place. This should provide the users more time for analysis and value adding work. However, even though the target is to increase analysis EAP, according to the project manager of the tool, is currently very little an analysis tool, the focus in the first initiations has been to gather the data.

BI HR supports managers with HR-data. The aim is to enable early detection of trends and defects that concern the employees. It should facilitate management of preferred

10 From here on Skanska Sverige AB will be referred to as Skanska
behaviours, provide information for better management decisions, forecasts, employee feedback and so forth.

4.2. How users perceive the information in Skanska´s BI-tools

The BI-tools in Skanska has, according to the results from the questionnaire, a pretty low usage. Hagerty, Sallam and Richardson (2012) argue that BI-tools should have the ability to interact with users. However, as seen in Chart 1, only 20-30% of the respondents use EAP and BI HR a couple of times a week or more and in VV this number is only 3%.

![Chart 1 - Usage of Skanska’s BI-tools](image)

The use of Skanska’s BI-tools is not high and thereby neither the interaction between the user and the BI-tools, which according to some of the interviewed managers can be explained with partly that some of the tools are quiet new and partly that there is not enough time to make use of these. Nevertheless, as Thucker, Thorne and Gurd (2009) argue BI-tools can determine whether organizational objectives are to be reached or not. The fact that usage of the BI-tools in Skanska is low might therefore have implications for their business. The responsiveness that Williams and Williams (2003) are talking about could be lost and the potential to improve decision making in the organization might be threatened. A higher usage would increase the chances to fulfill the benefits with BI that is highlighted in chapter 2.2.1.1 - 2.2.1.3, in the literature review. For instance, decisions can be based upon real facts and focus can be switched from production to analysis of data. If Skanska understand the importance of administrate their capabilities within BI the implications could be that they, just as Manyika et al (2011) argue, avoid the risk of being left behind and get lost in the big data world.

4.2.1. Immediate

To reinforce positive behaviours information should be delivered immediately, on the way to results rather than when results have been achieved (Daniels, 1989, p. 26; Braksick, 2007, p. 67; Olofsson, 2010, p. 155). The possibility to follow outcome and performance along the way to results is therefore important.
Among the three BI-tools in Skanska only VV displays specific region’s and district’s business objectives and targets. Since this information is not presented in EAP and BI HR it is more difficult to immediately follow performance linked to business objectives in these tools. The difference between outcome and targets are not shown and according to the interviewees this aggravates the possibility to take actions because of the information in the BI-tools. However, as seen in Chart 2, respectively 60, 69 and 73% of the respondents in the questionnaire believe they actually can follow performance compared to business objectives in the tools. This result implies that Skanska’s three BI-tools are perceived rather similar when it comes to immediateness of the information, either 19 or 20 respondents agree or strongly agree with the asked question.

The interviews and individual analysis of Skanska’s BI-tools provide an alternative picture and make a distinction between the tools that indicate actual differences in how intuitive these are. For instance, all interviewed managers agree that VV is not intuitive at all even though targets are set in the tool. One of the interviewed managers argues that;

“To some extent the results in VV come as a surprise every quarter, in connection to the forecasts”

(Manager 4)\(^{11}\)

As seen, information is therefore not delivered on the way to the results, which might as Daniels (1989, p. 26; Olofsson, 2010, p. 155) argue have implications for what behaviours that are reinforced and not. In this case there is a greater risk that the wrong behaviours are reinforced. Further, the interviewed managers believe that EAP is more intuitive than VV in the sense that it gets immediate answers to questions that concerns the financial part of the business. However, the overall opinion among the interviewees is that the most intuitive and hands-on tool is BI HR.

---

\(^{11}\) A complete list over the interviewees is found in Appendix 2
Neither EAP nor BI HR have the actual targets and business objectives visually in the tools, but are still seen as more intuitive than VV. An explanation to this could be, as one manager puts it, that the essential thing is that all information needed in relation to set up targets are gathered in the tools. This could further explain the high percentage being positive about the immediateness of information in the questionnaire. Additionally more than half of the managers argue that the numbers in Skansa’s BI-tools are rather used on long-term and strategic decisions, information that can previously be found in the tools. Therefore manager’s current need of information might be fulfilled. These managers simply do not request the possibility to follow performance along the way since the use of the BI-tools are not on a daily basis, and can therefore not be used to make operational decisions and actions. One of these managers denote that;

“If you are lucky there is some spare-time every other week to surf around in the tools” (Manager 1)

Then again, the other half of the interviewees contend that a possible reason EAP is not used for operative decisions is because the information is not linked to either forecasts or business plans. One of them says that the information in the tool becomes uninteresting and hard to make analysis upon because of the lack of this information. Consequently, there is a conflicting view upon how important it is to follow performance and not.

From the perspective of Skansa as a whole it would be beneficial to consider the last managers views, to include forecasts and set business objectives and thereby ease the process of follow performance along the way to results. If this is considered Daniels (1989, p. 26), Johnson et al (2008, p. 59), Braksick (2007, p. 67) and Olofsson (2010, p. 155) request of immediate information should be better fulfilled, which probably would have positive implications for the learning in Skansa. It would increase the possibility that the right behaviours are reinforced and that learning is created in the desired direction to fulfill business objectives. What should be kept in mind though is that two of the interviewed managers, who use the tools several times a week, still believe that it is currently possible to use the tools in their daily operations. Therefore, it is not only the fact that actual business objectives are set in the tools that determines if performance can be followed or not, it is also a matter of time that managers put on using the tool that determines the potential of immediate information from the tools.

4.2.2. Specific

When information is not immediate it is, according to Daniels (1989, p. 77), Johnson et al (2008, p.59) and Braksick (2007, p. 67) even more important that the information is specific. The conclusion in the previous chapter is that the immediateness of the information in Skansa’s BI-tools could be improved, which make it even more important to fulfill the specificity of the information. Just as in the previous variable, immediateness, the need of specificity is better fulfilled in EAP and BI HR than in VV. As seen in Chart 3 there is a distinctive difference between the tools in the results from the questionnaire; 86 and 80%
compared to 48%. This result is confirmed in the interviews where the managers state that the possibility to drill down in the information is larger in both BI HR and EAP, which enable specificity to a larger extent than in VV.

<table>
<thead>
<tr>
<th>Percentage</th>
<th>BI HR</th>
<th>EAP</th>
<th>VV</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>5</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>20%</td>
<td>13</td>
<td>18</td>
<td>15</td>
</tr>
<tr>
<td>40%</td>
<td>8</td>
<td>5</td>
<td>13</td>
</tr>
<tr>
<td>60%</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>80%</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100%</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Chart 3 – Specificity of information

In the questionnaire two of the respondents strongly disagree that the information in VV is detailed enough for them to understand what has affected the operations.

“The information is currently reasonably specific in VV but it is only right four times a year. In between operations are run more on intuition and the feeling that we are doing the right things”

(Manager 2)

Even though Bazerman and Moore (2009, pp. 4-5) argue that organizations need to find a balance of what situations real facts are preferred and what situations intuition can be good enough VV should not be a case for where intuition is good enough. VV has the aim to guide managers in the right direction and therefore it should be desired that these decisions are based on specific real facts that Williams (2011) is talking about. As seen, the opinions about whether specific real facts are available in VV diverge. Some of the interviewees hold that it is specific enough and that there is a possibility to drill down in most of the information while other managers agree with the majority in the questionnaire, that the specificity of information in VV can be improved.

To be specific Daniels (1989, p. 77) claim that delivered information needs to be specific in both what and how things are said. As mentioned, the results from the questionnaire enlighten that 86 % agree or strongly agree that the level of detail in EAP is sufficient enough. At first sight the interviews presented the same view as the respondents in the questionnaire. One of the interviewees say that;

“It is easy to drill down to each and every projects numbers and even though it is not perfect a decent overview can be received” (Manager 1)
However, when further questions were asked on the subject another picture was revealed. The common view among the managers is that EAP has much to improve to fulfil the needs of specificity. They claim that the information and reports are a bit messy which make it difficult to simply follow the operations. The information can be hard to read, it is not direct and it takes time to find requested information since too many options needs to be made. There are also ambiguities in definitions of what is included and excluded in the graphs that causes an overall confusion about what has affected the operations and not.

“To be able to use the numbers and graphs I have many times been forced to ask the controllers of the district what the reports actually indicate” (Manager 1)

Since it is possible to drill down in the information the specificity of what is said is fulfilled, in line with both Daniels (1989, p. 77), Johnson et al (2008, p.59) and Braksick (2007, p. 67). However, how things are said seems to be a greater problem of the information in EAP. Messy reports and ambiguous definitions make it hard for users to understand how information can be applied in their daily work. This might be the reason some of the interviewed managers hold the view that information in the BI-tools does not need to be that specific. They allege that if specific information is requested it will be received by communication and interventions with close managers and employees, not by the use of Skanska’s BI-tools. However, to learn what behaviours should be continued Daniels (1989, p. 77) claims that users need to know exactly what they did right, a variable that is not currently completely fulfilled. Foremost some improvements in how things are said might still be requested in EAP and VV to make the tools user-friendlier. If improvement in how the information is presented in the tools are made it would probably also enable managers to take actions out of the information they receive, actions that could be the foundation for new learning in Skanska. Consequently, if the “how-criteria” is not fulfilled the information might be more obscure, which could affect what information managers receive from the system.

4.2.3. Personal

The third variable that should be fulfilled for information to be reinforcing, according to Daniels (1989, p. 76), is that it should feel personal for each individual. To what extent the managers believe this is fulfilled or not, as seen in Chart 4, differs between the three BI-tools.
85% of the respondents in the questionnaire answered that the information in BI HR is personal enough. The feeling among the interviewed managers is that BI HR is more deliberate than the other two and this could be the reason it is easy to like and work with. There is a consensus among the interviewees that regarding BI HR there is not too much information and it is easy to get an overview of requested information, information that is requested by no one but them. A manager is positive when saying:

“It is actually a tool that helps me take care of and observe my employees” (Manager 7)

The number for EAP and VV was only 75 respectively 57%, to fulfil Daniels (1989, p. 76) definition of being personal it might be good for EAP and VV to be inspired from BI HR. Especially in the ease of getting an overview of the personal operations in the tools. During the interviews with the managers it was observed that the managers’ view of personal information could be divided into two dimensions; personal to fit specific position’s needs and personal in the sense that each user have the possibility to display specific areas of focus dependent on a region’s or district’s prerequisites.

The information in EAP and BI HR is linked to a specific person’s position which implies that an RM displays information about all the projects in his or hers specific region. The information can be displayed on both an aggregated level and a level of each specific project. However it is argued that;

“There is way too much clicking before analysis can be made” (Manager 1)

The information can be personalized in the sense that it only displays the specific managers regions or districts. However in EAP there are, according to the interviewed managers, many options to be made to find the right information and it is not user-friendly, which make it hard to get an overview of the individual situation. The managers believe that there is lots of information in the BI-tools that together display the complete picture, just as Cukier (2010) claims a BI-tool should. However, to also achieve the efficiency that Cukier (2010) speak
about some of the interviewed managers requests that users should have the possibility to sort out information to fit personal needs; important information for a specific position or person is currently lost. It is hard to get an overview of what information is imperative and not since the same measures, numbers and graphs are displayed for all users.

“We have different aims when we use the information in the tool, therefore we need to be able to make choices of what we are interested in” (Manager 5)

The managers in the interviews argue that not all information is of use for all users, therefore it is desirable to have the possibility to delimit the information and make all the tools simpler to use. One manager mentions that it is possible to export the information from EAP to Excel and make the analysis in Excel. This is not in line with Williams (2004) who depicts that BI should release people from the production of data and provide users with reports to their liking. In the current state it is rather the managers, not the BI-tools itself, that need to do the work of personalize the information. The users will not be released from the production, which might harm their possibility to focus on the analysis of the information. A further sign of the same phenomenon is the two interviewed managers who move information from the BI-tools into their personal steering card in Excel where analysis is made. The fact that the managers, not the BI-tools, need to do the work of personalize the information is a sign that the information currently does not fulfil the variable of being personal by e.g. Daniels (1989, p. 26), Braksick (2007, pp. 83-90), Damasio (1994, p. 207) and Mager and Pipe (1997). It indicates that at least some of the managers believe they could gain from making the information more personal and analyze it from their personal perspective. To lose this benefit could have implications for Skanska, since the managers probably would be overwhelmed with information that does not have any implications in their personal setting.

When the managers speak about personalizing the tools they all highlight that information cannot be too personal, it is important not to forget about the ability to make internal benchmarks. With this one manager claims that:

“If the reports are too personal comparisons cannot be made and the problem might be that discussions will be about what reports that are the best rather than about the content” (Manager 1)

As the interviewed managers argue it is important to have standardized ways of working at the same time as information is presented in different ways dependent on what occasion it is used. If this is not possible they claim, just as Daniels (1989, p. 76), that there could be a risk that information becomes too mainstream. This problem is seen in VV, which among the investigated BI-tools in Skanska is the tool with lowest usage. Only 3% of the users uses it a couple of times a week or more. One manager explains this fact with saying that the information in VV is too generic; there are different areas of focus in the business, some regions might need to focus on safety while others have performed poorly in the area of customers. All this information are currently in VV, but the manager claims that Skanska
LEARNING BY THE USE OF BUSINESS INTELLIGENCE

could gain from making the tools personal in the sense that each user chooses what to display. It might also be easier to get through with information that is relevant for specific persons and it could be simpler for users to analyze their personal setting. There should be a balance between the personal needs and what the organizations request managers to focus on. To reach out and affect the actions of the managers it might be beneficial for Skanska to delimit the information.

4.2.4. Certain

The most effective reinforcers to maintain or increase behaviours are certain reinforcers (Daniels, 1989, p. 76). Chart 5 illustrates that 45, 77 and respectively 79% using VV, EAP and BI HR answered that they trust all actions to be registered in the tool. This is not line with the results from the interviews where all managers had the same opinion; that the certainty is not fulfilled in neither of the tools. Some of them had experienced more problems than others and the ones who had not experienced problems by themselves had surely heard about others who had problems with unregistered information in the tools.

<table>
<thead>
<tr>
<th>Do you expect all actions to be registered in the tool?</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
</tr>
<tr>
<td>VV</td>
</tr>
<tr>
<td>EAP</td>
</tr>
<tr>
<td>BI HR</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Do not have access</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Agree</th>
<th>Strongly agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>VV</td>
<td>3</td>
<td>15</td>
<td>11</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>EAP</td>
<td>1</td>
<td>6</td>
<td>17</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>BI HR</td>
<td>6</td>
<td>10</td>
<td>10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Chart 5 – Certainty of information

If information is not certain there is, as Daniels (1989, p. 76), Johnson et al (2008, p. 59) and Braksick (2007, p. 67) claims, a risk that received information does not influence future behaviours at all. Currently, the interviewed managers argue that when they log in to the BI-tools they are never sure that the information is updated. They also claim that this could be the reason the tools might not be used as preferred. They recall that there is a desire to use the tools more interactively, but the uncertainty of the information makes it difficult to use the tools as preferred, which induces frustration;

“When the very reason I have started to use the tools is that I can receive correct and recent numbers it is even more frustrating when it does not work as it should”

(Manager 9)
The certainty is as mentioned the most powerful reinforcer. To lose trust in the certainty of the information will probably have implications for the future usage. Yet again, if usage is not as desired the linkage between learning and BI will probably fail. Further, the fact that users do not receive the information they should and expect can also be seen as extinction (eg. Daniels, 1989, pp. 31-33; Anderson & Klintrot, 2009, pp. 125, 128-130). Extinction will, in the long run, decrease actual behaviours. This is where many performance problems in organizations lie and it is for this reason important for Skansa to consider this variable in the future development of the tools. If not there might be a risk that user’s feel they do not get the attention they need to keep perform, which could have implications for the business of Skansa.

4.2.5. Sincere

There is not a single opinion about if the BI-tools in Skansa together provide a sincere and correct picture of how managers have performed. The answers from the questionnaire displays an overly optimistic picture of EAP and BI HR where 93 respectively 92% of the respondents answered that they agree or strongly agree that the information correctly reflect their operations.

In the interviews the majority of the managers did not want to comment on whether the information reflected their operations in a correct way or not. The reason was mainly because they believed they had not used the tools long enough. Further, even though they had used the tools for a while some of them had chosen to only use a few of the features because they had not had time to learn more. However, one interviewee claimed that the information to him was not sincere since only 75% of his areas of focus could be found in the tools. To provide a sincere picture all information that is of importance should be found in the tools, which according to this manager are not the case;

“It might seem okay when you have a first glimpse in the tools, but when digging further into the information there are many times numbers that can be disputed” (Manager 4)
Further, errors in numbers and graphs have according to the interviewed managers been detected several times, which is a sign of how insincere the information in the tools is. An example was one of the managers who had made safety visits and reported those, but the light was still red even though the target for safety visits was fulfilled. As one interviewed manager recall users have begin to get used to right and updated numbers in a simple and certain way, when this is not fulfilled frustration and disappointment takes place. This is, just as Daniels (1989, p. 78), Johnson et al (2008, p. 60), Braksick (2007, p. 67) and Olofsson (2010, p. 153) claims, the dilemma with insincere reinforcement; it can easily be seen as punishing rather than reinforcing. The correct picture is not shown in the tools and thereby it is hard to use those as requested. The insincerity with wrong numbers in the tools might damage the usage. The picture of what has been performed and not in the tool might thereby not reinforce the managers to take desired actions.

4.2.6. Frequent

From the results of both the questionnaire and interviews it is seen that the information in VV is not updated sufficiently enough, only 42% of the respondents in the questionnaire believe the information was updated sufficiently enough compared to 93 and 96% in EAP and BI HR.

![Chart 7 – Frequency of information](image)

An explanation to why information is not always up to date is that paperwork takes longer time than requested, an explanation which goes for all the tools. For instance, as one interviewed manager recall, information about a new project cannot be registered in the system before all paperwork is finished. Further, key figures in VV are mainly built on lagging information, which can be the reason this information is perceived as not being updated sufficiently enough.
“You often know what has happened in your business long before it is updated in the system”
(Manager 1)

The fact that it is built on lagging information can be seen as a problem. It makes VV fail to
fulfil the criteria of frequency that Daniels (1989, p. 79), Johnson et al (2008, p. 59) and
Braksick (2007, p. 67) claim is important when positive reinforcement is delivered. The
information in EAP and BI HR is updated every night and the managers are therefore
satisfied with those numbers where reports can be generated quickly.

However, it is according to Daniels (1989, p. 79) hard to define how frequent
reinforcement needs to be made. Therefore it is difficult to say whether VV should be more
like EAP and BI HR. Several interviewed managers emphasize that daily updates is not
requested since it would be too much administrative work. As mentioned in chapter 4.2.1.
many of the interviewees believe that focus should not be on short-term goals in these tools,
it should be on the long-term which, according to them, is more important. They believe
managers need to work close to the business and observe daily operations and the frequency
of information for that reason does not matter. Even though this is how some of the
managers in Skanska believe they should conduct their business this is not in line with how
Daniels (1989) believes positive reinforcement should be delivered. A change in this opinion
might need to take place to fulfil the frequency variable of Daniels (1989, p. 79), Johnson et al
(2008, p. 59) and Braksick (2007, p. 67) and reinforce learning. Further the interviewee’s who
uses the recent numbers from EAP in presentations for and meeting with the business
emphasize the benefits with frequently updated numbers. According to those managers it
has great effects and evoke immediate actions more than numbers that are months old. One
of these managers also stresses that even if strategic decisions, that are often not made on a
frequent basis, is in focus numbers still needs to be frequently updated. Since it is not always
known exactly when in time the strategic decisions are to be made it is important that when
this kind of information is requested the information in the BI-tools are the latest updated
possible.

This variable could be the most important for managers in Skanska to understand.
Not only the frequency of the information, but the frequency of using the tool and take part
of the information in the tools needs to be improved for them to understand how the tools
can be used to create learning in their daily operations, both in the long and in the short run.

4.2.7. Actions taken because of the information in the BI-tools

If learning is created or not can, according to Simons (2000, p. 36) and De Wit and Meyer
(2004, p. 109), be seen in the actions organizations take. The results from the questionnaire
indicate that the respondents do not believe that they are taking that many actions because of
the information in the BI-tools. The fact that not many actions are taken makes it hard to
determine whether learning is created or not in the use of the BI-tools in Skanska. The area
where most actions are taken is within Safety and Productivity where 47 and 50% answered
that they take actions that affects the safety and productivity of their business.
Within Green there is no actions taken, further the percentage for One Skanska, Employees and Customers is only 12, 8 and 10%. The interviewees confirm the findings from the questionnaire; not many actions are taken it is more that information in these confirm what was already known. On the other hand some other managers claim that it could be that actions are taken even though it is not obvious that it is because of the information from the BI-tools, which can be another reason for the low number of actions in the result of the questionnaire. One manager even confess that;

“You might say that you use VV to take actions in the operations, but you do not”

(Manager 7)

VV has been in use for quite a while and the aim is to enable managers to make strategic decisions, but this is for some managers not the case. However, as another of the interviewees claimed, when information actually is updated in VV immediate actions can be taken. This especially applies to the summary of the customer satisfaction. When it is released contact is made with unsatisfied customers to find out what has happened and what can be improved. Additionally VV can be used to compare regions and districts. Even though only 12% from the questionnaire believed actions were taken in this area an example of this was found in the interviews. A manager who was a well performer in working conditions got together with a region that performed better financially. They exchanged experiences for one day and learned how to perform better in these specific areas. Actions were taken even though information in VV was not frequently updated, which goes against the argument of Daniels (1989, p. 79), Johnson et al (2008, p. 59) and Braksick (2007, p. 67).

The results from the interviews indicate that it is easier to take actions by information received in EAP, than in the other two BI-tools. This is also confirmed in the

---

12 Answers to each and every questions that concerned the actions taken is found in Appendix 4
A questionnaire where the information in EAP mainly goes under actions taken in the area of productivity. The interviewed managers argue that responsible persons can be contacted and discussions can be held about what has happened. It is not always that actions are taken immediately out of the numbers in the tools but the interviewees still believe it is their responsibility to go to the bottom with what has happened and why. However, according to Mintzberg and Westley (2001) this rational learning is not enough. Actual actions needs to be taken so to learn what should be made different the next time. To think too much before actions are taken does not create, it could rather destroy learning. Important is therefore to take actions so that data can be reported into the tool and be transformed into information that in turn create new learning in the organization.
5. CONCLUSION

According to researchers within the area of OBM behaviours can be affected in two ways. Either by affect what comes before a behaviour, by the antecedents, or affect what comes after, by the consequences (eg. Daniels, p. 13; Wilder, Austin & Casella, 2009). However, antecedents cannot maintain a behaviour, only consequences and foremost positive reinforcers can and for this reason these have been the focus of this thesis. The attempt was to link the concept of learning with BI, which has become a tool for many organizations to improve their business. Learning from the information in the BI-tools should be a prerequisite for organizations to make an impact on the market and improve their business by the use of BI. The information therefore need to fulfill the same demands as Daniels (1989) claim positive reinforcers should; being immediate, specific, personal, certain, sincere and frequent.

After having made the analysis of the three BI-tools at Skanska the indication is that, from an OBM perspective, these tools does not currently create the right conditions for learning. As illustrated in the following traffic lights some of the variables are fulfilled more than others, but none of them can be seen as fully being in line with the definitions of Daniels (1989).

Since it is positive reinforcers that, according to Daniels (1989, p. 33) and Callahan and Nolan (2001), maximize performance it is important that information is delivered in the right way to enable actions in Skanska. Even though the information to some extent fulfils the variables of Daniels (1989) only 22% of the actions in line with the Skanskas Business Objectives are taken. Positive reinforcers are defined by its effects and if there are no effects, or actions, seen because of the information in the tools the information might not be reinforcing for the managers who use the tools. What should also be highlighted in this discussion was the low usage of the BI-tools that is the current state at Skanska. To focus on the usage could be a first step in trying to make managers increase their actions because of the information in the tools. However, the next step should be a development of VV, EAP and BI HR in the direction of Daniels (1989) variables. If actions taken increase because the information in the BI-tools are delivered in a better way it would hopefully increase the opportunities to create new learning in Skanska as well. The findings from this study will further be input in developing

![Traffic Lights Illustration](Image)

*Picture 4 – Indications of how the variables in the proposition were fulfilled*
an entire new BI-tool and also be the foundation for the BI-strategy that will assist Skanska in the development of their business.

To conclude, the purpose of this study was to, from an OBM perspective, investigate and analyze BI-tools to see if these create the right conditions for learning. Currently the BI-tools at Skanska do not fully create these conditions. The managers recite that only a few actions are taken because of the information in the tools, which should have implications for the creation of learning. Further, the lack of learning might decrease the possibility for Skanska to make an impact on the market.

5.1. Future research

After have made the literature research for this thesis a linkage between BI and learning from an OBM perspective was not revealed. This makes the future research even more compelling and the result from this study can be seen as a first attempt to link these concepts so that organizations can get an example of how they could get as much as possible out of their BI-tools. As mentioned many BI-implementations fail to meet the expectations because behavioural factors are not considered. The results from this study further indicate how important consideration of these is. The variables of Daniels (1989) are not fulfilled and consequently few actions are taken because of the information in Skanska’s BI-tools. In the future it would therefore be interesting to develop a BI-tool completely out of the six variables of Daniels (1989) to see if more actions are taken in such an organization. The alternative would be to analyze a tool that fulfil the variables, but at the same time also have been in use for a while.

The results from the questionnaire were only analyzed by descriptive statistics. It would therefore be appealing to statistically test if the relationship between delivery of information and actions taken are significant or not. The results from such a study could be a framework for future research in the area of BI and its ability to create the right conditions for learning.
6. REFERENCES


Franco, M. & Bourne, M., 2002, Factors that Play a Role in Managing Through Measures', workingpaper, Centre for Business Performance, Cranfield School of Management, Cranfield.


Hyde, K., 2000, Recognizing Deductive Processes in Qualitative Research, Qualitative Market Research: An International Journal, No 2, pp. 82-89.


LEARNING BY THE USE OF BUSINESS INTELLIGENCE


Olofsson, R., 2010, Beteendeanalys i organisationer: Handbok i OBM, Latvia: Natur och kultur


Statens offentliga utredningar (SOU), 2002, Skärpning gubbar! Om konkurrensen, kvaliteten, kostnaderna och kompetensen i byggsektorn, 2002:115,
http://www.regeringen.se/download/263cc131.pdf?major=1&minor=1649&c
n=attachmentPublDuplicator_0_attachment (2011-11-23).


Williams, S., 2011, 5 Barriers to BI Success and How to Overcome Them, Strategic Finance, July pp. 27-33.

7. APPENDIXES

Appendix 1 – Questionnaire

The aim with this study is to investigate how well you think that your needs of information for control of your business is satisfied in the present BI-tools Vägvisaren (VV), Ekonomisk Analysportal (EAP) and BI HR. The attached questionnaire starts with a few background questions and is after constructed in two parts. Part one comprises questions that concern how you perceive the information in the BI-tools. Part two comprises questions of whether you, because of the information in the BI-tools, are taking certain actions.

Background questions

Position RM, DM, PrM

Business category Building, Civil, Asphalt & Concrete.

How often do you use Vägvisaren?
Every day, A couple of times a week, A couple of times a month, More seldom

How often do you use Ekonomisk analysportal?
Every day, A couple of times a week, A couple of times a month, More seldom

How often do you use BI HR?
Every day, A couple of times a week, A couple of times a month, More seldom

When you use VÄGVISAREN do you think that...
1) … you can, along the way to results, follow how you perform compared to business objectives
2) … the information is detailed enough for you to understand what has affected the operations
3) … the information is presented from your specific needs
4) … you can expect all actions to be registered in the tool
5) … the information reflects your operations in a correct way
6) … the information is updated sufficiently enough for you to take actions on it

When you use EKONOMISK ANALYSPORTAL do you think that...
7) … you can, along the way to results, follow how you perform compared to business objectives
8) … the information is detailed enough for you to understand what has affected the operations
9) … the information is presented from your specific needs
10) … you can expect all actions to be registered in the tool
11) … the information reflects your operations in a correct way
12) … the information is updated sufficiently enough for you to take actions on it

When you use BI HR do you think that...
1) … you can, along the way to results, follow how you perform compared to business objectives
2) … the information is detailed enough for you to understand what has affected the operations
3) … the information is presented from your specific needs
4) … you can expect all actions to be registered in the tool
5) … the information reflects your operations in a correct way
6) … the information is updated sufficiently enough for you to take actions on it

Below follows some assertions of whether you are taking certain actions because of the information you have received in the BI-tool VV, EAP and BI HR. Tick in the box if you agree about the assertion.

The information in the BI-tools helps you to...

… recruit the right co-workers for your operations
… allocate new and challenging assignment for your co-workers
… staff your projects with co-workers who have the right competence and experience
… conduct your work according to VSAA
… bring order and method in the projects you operate in
… plan your operations on a long term
… plan your operations on a short-term
… follow up and take measures that improves working conditions in your operations
… call your customers
… take measures that decrease the costs of your operations
… interact with other business categories within Skanska
… interact with other regions or districts within Skanska
… share your own and take part of others experiences within Skanska
… not prioritize non profitable customers and projects
… review upcoming projects
… make contact with potential future clients
… make contact with existing partners and suppliers
… update your business plan
… analyze what customers that can provide a profitable businesses
… make contact with customers that can provide a profitable business
… analyze what customers prioritize green businesses
… make contact with customers that prioritize green businesses
… analyze the profitability of your business
## Appendix 2 – Lists of interviewees

<table>
<thead>
<tr>
<th>Position</th>
<th>Business Category</th>
<th>Usage of VV</th>
<th>Usage of EAP</th>
<th>Usage of BI HR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manager 1</td>
<td>RM</td>
<td>Civil</td>
<td>A couple of times a month</td>
<td>More seldom</td>
</tr>
<tr>
<td>Manager 2</td>
<td>DM</td>
<td>Civil</td>
<td>More seldom</td>
<td>A couple of times a month</td>
</tr>
<tr>
<td>Manager 3</td>
<td>DM</td>
<td>Building</td>
<td>A couple of times a month</td>
<td>A couple of times a month</td>
</tr>
<tr>
<td>Manager 4</td>
<td>DM</td>
<td>Building</td>
<td>Do not have access</td>
<td>A couple of times a week</td>
</tr>
<tr>
<td>Manager 5</td>
<td>RM</td>
<td>Civil</td>
<td>A couple of times a month</td>
<td>A couple of times a week</td>
</tr>
<tr>
<td>Manager 6</td>
<td>DM</td>
<td>Civil</td>
<td>A couple of times a month</td>
<td>A couple of times a week</td>
</tr>
<tr>
<td>Manager 7</td>
<td>DM</td>
<td>Building</td>
<td>More seldom</td>
<td>A couple of times a week</td>
</tr>
<tr>
<td>Manager 8</td>
<td>DM</td>
<td>Building</td>
<td>A couple of times a month</td>
<td>Every day</td>
</tr>
<tr>
<td>Manager 9</td>
<td>RM</td>
<td>Building</td>
<td>More seldom</td>
<td>Every day</td>
</tr>
</tbody>
</table>
Appendix 3 - Subjects for interviews

Current BI-tools

- What is it that you like and dislike in the current BI-tools?
  - How well can you follow how you have performed compared to targets?
  - Do you believe the information can be adjusted so to fit your specific position?
  - Is the information specific enough for you to understand what has happened and how you have performed?
  - Can you trust all information to be registered in the tool?
  - Do you believe the information in the tool provide you a correct picture of your operations?
  - Is the information updated frequently enough?

- What kind of actions do you take because of the information you receive in the BI-tools?

The future

- Do you have any suggestion on how you would like the BI-tools in the future?

What requirements do you think that the information in the BI-tools needs to fulfill for you to take actions on it?
### Appendix 4 – Actions taken because of the information in the BI-tools

<table>
<thead>
<tr>
<th>Action</th>
<th>No (%)</th>
<th>Yes (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plan your operations on the long term</td>
<td>17</td>
<td>18</td>
</tr>
<tr>
<td>Update your business plan</td>
<td>18</td>
<td>17</td>
</tr>
<tr>
<td>Plan your operations on the short term</td>
<td>11</td>
<td>24</td>
</tr>
<tr>
<td>Share your own and take part of others experiences within Skanska</td>
<td>26</td>
<td>9</td>
</tr>
<tr>
<td>Review upcoming projects</td>
<td>34</td>
<td>9</td>
</tr>
<tr>
<td>Make contact with potential future clients</td>
<td>34</td>
<td>11</td>
</tr>
<tr>
<td>Make contact with customers that can provide a profitable business</td>
<td>34</td>
<td>11</td>
</tr>
<tr>
<td>Not prioritize non profitable customers and projects</td>
<td>23</td>
<td>3</td>
</tr>
<tr>
<td>Recruit the right co-workers for your operations</td>
<td>34</td>
<td>5</td>
</tr>
<tr>
<td>Make contact with existing partners and suppliers</td>
<td>34</td>
<td>11</td>
</tr>
<tr>
<td>Make contact with customers that prioritize green businesses</td>
<td>34</td>
<td>11</td>
</tr>
<tr>
<td>Interact with other regions or districts within Skanska</td>
<td>34</td>
<td>11</td>
</tr>
<tr>
<td>Interact with other business categories within Skanska</td>
<td>35</td>
<td>2</td>
</tr>
<tr>
<td>Follow up and take measures that improves working conditions in your operations</td>
<td>26</td>
<td>9</td>
</tr>
<tr>
<td>Conduct your work according to VSAA</td>
<td>28</td>
<td>7</td>
</tr>
<tr>
<td>Call your customers</td>
<td>34</td>
<td>11</td>
</tr>
<tr>
<td>Bring order and method in the projects you operate in</td>
<td>14</td>
<td>24</td>
</tr>
<tr>
<td>Analyze what customers that can provide a profitable businesses</td>
<td>24</td>
<td>8</td>
</tr>
<tr>
<td>Analyze what customers prioritize green businesses</td>
<td>35</td>
<td>8</td>
</tr>
<tr>
<td>Analyze the profitability of your business</td>
<td>25</td>
<td>8</td>
</tr>
<tr>
<td>Allocate new and challenging assignment for your co-workers</td>
<td>34</td>
<td>11</td>
</tr>
<tr>
<td>Take measures that decrease the costs of your operations</td>
<td>26</td>
<td>9</td>
</tr>
<tr>
<td>Staff your projects with co-workers who have the right competence and experience</td>
<td>33</td>
<td>2</td>
</tr>
</tbody>
</table>

*Percentage of respondents who have taken the action.*