Implications of digitalization on management control

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Introduction

Studying and researching management control is not always a straightforward process. Dechow and Mouritsen (2005) argue that the studies of management control cannot be separated from technology and context, but should rather be studied in combination, so that the “underlying infrastructure” will be understood properly. Another reason for the challenges in management control studies is the large amount of definitions for management control systems (MCS). According to Fisher (1998), the first challenge when it comes to undertaking research on MCS packages, is the difficulty of explaining what MCS means. Some of the descriptions are very similar, and some have rather big differences.

Chenhall (2003) defined management control systems as a broader term for management accounting systems, that also includes (for example) personal and clan controls. Merchant and Otley (2007) share the same broad view of MCS; they think the term includes strategic development, learning processes, strategic control etc. Abernethy and Chua (1996) share a narrower view of MCS as “a combination of control mechanisms designed and implemented by management to increase the probability that organizational actors will behave in ways consistent with the objectives of the dominant organizational coalition”.

The first part of this paper gives a short introduction to the development of digitalization and the main characters of the information era. The next part consists of the effects of digitalization on management control systems. We introduce some viewpoints and results presented in the previous research that has been done on the topic. When it comes to digitalization and its effects on management control, one of the main elements is the enterprise resource planning (ERP) systems. Therefore, it is one of the topics of this paper as well. In the final chapter, we provide some suggestions for how digitalization may affect the design of MC-systems.
Development of the digital economy

Nowadays all the activities of a modern enterprise are somehow affected by digitalization (Bhimani, 2015). The term “digital economy” has been used to depict the transformation from agriculture and manufacturing of physical assets towards an information-based economy, where the focus lies more on intangible assets (Bhimani, 2003). In the so-called information era, knowledge, communication and information have become the main production factors and markets are increasingly dominated by the service sector (Hartmann & Vaassen in Bhimani, 2003). Beaubien (2013) argue that there are a lot of possibilities in using technologies even if it is not easy to predict outcomes.

MacKenzie (2014) has stated that the digital culture may possibly revolutionize “decision making processes by altering the way in which knowledge is gained and actions undertaken, with technologies and algorithms supplanting humans in the production and certification of knowledge, and in the making of decisions, as is already happening, for instance, in high frequency trading”. The development of mobile and cloud services, social media and "Big Data" are all examples of major technologies affecting businesses today, providing companies new and flexible ways to store, use and share resources with smaller costs (Bhimani and Willcocks, 2014). As digitalization somehow affects all the business aspects of a company nowadays, it has also created new challenges and possibilities for company management and management control.

Effects of digitalization on management control

In the past decade firms have gone through tremendous changes in their information technologies, organizational designs and competitive environments. Lukka and Shields (2001) for example claim that there are a lot of structures as well as processes in business environments, for example flat and horizontal organizational forms, many different kinds of matrix structures, networks of ‘virtual’ organizations and work teams that are self-directed. Nonetheless, the developments of information technology have led to innovations
as well as changes when it comes to collecting, analyzing, measuring and communicating the information both inside and outside firms (Atkinson et al., 1997).

According to Bhimani (2003), digital technologies influence the form, content and sources of a company’s internal accounting information, and further the behavior and actions of the organization’s members. Global competition has forced companies to make their supporting functions more cost efficient and has created a need for better decision and control support (Granlund, 2011). Moreover, cutting costs and making accounting processes more efficient has led to outsourcing and establishment of shared service centers (Granlund, 2011). Granlund (2011) continues, that although the development of modern technologies has clearly changed the most routine-like accounting processes, there still exist obstacles for some companies in adopting modern IT systems.

Hartmann & Vaassen (2003) state that the traditional management control thinking has focused much on managing labor and capital. However, the emergence of a knowledge based, "new economy" has shifted the focus towards managing knowledge, communication and information instead. Therefore, they suggest that the traditional strategic, tactical and operational control cycles should be replaced by an alternative classification of three causally linked “control domains”: business, communication and information domains. These three domains incorporate the company’s business processes, communication of the information and knowledge related to those business processes and the information systems and technologies used. The main idea is that the control system should include elements of knowledge management in addition to cybernetic and employee controls. (Hartmann & Vaassen in: Bhimani, 2003)

Bhimani and Bromwich (2009) state that virtual organizations tend to pay more attention to the outcomes of the work instead of specific actions and methods by which the outcomes are achieved. Thus, virtual corporations will evaluate performance by monitoring outcomes, and the ability to do this effectively will form a core competency for such firm. Also Liew (2015) states that technology-based management controls can be used to instruct employees specifically on how to achieve the desired outcome in their work. The information provided by accounting systems affect the employee's efforts to make the most of the organization’s internally controlled resources and encourages them to generate returns (Bhimani & Willcocks, 2014). This objective is in line with the essence of
management control systems; to ensure that the organizational members take actions that benefit the organization’s strategic goal and create shareholder value.

**Implications of modern IT and Big Data**

Some of the recent research around the topic has focused on the effects of modern IT on management accounting and control. Modern information technologies have provided organizations new ways in which they can organize decision making and management control systems (Granlund et al., 2013). Granlund et al. continue, that although the relation between modern IT and MCS have been researched to some extent, IT’s impact on control systems seems to be somewhat complex and the results varying. There is still relatively little research on how IT responds to management control problems and logic (Granlund, 2011).

Bhimani and Willcocks (2014) state that the changes in IT influence the information collection and analysis for management control purposes. Information technologies have a constantly growing impact on organizations’ business processes and their economic activities, which is forcing companies to integrate decision making and action more closely (Bhimani and Bromwich, 2009). To put it more precisely, in the digital economy, firms cannot separate technological and operational activities from their strategic decisions. To help align strategic objectives and actions, accountants’ role in the organization’s strategic planning processes will likely be enhanced (Bhimani and Bromwich, 2009).

One of the current trends affecting managerial decision making in a growing number of organizations is Big Data. For instance, Bhimani and Willcocks (2014) observe the possibilities and dilemmas of Big Data on management information systems and further, on management control. Traditionally, enterprises have designed accounting systems to collect formal information based on economic transactions. However, there has been a shift towards Big Data –type information processing where huge amounts of non-economic related data are derived and managed via analysis of data exhaust. Bhimani and Willcocks (2014) state that managers operating in a highly digitized environment using Big Data analysis tend to practice a more collaborative working approach which emphasizes trust, visibility and the importance of real-time feedback. Thus, also performance evaluation
systems and the chosen financial and accounting metrics should reflect this approach. However, this does not necessarily mean that Big Data should automatically lead to alterations in the adopted MCSs or replacement of smaller data sets. (Bhimani and Willcocks, 2014)

Quattrone (2016) has been criticizing the optimistic attitude that people have towards technology and the amount of data. He thinks, that people might have an illusion of control, since technology makes users believe that they are able to investigate accounting systems and get some answers out of them. Accounting numbers may not be listened and spoken of as much as they were before - instead they might only become digital inputs to decision making processes. Also the “visual power of numbers as digits” is growing. Quattrone makes a rough statement, that Big Data may lead to quick and wrong decision making in the future. People are receiving huge amounts of information every day, however, they spend less and less time on interpreting the received information. (Quattrone, 2016)

Finally, it is important to consider implications of different accounting information systems and how they affect MCSs. According to Bhimani and Bromwich (2009), a virtual enterprise’s overhead costs are largely tied to running its information systems and carrying out its coordination processes. Instead of reducing costs of physical products, virtual enterprises will have to focus on coordination structures and virtual flow mechanisms, as well as management of people and technology (Bhimani and Bromwich, 2009). Even though Bhimani and Bromwich (2009) use the term “virtual enterprise”, their proposition of a company’s costs being tied to running and coordinating large information systems could likely be extended to any modern enterprise.

Granlund (2011) notes that the utilization of IT does not automatically lead to more efficient decision-making. Modern information technologies have enabled companies timely forecasting and performance measurement systems - however, companies still might not be utilizing different software packages to their full extent. Also, Granlund points out that most companies purchase package software instead of developing these systems on their own. Therefore, focusing on technical system design may be somewhat irrelevant, since most of the software solutions are pre-made. While requirements analysis is still needed it is directed more towards strategic and managerial decision-making. (Granlund, 2011)
To conclude this chapter, the relationship between MCSs and digitalization seems to be complex to investigate. However, an inevitable challenge caused by digitalization on management control systems seems to be the quick development of modern IT and the large amounts of information available, which raises the question of how to manage and utilize these new possibilities to their full extent. One way for enterprises to manage and arrange their internal information flows are the so-called ERP-systems - softwares, that provide an organization-wide mechanism for management control. Next, we are going to look at the main elements and challenges of these systems.

Enterprise resource planning (ERP) systems

Management control and decision-making processes are needed to be based on up-to-date operational information (Kallunki et al., 2011). Kallunki et al., (2011) suggest, that ERP systems are one solution for this need: these systems are easy to access for the management and they provide reliable support for future considerations. Authors add that ERP systems can be one of the factors which allow organizations to intensify their performance. Thus, those systems are nowadays common in use in small companies as well as in multinational organizations. For that reason, we will next introduce enterprise resource planning systems, their benefits and challenges. In the end of this section, we will also discuss what kind of impacts digitalization have had on those systems.

Enterprise resource planning systems (ERP) are software programs, which are used by different business units inside the organization in order to integrate and coordinate information (Monk & Wagner 2013). ERP systems collect all the organizational data in one central database, which makes it available to all the users despite of their position or role (Dechow & Mouritsen 2005). Malmi and Granlund (2002) describe ERP as a “module based integrated software packages that control all the personnel, material, monetary and information flows of a company”. In addition, firms using the ERP systems cannot assume that in order to serve properly it’s enough to implement those systems: management must be aware about the nature and timing of post-implementation changes (Nicolaou & Bhattacharya 2008).
Following table (taken from Monk & Wagner 2013) illustrates how the ERP systems enables all business units to use the same data:

Marketing and sales function informs about the customer purchases and payments, orders and deliveries. Supply chain management provides information about the acquisitions, inventory and work-in-progress goods. HR function shows the information about employee recruiting processes, training and incentive programs. Accounting and finance function records all the transactions and based on them, creates reports for future management’s decision-making processes. Nicolaou and Bhattacharya (2008) add, that it is important to keep in mind, that ERP is not equal to other IT-systems.

Chen (2001) considers that one of the obvious reasons why organizations invest in ERP systems is their potential for enhancing the competitiveness of the organization. Managers should have understanding about the way how the organization is willing to operate, and based on that, decide which software package supports those aims best. In order to
complete that goal, management should take all necessary aspects into account, such as the current market position, targeted market segments, customer requirements and expectations, manufacturing environment, supply chain strategy and available resources. ERP database provides an excellent basis for both strategic and daily decisions, because all information is available immediately. That allows to react quickly on environmental changes and challenges.

As described above, it is obvious that the ERP is organization-wide system. The integration of data and information in business is desirable: efficiency and synergies are necessary in order to be able to respond to environmental challenges (Malmi & Granlund 2002). Kallunki et al., (2011) consider that in order to benefit whole organization, both sides, management as well as employees, must show a direct interest to the systems. Also Malmi and Granlund (2002) assume, that there are usually expectations inside the organizations, that the changes and novelties are not expected to produce benefits. It’s easy to imagine, that if the top-management is not committed in the ERP targets and does not direct the employees towards the desirable direction, the organization will hardly achieve any wanted impacts from those systems. The cultural and behavioral aspect can be considered to be significant. Also Chen (2001) emphasizes that in order to success, management should look beyond the technical features. When ERP systems are supported by tight control systems, such as result, action and cultural controls as well, there is a bigger likelihood that the effects of the ERP will be positive and performance of the whole entity will improve.

There are a few factors that could affect either the success or failure of ERP systems. Ifinedo (2007) suggests that there are at least three aspects: the size, the structure and the culture of the entity. It seems like especially the large companies can benefit from their sizes, which allows them to operate more effectively because of the functionality of the systems. Thus, large firms may have better opportunities to acquire the ERP, which are usually quite costly investments. Ifinedo also describes that ERP have less opportunities to success in such firms, where the tasks are not clear, less specialized and the decentralization of authority pervades. Organizations must also be aware about the cultural aspect. The organization’s culture may create resistance and support negative attitudes towards ERP, especially when the purpose of the implementation and practical benefits are unclear.
Before understanding the risks and benefits it’s vital to understand what purpose those systems try to serve. Davenport (1998) suggests that the answer is the fragmentation of information in the organizations. The managers must be able to do the appropriate decisions in order to help whole firm to achieve the targets. Shared information is one of the key factors that effect on the performance, because there is a need to connect all the databases into one which in turn helps to take all the aspects into account. If the ERP systems are designed and implemented in appropriate manner, the whole organization can benefit from it through improved communication, more efficient actions and further more efficient competitiveness.

The ERP systems can be viewed from different perspectives. The literature cannot give a clear answer whether there are more challenges or obvious benefits. Next, we will discuss what kind of impacts ERP systems have for an organization.

Benefits of ERP Systems

Davenport (1998) says in his article that in many cases enterprise systems may help organizations to operate more efficiently than they did before. Teittinen et al. (2013) summarize benefits of ERP system in their research:

1. enables the strategic vision,
2. implements standards worldwide in the company and
3. enables transparency in controlling subsidiaries.

These thoughts are mostly from top management point of view. They see ERP systems in ‘a very positive light’ because they know how to use it and recognize the possibilities it might provide.

One of the ERP system’s benefits is that these systems force their users to think about problems and then create solutions to solve them (Dechow & Mouritsen, 2005). ERP systems enable everybody in the organization to have all data available at any point of
time (Granlund & Malmi, 2002) which makes solving of problems easier because all the information is available on the same place.

Dechow and Mouritsen (2005) argue that ERP systems make management control practices more visible and acceptable in the organization. In addition, ERP systems make it easier to companies be in touch with their business activities and customers (Granlund & Mouritsen, 2003) which can create companies a competitive advantage.

Mostly the benefits of ERP systems are non-financial. Kallunki et al. (2011) state that by using ERP system there is an effect on the non-financial performance, because some empirical researches show that when an ERP system is implemented there can be seen many benefits in operational efficiency. In addition, according to Hunton et al. (2003), firms can have production and quality improvements in their key business areas, such as product reliability, customer service, and knowledge management, if they use ERP system.

Challenges of ERP Systems

Davenport (1998) has argued that the enterprise planning systems can bring great profits but at the same time risks are equally great. He recommends that managers should consider the different aspects about an enterprise planning system really carefully before implementing it. Also, Chen (2001) says that the chance of failure is really high.

Teittinen et al. (2013) state that it is challenging to implement ERP systems and always desired outcomes are not reached. They summarized challenges of ERP system:

1. employees do not want to use ERP
2. employees do not understand what ERP is
3. employees do not know how to use ERP
4. employees make errors in making entries
5. all the data cannot be entered into the ERP
6. sometimes ERP may be broken down.
As we mentioned above, the top management usually sees ERP in a positive light, but at the same there are a lot of problems in the production side when it comes to ERP systems. ERP may be a ‘fantastic tool’ for top management but in the production side people might not even understand why the company is using such a system (Teittinen et al., 2011).

As we stated above, one of the benefits of the ERP systems is that people have all the necessary information available at any time, but this might be a problem if then also faulty information is available (Granlund & Malmi, 2002). Granlund and Malmi (2004) continue that implementing a new ERP system is typically expensive and takes a lot of time partly because people need to be trained to use it (Granlund & Malmi, 2004). In addition, Dechow and Mouritsen (2005) argue that many corporations do not implement ERP systems just because they require large investments. Especially for small and medium-sized companies implementing these systems might be too costly. In addition, it can take many years before the results of implementing the system can be seen. On the other hand, Teittinen et al. (2013) note that when implemented in a quickly changing environment, an ERP system is not valid for long, which means that companies then need to make changes to the systems. This might be challenging especially for small and medium-sized companies because they might not have sufficient resources and time to do that.

According to Granlund and Malmi (2004) implementing ERP system might require some changes to company’s processes even if they are not wanted. It needs to be taken into account that an ERP system is always a standard software because it offers the same solutions to every company (Teittinen et al., 2013). Davenport (1998) notes that ERP systems are usually designed in the way that companies operate in general. The reason why companies are still using it is that it centralizes all the firm’s activities and in that way makes management control easier. Still, software package can reduce companies’ competitive advantage just because it forces them to operate in a way that is not necessarily the best way them to act.

Davenport (1995) argues that only if the ERP system is installed correctly it will have positive impacts on financial and productive functions. In addition, there is a risk that once
ERP systems are implemented it is not easy to change their structure (Dechow & Mouritsen, 2005). According to Dechow and Mouritsen (2005), “ERP systems are configured with certain problems in mind and even in their complex database technologies there is no place for all details of all management control problems”. That may lead to the situation that employees concentrate to the wrong things in the end. Also, Teittinen et al. (2013) argue that sometimes an ERP system does not fit to the company, which can lead to bad performance and in a situation like this it might not be easy to find a way out of it. In addition, enterprise systems do not always take customer perspective into account (Davenport, 1998) which is highly important when it comes to competitive advantage.

Cloud ERP Systems

As discussed above, traditional ERP systems has many sufficient challenges and the benefits of it mainly depend on individual organizational decision. Digitalization and other developments have allowed to start using cloud based ERPS. Peng et al., (2014) note that in the new technological environment it is possible to eliminate main problems of ERPS by including cloud computing technologies to the traditional ERPS platform. Compared to the traditional approach, a cloud ERPS is typically hosted by a third party, who manages and controls the system. This solution enables organizations to use their ERPS through an ordinary web browser, which does not require investing in the whole system and installing it to every device.

Peng et al., (2014) also notice, that cloud ERPS is a rising trend among all-sized organizations, both small companies and multinational corporations. Comparing to their study, it seems like cloud ERPS has attractive advantages but also some new issues to consider. Authors note that one of the benefits from cloud ERPS are the relatively low costs of its implementation compared to traditional ERPS. Organizations do not have to acquire the whole software package, and at the same time the utilization of the cloud is not depended on some specific location. Another benefit is also the system speed and performance – that refers especially to a faster system response time and the fact, that the system speed will not be slowed down by increasing data storage. The system upgrade made by cloud vendors and enhancement will also not cause problems. This fact is
essential especially for new growing companies which have limited possibilities for expenditures.

There seems to be some significant challenges as well. Especially lack of transparency and data privacy may cause some problems, because the users are not able to control data systems and may worry about where their private information is stored. Also data security problems make users to think whether their information is stored and controlled properly. Thus, changing to a new cloud service provider cannot be done properly, because the process where all data is moved from one place to another could easily become costly and time-consuming. There may be also huge differences in service quality provided. Changing current cloud ERP could also mean changes in other operational, organizational and managerial issues. For that reason, the customer could easily become a “prisoner” of cloud service provider. In addition, Peng et al., (2014) mention that cloud services may cause integrational difficulties and challenges on organizational levels.

There is relatively little research made about the implementation of cloud ERP systems, and for that reason it is hard to deduce whether the results are generalizable. However, the adoption of cloud ERP systems seems to have new aspects which organizations need to take into account. Peng et al., (2014) conclude that before making any decision toward selection of any type of cloud ERP, both CEOs and IT managers need to carefully weigh the overall technical, organizational and strategic implications.

Conclusions

It seems that the implications of digitalization on management control systems are somewhat difficult to identify due to the rapid technological development, variety of the different solutions available and multiple contextual factors, such as the nature of the business in which the organization operates. According to Kauppalehti (issue 30.11.2016), some Finnish companies operating in the service sector are still taking their first steps in utilizing digitalization in their business. Moreover, the majority of the companies in the service sector do not see digitalization as a strategic opportunity, which suggests that it
might be difficult for many companies to understand and utilize the potential that different digital solutions have to offer.

Different softwares and information systems designed for management control purposes, such as the ERPS, are one implication of the digital development and a concrete example of how companies can utilize the possibilities of digitalization on a day-to-day basis. As regards the ERP systems, companies should identify the best practices for them, as every option has its pros and cons. Granlund and Malmi (2004) state that contextual factors such as the structure, industry and size of the organization as well as the costs related to implementing the enterprise planning system define, which solution is best for each organization.

There are naturally many questions arising when choosing the right software solution (Granlund & Malmi, 2004). One of them is, whether to acquire package software or entirely tailored software. If a company chooses to invest on a package software, it is useful to do some research of available options. Usually it is also possible to do some tailoring into the package solution. Decision-making process can take months or even years, if the organizational structure is complex or if the company is multinational and large. Integrating the financial administration department is also possible to carry out without the ERP-technology. When the development pace of technology is still accelerating rapidly, one can only imagine what kind of solutions we have access to in just a few years. (Granlund & Malmi, 2004)

As discussed in this term paper, ERP systems are one of the main elements that allow organizations to achieve competitive advantage and organize their management control. Because ERP systems enable that all data is available to everyone in the organization at the same time it may help organizations to operate more efficiently than they did before. In addition, it makes management control practices more visible. Despite of all the benefits, however, ERP systems have been criticized about their disadvantages and challenges. ERP systems can lead to great profits but also the chance of failure is high in them. It may be expensive and time consuming to implement an ERP system, which is the reason why especially small and medium-sized companies cannot always do that. In addition, there is a continuous need for updating and impropriety to organizational structures. The
usefulness and success of the ERP systems has been seen depended on the size, structure and culture of the organization (Ifinedo 2007).

As digitalization is gaining a strong foothold in business life, some organizations have already adopted cloud ERP systems as well. The reduction of ERP costs, more effective system upgrade and enhancement as well as improved system speed and performance provide new possibilities for all-sized organizations. But at the same time, organizations have faced new challenges, such as the lack of transparency and data privacy, data security, integration barriers and organizational difficulties. Problems such as the lack of top management support, poor internal communication, inadequate management of change and business process redesign are still present.

As presented above, the success of the traditional ERP systems also depends on those same managerial factors. It seems like the new cloud solutions force the management to consider similar problems, but in a different context. It is still important that both sides (top-management and employees) are committed to a desirable goal. We assume that in the digitalization era it is important to clearly communicate the achievable targets and ensure that whole organization understands why certain solutions are adopted. Especially cultural controls can be a necessary tool to engage personnel in corporate culture and direct their actions in an uncertain environment. Even when technologies are very present in business life, ordinary face-to-face conversations, guiding and personnel support are still needed. Further, in our opinion, it is crucial to think whether the adopted control system truly leads the organization to a better performance and value creation, or if those systems are implemented only due to pressure to keep up with the time and technological development.
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