

ORGANIZATIONAL EFFECTS OF DIGITALIZATION: A LITERATURE REVIEW

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ABSTRACT. The effect of digitalization on organizations has been studied separately but there has been very little research done on the overall “big” picture of the effects. However, the digitalization of society and business is marching forward at an ever increasing speed, calling for more converged research on the phenomenon. The main areas of effects elicited from the literature are organizational learning, digital innovations, organizational agility, business ecosystems, and organizational structures. More minor influences have been gathered in the framework of digitalization presented in this article. It can be seen as a tool for managers to explore their organizations capabilities on the digitalization front.

INTRODUCTION

This literature review is framed from the viewpoint of the aspects of digitalization that are interesting from the management perspective. The research question is formulated as: “*What are the key areas in an organization that digitalization enhances/affects?*” It would be hard to imagine an effective organization without any IT assets. Still, the ways in which we work have remained similar to pre-digitalization days in many fields. Some CEOs and researchers have stated that the way we work is about to be changed. Digitalization will give the most efficiency when the associated working habits and processes are changed to accommodate the improved efficiency enabled by digitalization. Just shifting the same processes from paper-based to digital-based does not in fact improve the overall efficiency all that much. It is important to gather knowledge of where

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organization are at the moment as well as what is the actual state of research on digitalization to be able to predict where organizations should try to advance to gain most benefits. This literature review was created to see what is the state of current research and to identify any potential research gaps. Articles found can be roughly grouped into the categories that are discussed in the review section: Organizational agility, the Organization's size and shape, Organizational learning, Digital innovations, and Business Ecosystems. Some studies were found outside of these categories, but in the end the chosen ones were seen as the most impactful areas of influence of digitalization. However, no collective review of the whole phenomenon was found. This literature review starts bridging this research gap found within the extant literature by offering a framework of the organizational effects of digitalization. This framework weaves together all the main categories along with the lesser effects found within the extant literature to offer an overall vision of digitalizations effects on organizations.

The remainder of this article is structured as follows: Each topic of interest is presented individually in the following section. Methodology used within this literature review is then explained. Managerial aspects and implications are discussed separately and final section sums up the article and presents ideas for further research.

LITERATURE REVIEW

The aim of this literature review is to define the current state of research regarding the organizational effects of digitalization. Digitalization is often used as a vague term to describe many different things depending on the context. Within this article digitalization refers to usage of any digital assets organizations can use to improve their performance and the effects of these technologies have had on how the world works. This includes all digital communication technologies as well as automated systems along with data storing devices. The key aspects that were elicited from the literature are: Organizational agility, the Organization's size and shape, Organizational learning, Digital innovations, and Business Ecosystems. These are the topics that generated a notable amount of articles in the past decade. They are presented in following sub-sections. There is obviously a plethora of additional effects – some of

these are mapped in the framework presented in the discussion section of the article.

Organizational Agility

Organizational agility is seen as a necessity rather than an objective in today's fast paced world (Alavi et al., 2014). In a study by the Economist Intelligence Unit, the vast majority of executives (88%) identified agility as a key aspect in terms of global success (Yang et al., 2014). Agility offers two main benefits: first, being able to respond to business threats in a timely manner. The second benefit is the ability to identify and capitalize on opportunities as they present themselves. Organizational agility can be seen as a distinct, inimitable advantage supporting long-term advantage in company performance (Alavi et al., 2014). Sambamurthy et al. (2003) assert that digitalization increases the capabilities of organizations, agility among them.

Alavi et al. (2014) define organizational agility as a means of responding to rapid environmental challenges. Agility also allows companies to exploit opportunities for innovation and competitive actions (Yang et al., 2014). Organizational agility may be divided into two different sub-sections. Workforce agility refers to aspects of human resources and their cumulative effect on agility (Alavi et al., 2014). Business process agility refers to the ease and speed at which companies can adapt their business processes. Alavi et al. (2014) set out to find what organizational concepts matter in workforce agility. They found many different theoretical models - yet empirical studies are scarce. Based on theoretical work, they formulated two hypotheses on the subject. The first is threefold: low formalization, decentralization, and a flat structure all promote workforce agility. Their second hypothesis is that organizational learning promotes workforce agility. The study supports the view that low formalization among organizations may not solely promote organizational agility as they did not find any support for the hypothesis. Formalization in an organization refers to the rigidity of instructions and ways of working. On the one hand, it should promote agility. This is due to employees being motivated to experiment and try out new ways of doing things, so the initial barrier for innovative, agile solutions should be low (Chen et al., 2010). However, high formalization has been shown to motivate people to try out new solutions and ideas (Nicholas et al., 2011). The

conclusion is that organizations should strive for the middle ground in formalization. Alavi et al. (2014) found support for their hypotheses about decentralization and flat organizational structures being enablers of workforce agility: e.g., an employee who confronts a challenge is empowered to make a decision on the matter alone rather than having to ask the opinion of a superior. Digitalization acting as an enabler of flatter organizational structures will be discussed under organizational structures.

Yang et al. (2014) delve into the world of business process agility. Their basic assumption is that business process agility is the key mediator in how digital capabilities generate value for companies. This, they argue, is because digital capabilities are enabling rapid business process actions, facilitating flexible business processes, and enabling business process innovation. The study demonstrates two significant variables controlling the effect of business process agility on company performance. Environmental hostility is the amount of resistance from external forces that prevents a firm's sales or growth. It might be the result of political, societal, or economic factors. As the amount of environmental hostility grows, it directly reduces the impact that business process agility has on company performance. Environmental complexity describes the number of "moving parts" in a firm's operating environment. Yang et al. (2014) found a direct link between environmental complexity and the mediating power of business process agility. The more complex the environment, the greater the impact that business process agility has. One way companies are increasing in agility is by adopting new working techniques and technologies offered and enabled by digitalization. Enterprise 2.0 is a term that was coined by Andrew McAfee in 2006 in his paper titled "Enterprise 2.0: the dawn of emergent collaboration". It refers to companies using web 2.0 related technologies in their organization. The paper, and later a book, set out to define how these technologies affect the organizations using them. The term Web 2.0 was coined in 2004 to promote a conference by O'Reilly & Associates. Since then it has expanded in use and now refers to any and all web applications where the users create the actual content of the platforms while the companies merely create the place to show the created content. Well known Web 2.0 platforms include Facebook, Flickr, Instagram, Twitter, and various platforms enabling the blogosphere. Technologies associated with Web 2.0 include RSS feeds, podcasts, cloud services, and Ajax.

In his paper, McAfee (2006) defines Enterprise 2.0 technologies as all those that comply with six components: Search, Links, Authoring, Tags, Extensions, and Signals. He refers to these qualities with the acronym SLATES. Today, a *Search* function is standard in websites. McAfee asserted that in order to improve the search functions of intranet pages, *links* needed to be built up by a large crowd. *Authoring* is a way to elicit knowledge from people who previously would have shared it by e-mail with some small subset of possible interested readers. Authoring tools enable company intranets to become tools for many people to work and share knowledge with. *Tags* help with the categorization of intranet content as well as searching for relevant information. Free tagging by any members of the work community enables a wide array of different patterns and information flows to become visible and traceable for anyone in the company. *Extensions* refer to recommendation systems that suggest likely pages based on what others who viewed a particular page have also visited. The final element of SLATES is *signals*. Signals greatly reduce the time used for following sites as the sites send out a signal each time they are updated, eliminating the need for refreshing the site for updates.

Differences between Enterprise 1.0 and 2.0 (Reprint from Consoli, 2013) in Table 1 shows how Consoli (2013) categorizes differences between Enterprise 1.0 and an Enterprise 2.0. New open and flexible structures, along with hierarchy, centralization, and location vs. mobility have been discussed in the section on organizational structures. The effect of digitalization on agility – which includes agile production as well – is explained in this section, while competition turning into cooperation as well as companies becoming customer-oriented are both dealt with in the section on business ecosystems. Public organizations are also shifting into web 2.0 world, having the systems they use made transparent to public. Citizen involvement was found to be one of the critical success factors in digital governance of Prague (Melitski et al., 2011). Roman and Miller state that usage of digital assets has benefitted the governments, but it is still one-sided – the democracy aspect is missing (2013). The ethics involved within e-governance have received scarce studies. Roman suggests key questions for this research path in his article (2015). Bezboruah and Dryburgh (2012) suggest that when using web 2.0 the employees in civil governance should be made clear about their role

TABLE 1
Differences between Enterprise 1.0 and 2.0

| Enterprise 1.0 | Enterprise 2.0 |
|----------------------------|-----------------------------|
| Closed and rigid structure | Open and flexible structure |
| Rigid | Agile |
| Hierarchy | Network |
| Centralization | Distribution |
| Competition | Collaboration |
| Traditional marketing | Social marketing |
| Product-oriented | Customer-oriented |
| Intranet-extranet | Web 2.0 |
| IT driven | User driven |
| Top down | Bottom up |
| Location | Mobility |
| Owner standards | Open web-based standards |
| Planning production | On demand production |

Source: Consoli (2013).

as public servants even when updating their private profiles. Poor publicity of a single employee could stain the whole organization they're working for.

As for the managerial part, McAfee (2006) sets a high challenge – in order to succeed in transformation to Enterprise 2.0, managers need to take a guiding role at the beginning but they also need to sense when it is the right time to step away from that position and allow the media to be grown by the employees – even if they say things the management would not like to hear. On the other hand, cyberbullying is a real possibility, if management doesn't manage the media at all (Heatherington and Coyne, 2014). Simply presenting the options made available with IT will not change the behavior of the organization.

Organizational Structures

Organizations have been found to be shrinking in size, measured by the number of employees (Brynjolfsson et al., 1994; Snow et al., 1999). This has partly been attributed to IT simply doing away with manual tasks such as data collection and processing by middle

management. The main reason for smaller company sizes was found to be the decoupling of business due to lower costs of transactions and coordination (Sambamurthy et al., 2003). BarNir et al. (2003) showed that smaller company sizes and company age was associated with increased use of digital technologies in printing press, leading to a competitive edge.

Virtual organization as a term was coined in the 1990s. Snow et al. (1999) defined a virtual organization as multisite, multi-organizational, and dynamic. Since then, the definition has been broadened to encompass “organizations whose business processes are predominantly driven by e-commercial activities and whose members are geographically apart, usually working by computer using email and groupware while appearing to others in the form of a website to be a single, unified organization with a real physical location” (Mohammad, 2009, pp 5). Priego-Roche et al. (2015, pp 1) states: “this integration is possible throughout the layout of an information system infrastructure to satisfy customer requirements, or to seize a business opportunity without having to form a new legal entity.” Some forms of virtual organizations benefit from increased agility – teams form to solve an issue and disband after, only using a workforce that can contribute to the task at hand (Snow et al., 1999). As virtual organizations are becoming more common, it is hard to draw a line between a single virtual organization and a business ecosystem. Some researchers have more negative take on the effect of virtual organization. Thorne (2011) clearly states his opinion that virtual organization is not the optimal answer for the demands of increased business clock speed in contemporary companies.

The major impact of digitalization on organizations is that information is more accessible and transparent. Digitalization has made it much easier to make information available for all personnel, who have previously been working with limited knowledge of the big picture of the business. This allows employees to make more informed decisions at lower levels of the organization. Business Intelligence (BI) programs are made to analyze and compress data for top management – a task previously done manually by middle management. Together these assist in making modern organizations flatter with fewer hierarchies than before (Dewett and Jones, 2001). Managers and team leaders usually have some active duties on top of their managerial roles.

A knowledge silo in an organization is an organizational unit that is very good at what it does, but is unable to share information effectively or perform other tasks than what it is good at (O'Reilly et al., 2012). Knowledge silos usually consist of deeply trained specialists in one field. However, these silos are being brought down by the organizational changes driven by digitalization. This is a direct result of knowledge being distributed more and more efficiently – and the need for lean and agile organizations that are able to perform different actions in quick succession. Contemporary organizations believe information sharing is the key to success. This is enforced via various platforms, enabling employees to gain knowledge of the status of the company – online screens, intranets and more recently social media, are among the ways companies keep their staff up to date (McAfee, 2006).

Organizational Learning

Organizational learning is important for companies because it enables innovation and process effectiveness (Joshi et al., 2010). Organizational learning is an ambiguous term that has several meanings depending on the context. Real et al. (2006, pp 506) define it as the “dynamic process of knowledge creation generated at the heart of the organization via its individuals and groups, directed at the generation and development of distinctive competencies that enable the organization to improve its performance and results.” In their study, Fernandez-Mesa et al. (2013) differentiate between internal and external learning. Internal learning refers to knowledge created within the company, mainly through R&D and implementation of best practices. External learning refers to the knowledge the company gains from the outside world. This includes the environment and other companies working in the same field. In this article, organizational learning is viewed through the lens of digitalization and is thus focused on the processes enabled by digitalization.

Digitalization affects internal learning by enabling codification and improved analysis of knowledge. Quality management tools are a good example: A database which contains the information of all the claims a company has received, in an easily searchable form. Compare this to quality managers who learn by doing and take the knowledge with them when they leave the company. It is obvious that the former type of organization is better off in the long run. Indeed,

Sriram and Stump (2004) found evidence of the improved effect of quality programs after IT investments. Alavi and Leidner (2001) state that digitalization can act as an enabler of organizational memory in databases, increasing companies' learning capabilities. Another good example is the use of business intelligence (BI) programs, which store and process information for managers to improve their decisions in terms of both speed and accuracy. A study by Leidner and Elam (1995) suggests that the use of BIs is positively related to the problem solving speed of managers. Real et al. (2006, pp 508) find support for their hypothesis, stating that "Information technology has a positive influence on organizational learning as a knowledge creation process" – albeit that they do not differentiate in their research how IT helps this process. However, Johannessen et al. (2001) warn that investing in information technologies easily leads to focus on explicit knowledge and demotion of tacit knowledge, as tacit knowledge is not easily transferred to digital form. This could hinder the competitiveness of organization, so an emphasis on tacit knowledge while adding digital assets is suggested.

Many information technologies directly affect communication in companies. Recent technologies include e-mail, conference calls, and videoconferences. These new communication channels help in the forming of 'weak ties.' Weak ties are social relationships where the correspondents are somewhat familiar, having occasional discussions. Dewett and Jones (2001) assert that weak ties help organizational learning, as people who are connected share more information with each other. The concepts of Enterprise 2.0 also contribute to a company's internal learning capabilities as employees can find relevant information and contacts within the company from the corporate intranet pages and blogs. McAfee (2006) notes that in order to create a vivid environment for employees to start discussing matters in a web 2.0 environment, managers need to firmly guide the first steps of initiation. It is equally important to cut the environment loose at the correct time so as to give the organization a feeling of ownership of the internal media.

The absorptive capacity theory defines a firm's ability to recognize the value of external information, and of assimilating and applying it to their commercial ends. The absorptive capacity theory is thus used to explain external learning (Dong and Yang, 2015). Joshi et al. (2010) divide absorptive capacity into potential and realized absorptive

capacities. Potential capacity consists of knowledge acquisition and assimilation while realized capacity consists of knowledge transformation and exploitation. Digitalization provides several technologies to enhance both potential and realized absorptive capabilities. Data retrieval techniques such as query systems and search engines help to identify and retrieve information from varied knowledge sources with ease and accuracy. This enhances the potential absorptive capabilities. Most new information gained does not help the company directly. Usually, the information needs to be transformed to fit the context of each company. Digitalization affects this process in much the same way as in internal learning as discussed earlier, by improving realized absorptive capacity (Joshi et al., 2010).

Digital Innovations

Digital innovations have received a fair amount of attention (Nylen and Holmström, (2015); Fichman et al., (2014); Fernandez-Mesa et al., (2013); Dibrell et al., (2008)). Major new digital innovations are appearing at much shorter intervals than before. During the 1980s, a major new technology broke through once every decade; now there seem to be many different breakthroughs just around the corner at any given time (Fichman et al., 2014). The rapid pace of digital innovations is enabled by the nature of digital technology: ease of reconfiguration (Yoo et al. 2012.) Digital innovation processes have evolved since the industrial era. The difference is highlighted in solutions where digital technologies are embedded in traditional products (Nylen and Holmström, 2015). For example when a car manufacturer added an entertainment system to their vehicle, a surprising number of challenges surfaced (Henfridsson et al., 2014). These embedded products form the Internet of Things, which is widely regarded as certainty in the future.

Fichman et al. (2014, pp 330) define digital innovation as follows: “We define digital innovation quite broadly as a product, process, or business model that is perceived as new, requires some significant changes on the part of adopters, and is embodied in or enabled by IT”. Nylen and Holmström (2015) stated that digital technology contains unique properties, which enable new types of rapid and unpredictable innovation processes. These processes require companies to have agile technologies, organization structures, and

cultures to be able to cope with the fast cycles of innovation. Dibrell et al. (2008, pp 205) define innovation as a process or discrete event; “any idea, practice, or object that the adopting individual or organization regards as new.” Digital innovations offer great benefits but they also present a great challenge in understanding the properties of digital innovation processes (Nylen and Holmström, 2015).

Henry Chesbrough coined the term *Open innovation* to describe novel ways of handling innovations and R&D. The traditional way has companies guarding their innovations as business secrets. Open innovation states that modern companies do not hoard innovations. Inbound, open innovation is an idea that has come up within the environment of the company that the company could use. An outbound idea is an innovation within a company that has no direct use for it (Cui et al., 2015). Cui et al. (2015) focus their study on the effects of digitalization on inbound open innovations. They posit that the strategic alignment of IT is a moderator for inbound innovations. Good strategic alignment of IT thus increases both the volume and quality of innovation of the company.

Whelan et al. (2010) set out to modernize the *gatekeeper theory*. The gatekeeper theory was first developed in the 1970s by Allen in his book “Managing the flow of technology” (1977). The theory states that if an R&D department has so-called gatekeeper personnel within it, it will be much more effective in capturing inbound innovations. A gatekeeper is a person who actively seeks data from outside of the company, classifies it, changes it to fit the organization, and finally distributes it to persons who will benefit the most from it. The gatekeeper was shown to be an important person in the era before digitalization as information was scarce. Digitalization has totally changed this picture. Vast amounts of information are available to anyone who is willing to seek it. Social networking sites (SNS) are a good example how ideas travel today. Single question in twitter might reach hundreds or thousands of people with potential knowledge (Hu and Bryer 2014). In their study, Whelan et al. (2010) find that gatekeepers still exist after a fashion in contemporary firms. It is very rare that one person undertakes the whole gatekeeping function alone, but rather the role has been split between two persons. The first one sifts through the information and verifies it. He/she then

sends it to the second one who is able to recodify and distribute the data.

Dewett and Jones (2001) assess how digitalization has changed analogical innovation processes. They suggest that digitalization moderates the effects of organizational characteristics, leading to improved innovation. This is due to the improved collaboration and coordination allowed by enhanced communications within companies. In their study, Dibrell et al. (2008) find support for their hypothesis that in the presence of a firm strategy of innovation, an emphasis on digitalization will be positively associated with financial performance. This, along with the rejection of their other hypothesis stating that innovation alone is positively associated with financial performance, supports the claims made by Dewett and Jones (2001).

Business Ecosystems

Business ecosystem is a term for a group of companies focusing on the same market or product, often interacting with each other. The origins of the term are in biology. The New Oxford English Dictionary (1993) defines a biological ecosystem as “a community of living species, occupying a habitat and interacting with the environment in which they live.” A business ecosystem is quite a direct analogy for the ecosystems of nature. In his study, Li (2009) finds three characteristics for business ecosystems: *sympiosis*, *platform*, and *co-evolution*. All involved parties work with each other and gain from each other's success. They work on one product or service, the platform. While platforms have existed before digitalization, new digital technologies have elevated their role within the business (Yoo et al, 2012). This can be accounted for easy addition and modification of software as discussed in innovation section. Evolution of the central technology leads to evolution of the whole ecosystem. Similarly, the fall of the “keystone player” could cause the fall of the whole ecosystem, including all the smaller companies. As an example of business ecosystems, Microsoft has created their own ecosystem around PCs with Windows. Intel is a major player in Microsoft's ecosystem, but there is a myriad of other smaller companies as well. These minor companies provide third party software that works with Windows, or are hardware producers working with hardware compatible with Windows OS.

Digitalization has played central role in the development of business ecosystems. This is due to the enabling role of digital technologies in automating business transactions and in offering cheap communication possibilities. Many digital age ecosystems encompass such vast amounts of technologies that it would be nigh on impossible for any single company to cover them all (Korpela et al., 2013).

Several typical actors in the business ecosystems have been identified from the literature. Most of the ecosystems have either one dominant keystone player or a few. A keystone player is a company or group of companies who mainly decide where the ecosystem is headed (Lu et al., 2014). They also seek to maintain the health of each member of the ecosystem, as well as creating platforms such as services or tools that are open for all the companies in the ecosystem to act upon (Clarysse et al., 2014). Ecosystems also contain multiple niche companies. They are companies that are operating in ecosystems much larger than their business and containing much larger companies. Niche actors carve a small corner for themselves from the ecosystem. Typically, this corner is only capable of sustaining small-scale business, thus making the keystone players uninterested in it (Lu et al., 2014). Suppliers are needed for both software and hardware. They typically do business with the keystone players, not directly with the end users. Vendors are the storefront of the ecosystem, providing the end user with access to the product created by the system. Some keystone players provide this interface themselves, but it is often outsourced to third parties (Lu et al., 2014). End users are perhaps the most important actors in the ecosystem, as they are the ones bringing in the money. They are either individuals or companies who use the value created by the system. Melitski et al. (2010) suggest that public organizations are acting in ecosystems as well. However this study does not recognize governments as true parts of the ecosystem, yet they are still very much involved as they set the legislative frameworks in which the ecosystem must operate and might grant some financial support for innovations (Clarysse et al., 2014). Sometimes these frameworks may help the business, other times it might make it impossible to continue or at least to undergo a major transformation. Academia is often considered part of the ecosystem – many times being part of the research and development process of the products within the system (Clarysse et al., 2014).

It is worth mentioning the close cooperation between the companies within an ecosystem. The traditional supplier-buyer relationship seems to be diminishing in favor of more close partnerships between two companies. Inter-organizational networks exist for both competitive and cooperative actions. Two companies might cooperate on one front and compete on another. Through collaboration, the companies leverage their interdependencies and generate an advantage over single companies with a full value chain in their own hands (Clarysse et al., 2014).

METHODOLOGY

The study started with a wide-ranging search to set up the scope and gain an overall view of the phenomenon. The aim was to find out what different organizational effects of digitalization have been proposed in extant literature. From this search, more focused topics were selected based on the results within the articles in this shallow but extensive first search. The topics selected are all previously identified within the extant literature, this review merely attempts to bind the areas together in a coherent fashion.

The topics chosen were then individually given a standard literature review, according to the methodology from Creswell (2012). For example, in the literature review on agility, the keywords used in the search for articles were “organizational agility” and “digitalization agility.” The search was conducted on Google, Google Scholar, and in a combined search from several article databases, including EBSCO, Ex Libris, and the Science magazine. After finding relevant articles with these searches, a forward search from articles citing these articles was made, along with a backward search from the references. This process was repeated with all the new articles added until no relevant new articles surfaced. The procedure usually yielded around ten articles for each topic. No validation was made as the articles used are from peer-reviewed journals or scientific conferences, which was deemed to be enough to validate the articles.

DISCUSSION

This article brings together all the findings of the literature review and presents a framework of digitalization based on these findings. Digitalization is a broad theme with a plethora of different effects on organizations. No studies were found during the literature review that covered the phenomenon as a whole – all the studies picked a particular point of view to investigate. This article thus begins to fill a gap in the extant literature by analyzing and presenting the results of a literature review aimed at providing a broad view of the effects. These effects are not all direct, but rather consequences of first order effects. The framework presented in Figure 1 was created to sum up the information found during the literature review. The framework depicts the organizational surroundings of different key issues raised by digitalization. This framework is useful to managers by allowing them to easily focus their efforts in the right components of their organization if they want to enhance some particular aspect. For example, if a manager feels that the organizational learning is sub-par in their organization, it should be helpful to see how analyzation, codification, and storage of knowledge are dealt with and how the total quality management system functions, if there is one in place.

Organizational structures have been among the aspects most changed due to digitalization. Hierarchical organizations are viewed as a thing of the past as new organizations strive for flatness and agility. *Organizational agility* has thus become a necessity for contemporary organizations as the clockspeed of business has increased tremendously in the last few decades – and seems to be continuing to increase. Digitalization has been the force behind this change, as it has increased the clockspeed in which the world runs by enabling the customers to shop where and when they want, regardless of boundaries. *Organizational learning* has become easier as digitalization has vastly increased the amount of available information and ease of boundary spanning activities. Organizational learning should however be carefully managed to reap the most benefits from the new opportunities presented by digitalization. Digitalization enables different *innovation* processes than before – knowledge and platforms are freely available, innovators often merely find out new ways to use the existing techniques with only small modifications needed for the original products. The nature of software

FIGURE 1
Framework of the Effects of Digitalization



makes this transition relatively simple and much quicker than traditional innovation processes of pre-digital era that require, for example, new ways of working with materials. All the above mentioned issues have led to the rise of *business ecosystems* around certain technologies. Today, business ecosystems receive attention from keystone companies who specifically create strategies including the development of the whole ecosystem, not just their products in it. Even though business ecosystems are possible without digital assets, the increased communication capabilities the digitalization offers makes them much easier to organize.

The management implications of this research are to highlight the areas where a company needs to perform in order to reap the benefits of digitalization. Academically, the interest is in the current status of the research as well as unearthing some areas that have received scarce attention. Organizational learning and structures have not been the focus of many studies in the past few years.

SUMMARY AND FUTURE RESEARCH PATHS

This research set out to determine which outcomes of digitalization are interesting from the organizational viewpoint and the current state of research on these topics. The topics of interest were the organization's size and shape, organizational learning, organizational agility, digital innovations, and business ecosystems. These topics have been the focus of a significant number of studies in the past, but no studies grouping the effects together were found. The framework concluded from the research draws together these effects and shows the interlinking nature of digitalization as a whole. It also functions as a map where managers can focus their efforts if they desire to grasp some part of the benefits of digitalization more fully.

Future research possibilities for this topic include research on how well organizations have grasped the phenomenon and are using it to their benefit. Most current studies focus on small area of the phenomenon, so a wide focused research on the topic would be warranted. An interesting idea is to see how two partner organizations evaluate their own and their partner's digitalization capabilities, shedding some light on how well self-evaluations hit mark in this respect. Another similar research path leads to researching digitalization in business ecosystems. Extant literature focuses on how business ecosystems are working, but the scope of digitalization within the business ecosystems is largely in the dark. Novel research on organizational learning and organizational structures in the light of digitalization would be called for, as these topics have not been recently covered.

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