ABSTRACT

ALIGNING STRATEGIC ENABLERS FOR ACCELERATING THE DIGITAL TRANSFORMATION

By

Marius Paul Richter

Digitisation is often accompanied by disruption of organisations, industries or even entire markets, since digital or digitised business models usually interrupt old business models. An often-mentioned example is Google with its self-driving technology as a new entrant into the automotive industry, which for over a century has only been divided up by traditional car manufacturers.

The necessity of a digital transformation has therefore become an existential necessity for companies. Nevertheless, many organisations fail to master this digital transformation, since they focus exclusively on technology. While in the past, It was often undermined by the business perspective, nowadays it seems to be so in focus that other necessary factors for digital transformation are often overlooked. So, it is not just a question of translating analogue business models, products, or services into digital ones, but rather, the company itself must be understood as a system that has to be digitised, in order to ultimately be able to digitise the business model, its products and services.

The causes for failure of digital transformations only become clear when looking at a company from a systemic point of view: as all systems, also companies strive for stability and order, but this diametrically opposes instability, as an essential prerequisite of digital transformation. Many managers of traditional companies are still trying to manage the company according to the principle of steering and regulation, and by making decisions based on routines, i.e. on patterns that have emerged as products of the past.

Furthermore, due to a lack of a systemic perspective, the relationship of important drivers that facilitate digital transformation is not recognised and thus neglected.

This dissertation uncovers these aspects by reviewing relevant literature and by conducting and then analysing a survey of 80 managers and employees working at organisations with different levels of digitisation. To summarise the findings, compared to traditional companies, digital companies show strong

relationships between strategy, organisational structure, culture, and IT. With this interaction of these four factors, existing established patterns can be broken through and a company can be developed as part of the digital transformation as a self-organising network. Technology is therefore not only a business solution, but in interaction with strategy, organisational structure, and culture, a systemic facilitator of a digital transformation.

TABLE OF CONTENTS

Chapter 1. INTRODUCTION

1.1 Scope

The scope of this dissertation is investigating the digital transformation of organisations and providing a framework containing guidelines about how digital transformation can be successfully achieved and accelerated. The aim of the project is therefore to describe digital transformation as an integrative approach with interrelated enablers.

The study is developed based on a review of existing literature and hence the thesis is that a prerequisite of successful digital transformation is the systemic consideration and implementation of strategy, organisational structure, culture, and IT as mutually dependent, and, if aligned, synergistic aspects.

A subsequent survey of managers and employees working at digital, digitised and (still) traditional companies is conducted to answer the identified research questions and to derive guidelines for the above-mentioned framework.

1.2 Problem Statement

Digital transformation is a key challenge for many organisations and mastering it is not only the basis for future success, but also often a prerequisite for their survival. Hence it is not surprising that the question as to how organisations can implement and improve their digital transformation processes as an integrated holistic approach in a dynamic environment is a commonly debated topic in both academia and many industries (von Leipzig et al., 2017).

Countless companies are trying to address the challenge of digital transformation on an operational level, such as using technology to solve operational problems, but what is often missing is the linkage of individual components such as strategy, organisational structure, culture, and IT in a strategic way.

If companies lack the understanding of the individual elements of a digital transformation and how these interact, their efforts are likely to fail, for example, when the solution is seen in technology as an end in itself.

Companies must therefore develop a systemic understanding so that the entire organisation is understood as a system in which processes, employees, skills and structures are interrelated.

To investigate how exactly a systemic approach for enabling and accelerating digital transformation should look like and which aspects are important within the framework of this systemic approach, the following research questions are examined:

- **RQ1**: Does strategy contribute positively to digital transformation?
- **RQ2**: Does organisational structure, in terms of decentralised structures, contribute positively to digital transformation?
- **RQ3**: Does culture contribute positively to digital transformation?
- **RQ4**: Does IT contribute positively to digital transformation?
- **RQ5:** Are there synergies between strategy, organisational structure, culture and IT in digitally transformed organisations?

Based on the survey, in which digital, digitised and traditional companies are examined with regard to the five research questions presented, a framework is developed that represents the context of the individual drivers of a digital transformation. With the help of this framework, companies should be able to align and optimise their digital transformation efforts.

1.3 Approach

The dissertation aims to develop a framework of actionable recommendations for organisations that are undergoing digital transformation. The employed approach is rooted in a critical analysis of existing literature in the context of digital transformation and extends to include an examination of the characteristics of an organisation from the systems theory perspective.

The findings from the literature research serve as the basis for developing a subsequent quantitative survey encompassing all relevant constructs, which are then operationalised in their dimensions and respective items.

The survey of managers and employees working at digital, digitised and (still) traditional companies collects data on their assessment of digital transformation enablers using Likert scales. The data of this survey is then evaluated through statistical tests and the results form the basis for the development of a framework that companies can utilise to not only evaluate their own digital transformation in a self-reflective manner, but also to develop measures to initiate, optimise and control the digital transformation process from an organisational perspective.

1.4 Outcome

The study was successful in highlighting the pivotal role of the factors strategy, structure, culture and IT for the digital development of a company, thus supporting research questions 1 through 4. In addition, the synergetic relationship of these four factors could be demonstrated, hence this supports research question 5. Consequently, internal IT is just as necessary for the establishment of a decentralised structure that promotes digital transformation as it is for a corresponding corporate culture in which employees are equipped with more responsibility and degrees of freedom with regard to their actions. The overarching result of this study is that digital transformation must be viewed in a systemic context, i.e. the individual organisational factors must not be viewed in isolation, but in mutual relation to one another. As a result of this interaction, an organisation can be constructed as a self-organised network that enables diversity and transparency, and thus the transition from an existing stable, non-digital pattern to a new, digitally transformed pattern. These changes need instability, which are made possible by the network that characterises a self-organising company.

Concrete guidelines regarding the four strategic enablers, while considering the systemic view, were derived from the results of the study and in connection with the existing literature. These guidelines are presented in detail in chapter 4.3 of the dissertation.

Chapter 2. BACKGROUND AND REVIEW OF LITERATURE

2.1 Background

To date, there is no commonly agreed upon definition for the term "digital transformation". In the context of business, many definitions refer to the technological dimension for generating new, or extending existing customer benefits, but without considering the overall organisational context. Iansiti and Lakhani (2014, p. 5), for instance, define digital transformation as the “digitization of previously analogue machine and service operations, organizational tasks, and managerial processes”.

Others, however, such as Main et al. (2018, p. 18) emphasise, that „digital transformation is not just about technology". The authors underline that digital transformation is like an orchestral interaction of individual organisational components, to which technology undoubtedly belongs, but is not sufficient as a standalone.

This holistic understanding is also expressed in the definition of Mazzone (2014, p. 8), who states that digital transformation is “the deliberate and ongoing digital evolution of a company, business model, idea process, or methodology, both strategically and tactically." This definition, which emphasises the importance of the organisation, is also consistent with the findings of the joint study by the SAP Center for Business Insight and Oxford Economics. Among other things, the study found that leaders of companies that successfully undergo a digital transformation transformed the organisation as a whole, instead of "episodic, piecemeal changes" (SAP, 2017, p. 4).

Interestingly, a survey by the Global Center For Digital Business Transformation (2015) of 1,000 CEOs from 12 different industries indicated that 45 percent of respondents did not regard digital transformation as relevant at board level and 43 percent would rather react to digital developments than act proactively. These findings point to the basic issue why many companies struggle with digital transformation: on the one hand, companies lack the necessary understanding of digital transformation, which does not only take place at the technological level, but at all levels of an organisation and, on the other hand, they lack the required agility accompanied by the appropriate organisational culture.

Azhari et al. (2014) introduced the so-called Maturity Model that lists the following nine areas within the scope of which digital transformation must take place: Technology, leadership, products, operations, culture, people, business governance, IT governance, and strategy. These individual areas cannot and must not be

viewed in isolation from one another, but must be synchronised within the framework of the digital organisation. Precisely this resulting complexity and the corresponding interrelationships require a holistic, systemic approach for a successful digital transformation (Heavin & Power, 2018).

Hess et al. (2016) argue that it is exactly the lack of understanding of the connections between the individual elements and the lack of agility that causes organisations to fail with their digital transformation. Perry Hewlitt, CDO at Harvard University, underlines the importance of agility in digital transformation by saying that agility is more important than technological capabilities (Kane et al., 2015). A number of different studies conclude that digitally successful companies use technologies to enable agility and changes in the way the business functions, while less successful digital companies use technologies to solve individually separated business problems (Hirt & Willmott, 2014). Kane et al. (2015) also conclude that technology is not an end in itself and that within the context of digital transformation the organisation must be changed in terms of more agility and a supportive organisational culture.

Digital transformation must therefore be seen as a holistic approach in which the individual elements are not isolated from each other, but in a mutual relationship (Heavin & Power, 2018, Cianni & Steckler, 2017, Yeow et al., 2018). This means that the complexity of the organisation as an object of digital transformation is not trivialised by the individual consideration of the respective elements, but that the success of digital transformation lies precisely in the dynamic consideration of the interplay of these individual elements.

In order to investigate the drivers of digital transformation, and the relationship between agility, culture and technology, the understanding of an organisation from a systems theory perspective must therefore be explained at the beginning.

2.2 Literature Review

2.2.1 A systems theory perspective on organisations

The sociologist Niklas Luhmann views the ongoing decision-making and continuous communication as the essential features of an organisation (Schoeneborn, 2011). In the organisational context, situations often require decision-making in a state of uncertainty, since not all developments and external influences can be foreseen. In order to avoid risks, decisions are hence often strongly based on the knowledge generated

from previous decisions (Smith et al., 2010), which can result in a "We have always done it in that way"-mentality driven by routines. But due to increasingly dynamic markets, disruptive technologies, digitisation and changing customer desires, retrospective considerations of successes are becoming increasingly deceptive, making such routine-driven decisions more and more dangerous (Bleicher & Stanley, 2017, Sirén et al., 2017). Routines can therefore lead to a mental constriction and formulaic constraints that prevent the organisation from thinking freely in order to be able to question the status quo.

This adherence to the tried and tested is also reinforced by the fact that all systems, including organisations, form order patterns and strive to achieve stable conditions (Veiwey & Davis, 2011). However, a digital transformation is the transition from one macroscopic order pattern to another macroscopic order pattern. In order to achieve this and move from one stable order to another, i.e. the "transformed" order, one has to question the existing order and break it up. This leads to a conflict between digital transformation and stability (Farjoun, 2010). To this end, there must be a willingness to move from one stable state through a state of disturbance and crisis to a new stable state. This means that a lower level of efficiency during the transition period must be considered and accepted. This requires that an organisation is not used as an instrument, as this would trivialise the complex context of digital transformation from analysis to implementation and transformation of the organisation (Nagel & Wimmer, 2014).

This trivialisation is also expressed in that strategic decisions regarding digital transformation are often made within the framework of proven routines and established standard communication and structures (Neus et al., 2017). However, this cannot do justice to the degree of complexity of digital transformation, since routines assume that problems are known to which one can react with previously established solutions. This means that analysis and thought processes must be decoupled from routines and also slowed down in order to cope with the complexity (Nagel & Wimmer, 2014). So, making decisions is not just about making things safe or correct, but also about constantly questioning them in a recursive process that should take place outside existing routines and patterns of thought. Digital transformation is therefore not only a technical matter, but first and foremost the creation of organisational prerequisites. In addition to the vital importance of decisions for organisations and the necessity of questioning routines and decisions in the context of a digital transformation, a closer look at the decision-making framework is therefore important.

There is always a framework for decisions in organisations, which Luhmann (2011) defined as the three decision-making premises of programmes, communication channels, and people:

1. **Programmes:** This decision-making premise is about how the organisation defines itself. What is the aim of the organisation? What are the tasks of the organisation? How will the organisation position itself? It is therefore about the business model and the strategy that provides the employees with a framework for action. If a strategic goal is lacking along with a strategic plan, this leads to disorientation. Companies tend to fail at digital transformation, if they do not understand the complexity and therefore do not formulate their strategic objectives clearly, or even worse, do not even have a clear goal at all.

2. **Communication Channels:** This decision-making premise refers to the formal organisation in a broader sense. How does communication take place within the organisation, which hierarchy level may communicate with which, or who is authorised to issue instructions to whom?

3. **People**: The coupling of the organisation with the employees as a psychological system is summarised under this third decision-making premise. The coupling provides the organisation with access to the knowledge, creativity and judgement of the employees and allows the organisation to gain a high degree of agility. However, it is crucial that knowledge is not regarded as an end in itself, but is linked to the organisational strategy and operational processes within the company (Ale et al., 2014).

These three decision-making premises, which can be derived from the understanding of an organisation as a system of continuous communication and decisions, are an essential component of organisational design and must therefore not be viewed in a detached way. The management of an organisation has direct influence on exactly these three decision-making premises; It must therefore build and steer the organisation and hence do justice to the complexity of digital transformation.

A system with a high degree of complexity, i.e. consisting of many individual interrelated elements, both within and outside the organisation, and with a high degree of instability due to the high dynamics of change, can no longer be maintained and further developed by simple steering and regulation, nor can it thus be digitally transformed.

This principle is reminiscent of the so-called TOTE unit, i.e. Test-Operate-Test-Exit unit, which was developed by Miller et al. (1960) in order to model human behaviour. According to this model, the management develops the traditional, i.e. non-digital, organisation by setting goals and sub goals. The

achievement of these goals is ensured through directed activities and a continuous comparison of the target and actual performance situation. This form of steering through target agreement corresponds to the application of first-order cybernetics. So, based on Arévalo and Esperanza (2016), when a manager begins a process with the definition of a goal, i.e. a target value, and with a situation analysis, i.e. the definition of the actual value, he therefore assumes that the system itself is stable.

In this context, however, target values are the projection of current conditions into the future, which simply presupposes that a development can be planned. But what happens if the system changes suddenly and incalculably, as it has become the rule in the era of digital development? This idea of plannability through steering and regulation, which goes hand in hand with a classic image of the manager as an omniscient leader, is all the more problematic, the more a temporary instability of the system, and thus uncertainty, must be accepted for changes such as digital transformation to happen (Kruse, 2004). It is precisely this picture that is reflected in centralised structures with a high level of risk aversion, and many rules and regulations.

In corporate environments, which simply due to the ongoing digital development are now fundamentally complex and unstable, the principles of corporate management and development must be extended beyond regulation and control in favour of the principle of self-organisation (Lenkenhoff et al., 2018). For this reason, a decentralised structure and a trusting culture is necessary in which employees are equipped with a higher degree of responsibility and in which IT systems are used to support strategy development, to enable horizontal and vertical communication, and to exchange knowledge.

It is therefore a matter of establishing a self-organising network with the resulting diversity and corresponding creativity in order to break through existing patterns and routines. For the development of such a dynamic network, various elements are necessary: a corresponding IT to enable the necessary information flow, a corporate culture promoting the exchange of information and knowledge, and fundamentally also an adequate structure as part of the organisational design, which together with the IT, forms the physical structure, or the backbone of the network.

2.2.2 Organisational design

Kolarić and Petrović (2013, p. 96) define organisational design as the “process by which managers select and manage aspects of structure and culture so that an organisation can achieve its goals". It is therefore not only a question of creating a rigid formal organisational structure in which the entire organisation is divided into its individual functional units as silos, but that these units are in turn connected to one another in order to support the efficiency of the organisation.

This is precisely the paradox of an organisation and the difficulty of digital transformation: On the one hand, the organisation needs stability to fulfil its operational and strategic tasks, but on the other hand, it must also be able to adapt its structures, processes and patterns of thought to the requirements of its environment. The organisation must therefore be understood in the rational systems perspective as a system, and not as an instrument in the sense of purpose rationality.

2.2.3 Organisational culture

Naranjo-Valencia et al. (2016, p. 32) define organisational culture as “the values, beliefs and hidden assumptions that the members of an organisation have in common”. Costanza et al. (2016, p. 361) state that it is a “critical resource for organisations to adapt to dynamic environments and to survive in the long term”. Hence, it is crucial that culture is understood as an indirect variable, i.e. that it cannot be influenced directly, but only through certain systemic framework conditions. Based on Meyer et al. (2010), these include, amongst others, leadership, strategy and organisational structure.

One of the most fundamental concerns of a healthy organisational culture is the collection and sharing of knowledge and thus the establishment of a learning organisation. This refers more to informal learning rather than formal continuing education programmes. However, it is often made more difficult by internal resistance, for example, due to a lack of supportive culture, lack of communication, and a lack of technical infrastructure (Sezgin et al., 2010). Furthermore, although implicit knowledge and learning is an enormous competitive advantage and a necessity for agile companies, it is often underestimated, since as it is only an intangible asset that is not listed in the balance sheet (Thoene & Buszko, 2014). But this is precisely where the need for an organisational culture that promotes informal learning arises. Learning can reduce uncertainty and improve confidence in decision-making based on new findings. Informal learning also

promotes cognitive decoupling from proven patterns of thought for all persons participating in digital transformation.

The creativity and innovative ability of employees can only be promoted indirectly by creating appropriate spaces of opportunity (Volkema, 2010). This means that an organisation, as a system, should not have an assimilating character, but rather be able to work with internal tensions. Because tensions themselves represent an unstable state, which offers the organisation the possibility of transition to a new pattern.

It is therefore not a question of creating organisational uniformity within the framework of digital transformation, but rather the opposite. Here, too, the aim is to counteract the nature of the system, namely its strive for stability. Especially in the time of digitisation, the organisational environment is increasingly characterised by extreme complexity, hence the pursuit of stability tends to be very high. According to Ashby's Law, however, wherever a highly dynamic and complex problem system exists, an equally complex solution system is required (Ning & Tanriverdi, 2017).

According to Cunha and Rego (2010), the complexity of digitisation can be countered by organisations through building networks. This is because networks help to enable that communicative feedback effects are no longer linear and thus isolated from other opinions, information and ideas. Existing stable patterns such as common assumptions, can hence be dissolved. The need to turn away from thinking in isolated silos within the framework of the organisational structure becomes apparent, and thus also the need, as Islam et al. (2015) emphasise, for a consistent view of organisational structure and organisational culture.

2.2.4 Organisational culture and structure

When looking at the level of the employees, the necessity of building networks becomes clear: According to Kruse (2004), one can distinguish between creators, owners and brokers. A creator is someone who constantly confronts the organisation with new ideas, and thus disrupts the current stability. An owner, in turn, is the knowledge owner, who masters a subject in depth. The broker, on the other hand, knows people who know something and brings them together. Each type therefore has different abilities and characteristics. The creator and the owner together can produce ideas to create solutions. The owner and the broker together can evaluate knowledge, and the broker and the creator together can lead to agitation,

and disrupt the current order pattern. All three together result in agitation, solution formation and evaluation, hence the elementary capabilities for digital transformation (Kruse, 2004).

To enable this form of networking however, an organisation needs cultural freedom. By building such networks, the non-linear feedback effects ensure that the stability of the system is broken up through questioning (Volkema, 2010). This is precisely why an organisational culture in which employees have the freedom and incentives to build and use such networks is important in order to not remain trapped in the stable order of their own thought patterns.

Organisational culture and the networks associated with it, are the prerequisite for sharing knowledge, which in turn is important for agility and a high degree of innovation. Knowledge sharing is particularly promoted in organisations with an organic structure characterised by informal control mechanisms, adaptability and open communication, hence horizontally integrated organisations tend to have a higher degree of innovation than vertically integrated organisations (Zheng et al., 2010; Szczepanska-Woszczyna, 2018). One explanation for this is that if an organisation is less formally structured, less formal rules and regulations are derived that restrict employees of creative freedom of action and hence enable free communications (Chen et al., 2010).

Also, Islam et al. (2015) conclude in their study that a high degree of centralisation leads to a rather non-participative environment, and thus to less communication and lower involvement and commitment. The degree of innovation of an organisation, which is closely related to the agility of an organisation, is thus moderated by the organisational context, i.e. the organisational structure and organisational culture (Zheng et al., 2010). The aforementioned need to build up networks is therefore not only subject to intrapersonal requirements, but also to the organisational structure.

2.2.5 Organisational culture and strategy

Strategy development is a very crucial process, especially in the context of digital transformation, however, according to Ahmadi et al. (2012), if strategies fail it is less likely due to their development, but rather because of their implementation. Based on Warrick (2017), an essential construct for the implementation is involvement, referring to the ability of the company and hence its managers to involve employees in various activities. This is accompanied by decentralised structures, empowerment, group orientation and

development of resources, both in terms of strategy and, above all, the further development and training of existing employees.

There are two main reasons for the need for involvement as part of the organisational culture in the context of digital transformation: Firstly, if employees are not involved in a transformation process, uncertainty, fear, and reactance can result, which can block the entire transformation process (Jost, 2015). Schwertner (2017, p. 392) agrees by stating that the key challenges of digital transformation are “not technologies, but human factors, cultural traditions, employees' resistance to change, lack of relevant knowledge and good practices, lack of adequate resources, lack of motivation and risk taking”.

The second reason, why involvement is considered an important part of digital transformation lies in the increasing complexity of internal organisational dynamics and technological issues. Management alone can no longer understand and embrace all relevant aspects and topics necessary for digital transformation in the traditional sense. For this reason, employees must be involved in decision-making processes with their expert knowledge. Employee knowledge and experience should therefore be seen as a competitive advantage.

2.2.6 Strategy and organisational structure

Another relevant aspect is the connection between strategy and organisational structure. Several studies show that exploration and exploitation require different strategies and organisational structures (Boumgarden et al., 2012). Here, exploration refers to the search for new opportunities, while exploitation revolves around the further development of existing values and competencies. According to this distinction, exploration is associated with a higher degree of "organic structures, path-breaking, and emerging markets and technologies, while exploitation is associated with mechanistic structures, path dependence, and stable markets and technologies" (Zakrzewska-Bielawska, 2016, p. 599).

Based on Libert et al. (2016), strategies that have a disruptive character from previous business, as is characteristic of digital transformations, thus require structures in which knowledge and creativity are promoted and which thus make it possible to break through existing patterns of thought.

With the famous postulate "structure follows strategy", Chandler (1962) describes the necessity for companies to adapt their structures to changing environmental conditions and thus to changing strategies.

He stated that "unless structure follows strategy, inefficiency results" (Chandler, 1962, p. 314). So, if processes are seen as a means, and the goals of digital transformation differ significantly from the previous strategic objectives, other means are now needed to achieve these new goals, and thus a new or adapted organisational structure that regulates the flow of these processes.

The challenge, however, is that digital transformation is a prolonged process, creating tension between the pursuit of new skills, i.e. exploration, and the use and development of existing skills, i.e. exploitation. According to Heracleous et al. (2017), the ability to release this tension, which results from the contradictory strategies and corresponding requirements, namely, on the one hand, to ensure stability, and on the other hand, to generate flexibility, is called ambidexterity. Heracleous et al. (2017, p. 327) state that organisational ambidexterity is “a way for organisations to accommodate the tensions arising from simultaneous exploration and exploitation”. De Clercq et al. (2014, p. 193) point to problem by stating that one the one hand "adaptation, without alignment, can lead organizations into a morass of unrealizable and unrewarding change”, on the other hand, ‘‘too much alignment, without adaptability, ties organizations too tightly to the past."

Basically, there are two possibilities to solve the described tension, namely structural and contextual ambidexterity: In structural ambidexterity, exploration and exploitation are divided into two independent business areas. Exploration structures in particular are informal, risk tolerant and decentralised. However, the problem here is that different exploitation and exploration structures can lead to tensions between the two business units. Especially if this gives the exploitative business unit the impression of being excluded from shaping the future of the organisation. Informal organisational structures should be established despite formal structural differences, since missing mechanisms to link both business areas can lead to interdivisional conflicts within an organisation (Shibata et al., 2018).

The contextual ambidexterity approach means that no separate business areas are necessary for meeting the different requirements of exploration and exploitation. Instead, organisations and workplaces are adapted so that employees can accept the tensions and develop the willingness and ability to participate in the innovation and transformation processes. So, while structural ambidexterity refers mainly to the formal organisation to ensure separately exploration and exploitation, contextual ambiguity focuses on the employee and management, who should be encouraged and enabled to make their own decisions regarding the balance between exploration and exploitation (Siacho & Gkorezis, 2018). Based on Adler and Heckscher

(2013), this employee-centred approach requires, in particular, a participative management style, a decentralised corporate structure, and a corporate culture in which employees and the management are more empowered. based on Teece and Linden (2017) and Bughin et al. (2018), it is therefore a matter of creating the appropriate frame conditions, i.e. an alignment of strategy and structure to become more agile in order to adapt the organisation to a faster-changing and more complex organisational ecosystem.

2.2.7 Strategy and technology

Many authors, such as Pálka and Hajkrová (2015), attach great importance to IT in terms of business strategy since IT systems, such as ERP, CRM, MIS or EIS systems can be used to acquire, collect and evaluate data from the company and its environment. In other words, data is used to generate information and insights that can then be incorporated into strategy development. In this context, the agility of IT is key, since, according to Fink and Neumann (2007, p. 444), it is necessary to "respond operationally and strategically to changes in the external environment through IT".

This results in a triangular relationship between IT, strategy and changing environmental conditions: Due to the latter, constant strategic adjustments are necessary, which means that IT also has to constantly realign itself. A decisive factor in this context is the IT-dependent strategic agility mentioned by Lowry and Wilson (2016). This view of IT as a strategic competitive factor includes the ability of an organisation to react to new market opportunities with the help of existing IT structures and systems, as new market opportunities do not always require a new IT system. The question is therefore how quickly and cost-effectively the existing IT system can be adapted to take advantage of potential benefits resulting from market changes. For example, in the absence of IT-dependent strategic agility, there is a risk that the strategic goal cannot be achieved within the target time through existing technological resources.

For this reason, an experimental handling of IT resources is recommended, in which different scenarios of possible future changes are played out. This, again, points to the importance of continuous exchange between IT and business level and its institutionalisation.

2.2.8 Organisational structure and technology

IT, and in particular ICT, can strongly influence both the degree of centralisation and decentralisation of the organisational structure (Lukić, 2014). The degree of centralisation can increase when the management receives real time information and insights through ICT. However, also the degree of decentralisation can be increased by communicating information transparently across business units and across hierarchies, which enables employees to make independent decisions.

In the context of digital transformation, IT thus plays a major role in the building of networks, and thus for the development of decentralised structures, which, as Cunha and Rego (2010) also emphasise, is crucial in the context of digital transformation. With the help of IT-supported communication, the flow of information between managers and staff is strengthened horizontally, vertically and laterally (Lukić, 2014). IT helps, so to speak, to overcome rigid structures of the formal organisation.

But it is not only the intra-organisational structure that is decisive in connection with IT, but also the inter-organisational structure. According to Joshi et al. (2010) and Roberts et al. (2012), IT is an essential component in building up absorbent capacities to use knowledge and information from the external organisational environment for more efficient and faster innovations. This underlines the importance of open innovation. Intra- and inter-organisational structures influence each other, since the information within the organisation is communicated and processed via the structures of the knowledge acquisition.

Thus, Dong and Yang (2015, p. 114) argue that IT-enabled knowledge partnerships can enhance organisational learning by “the more effective ways of collaboration this allows and the learning that can occur based on previous successful experiences". Tambe et al. (2012) also indicate that companies cannot achieve productive returns on their IT investments unless structures are also established that enable a cross-border, i.e. cross-organisational flow of information. As previously mentioned, however, the strategy influences the organisational structure. So, if strategies in the digital context need to be adapted and changed more frequently and quickly, the organisational structure, and consequently also the IT, must also be adapted so that, for example, the right departments and the right employees continue to be supplied with the right information at the right time. To meet these demands, Lowry and Wilson (2016) discuss the need for IT-dependent information agility that enables access to information despite changes in the organisational structure.

In the context of aligning IT and organisational structure, also IT-dependent system agility is necessary, meaning the ability of the organisation to make necessary changes to information systems with the help of system developments, system implementations, system modifications and system maintenance due to structural changes (Lowry & Wilson, 2016).

2.2.9 Organisational culture and technology

Culture is an essential prerequisite for the efficient use of IT within the framework of organisational processes. Issa and Haddad (2008) state that IT can, for example, facilitate the exchange of information, but first an organisational culture is needed in which employees are motivated and have the trust in the organisation to use these technologies.

In this context, Islam et al. (2015, p. 73) claim that tech platforms can only support the stimulation of knowledge flow; the actual impact on knowledge sharing is “less visible without a proper cultural and organisational context in which people are encouraged to develop and share their knowledge". Also, Lindner and Wald (2011) emphasise that the implementation, use and combination of IT-supported systems helps to transfer tacit knowledge into explicit knowledge, which represents a considerable accelerator for the digital transformation of an organisation. The authors, however, also emphasise the importance of a knowledge culture, since without this being in place, even modern IT systems cannot transform tacit knowledge into explicit knowledge.

So, according to Intezari et al. (2017), in order for knowledge to be understood as a serious driver of digital transformation and to be used efficiently in organisations, an appropriate synthesis with an organisational culture that promotes the use of these systems is required, in addition to suitable IT systems. This includes the central dimensions of promoting intrinsic motivation, creating a culture of error, empowerment, involvement, trust, and transparency. Only then can the added value of such IT systems be recognised, not only for the company, but also for the employees themselves, which leads to proactive suggestions for improving the systems.

Besides IT and culture as a symbiotic unit within the scope of knowledge generation and knowledge sharing, culture is fundamentally decisive for the acceptance and use of IT and thus for its efficiency and success. In addition to the emotional barriers, which arise, for example, from organisational deficit in terms of fear of

loss of power and fear of mistakes as existing routines are broken up, Comelli and Rosenstiel (2003) also define knowledge barriers which can arise through new IT. A lack of knowledge can therefore slow down or even cause the digital transformation to fail (Ćirić & Raković, 2010). So, based on Cambra-Fierro et al. (2017), ongoing IT trainings must be considered as part of the corporate culture.

2.3 Theory

The literature research has led to the assumption that strategy, organisational structure, culture and IT are all drivers of digital transformation and the interaction between these enablers promotes digital transformation.

Derived from these assumptions, the following research questions arise:

- **RQ1**: Does strategy contribute positively to digital transformation?
- **RQ2**: Does organisational structure, in terms of decentralised structures, contribute positively to digital transformation?
- **RQ3**: Does culture contribute positively to digital transformation?
- **RQ4**: Does IT contribute positively to digital transformation?
- **RQ5**: Are there synergies between strategy, organisational structure, culture and IT in digitally transformed organisations?

These research questions will be investigated through a survey of managers and employees, who work at organisations with different levels of digitisation. The details of the study design will be described in the next chapter of this dissertation.

Chapter 3. STUDY DESIGN

3.1 Quantitative survey design and constructs

In order to investigate the aforementioned theory, a quantitative survey was developed. The main objective of the questionnaire was to find out how exactly digital organisations differ from digitised and traditional organisations, in terms of the four main factors: strategy, organisational structure, culture, and IT, and their respective sub-dimensions. The target audience of the study were C-level, managers and employees of these organisations to receive a holistic view. Based on the questionnaire, findings will be derived regarding to what extent the individual factors, as well as their interrelationships, are prerequisites and enablers for digital transformations.

The survey design consists of two data collection sections to qualify and cluster participants, and to collect data for answering the identified research questions:

Section 1:

This contains four questions regarding the respondents and their employer to qualify participants for the survey and to inform the researcher about characteristic properties of the sample:

- Job seniority
- Size of the organisation
- Level of digitisation of the business model
- Level of digitisation of core processes

The data is later also used to evaluate the results in different clusters.

Section 2:

In this main section of the survey, data about the assessment of the four enablers of digital transformation, i.e. strategy, organisational structure, culture, and IT, is collected to answer the research questions. The enablers however must be examined as hypothetical constructs, i.e. the respective constructs cannot be

observed directly and thus cannot be described with a word or a single item. Hence, the four constructs are first operationalised into relevant dimensions and then into respective items:

Construct: Strategy

The STROBE Framework by Venkatraman (1989) is a proven and established tool for surveying of the strategy construct. This framework was adapted for the survey and operationalised in the four dimensions **analysis**, **futurity**, **proactiveness** and **riskiness**. These four dimensions are further operationalised with two items each.

One item of the dimension futurity, for instance, reads: “We often conduct ‘what if’ analyses of critical issues”. The dimension analysis was identified as a connection between strategy and IT and serves as an indicator of level of integration between these two enablers.

Construct: Organisational structure

The literature review showed that the degree of decentralisation was decisive for the innovative ability of a company, hence the construct of organisational structure is operationalised into the dimension of **decentralisation** and translated into two items. The measurement scale developed by Ferrell and Skinner (1988) was adapted for this survey. One exemplary item is: “Little action can be taken until the management has approved it.”

Construct: Culture

According Denison and Neale (1999), the construct culture can be operationalised into the four dimensions **adaptability, consistency, involvement** and **mission**. Each of these four dimensions are expressed in two items. Since this study surveys managers as well as employees, the original Denison survey method was adapted to reduce potential bias. An example for the operationalisation of the dimension mission is: “We have a shared vision of what this organisation will be like in the future.”

The dimension adaptability was identified as a connection between culture and organisational structure and serves as an indicator of level of integration between these two enablers.

Construct: IT

Based on the literature review, IT can drive various dimensions of an organisation: the ability to innovate is connected to a high degree of IT-related agility, strategy development processes can be supported through strategic analytics, and IT can play a key role as vertical and horizontal communication enabler and facilitator. Hence, the IT construct is operationalised in the three dimensions **agility**, **communication** and **analysis**, and these are further translated into two items each.

The latter dimension, i.e. analysis, was identified as a connecting aspect between strategy and IT, indicating the integration level of these two drivers. One example for surveying the dimension agility was: “Our IT systems can be quickly adapted to new business requirements.”

Connecting enablers: strategy & culture, strategy & structure, IT & culture

In order to measure the level of integration between the above-mentioned enablers, additionally two items per connection were constructed. This part is measuring the respondents’ assessment of the systemic perspective.

Survey scales

All survey questions of section 2 used Likert scales to measure responses. A characteristic feature of a Likert test is the formulation of several judgmental statements that the person can agree or disagree with using a scale. The respondents can usually answer the corresponding items of the Likert type on a response scale consisting of 5, 7 or 11 characteristic values. The middle answer is representative of the answer "don't know".

Since, according to Wu (2007), the most common Likert scale has five levels ranging from strongly disagree, disagree, neither agree nor disagree, agree and strongly agree, these five levels were also used in the questionnaire to measure the acceptance of the managers regarding their consideration of strategy, structure, culture, and IT as drivers of digital transformation.

Validation of the survey

Before the survey was officially launched, it went through a pre-test. For this purpose, three people that matched the described characteristics of the test subjects were presented with the questionnaire and checked for the following criteria using the "think aloud" method:

- Are the questions understandable in terms of content and language?
- Are the questions acceptable?
- Are there any missing or inappropriate answers?
- Are there redundant questions?
- Does the structure and sequence of the questions make sense?
- Does the scale make sense and is it sufficiently differentiated?
- Are there any other questions or ideas?

Based on the results of this pre-test, items were further elaborated and partly linguistically modified. A key realisation was that the original number of items was too high, and thus each dimension of each construct was only operationalised with the help of two items.

Additionally, as presented in the literature review, the constructs are partly dependent on each other, hence special attention was paid during the survey design that constructs are clearly separated from each other for the operationalisation.

3.2 Survey setup

The survey was set up on Google Forms and administered online. The survey participants were invited to take part through email outreach, LinkedIn and the website of strategie-spektren.de. The questionnaire was focussed on managers and employees of organisations based in Germany and was hence translated into German.

After informing participants about the research goal and collecting consent, participants declared their job seniority, size of the organisation, and level of digitisation of the business model and core processes.

In the following section 2 of the survey, participants indicated their level of agreement on a five-point Likert scale from “strongly disagree” to “strongly agree” on 28 statements covering all above-mentioned constructs.

Chapter 4. RESULTS AND EVALUATION

4.1 Characteristics of the survey participants

The survey was answered by a total of 80 participants. As part of section 1, all participants declared their job seniority (C-Level: 7 respondents; Managers: 28 respondents; Employees: 45 respondents) and the size of their organisation (>250 employees: 52 respondents; <250 employees: 28 respondents). Table 1 below shows a cross tabulation of job seniority and company size.

Table 1 Cross-tabulation of job seniority and company size

		Company Size		Total
		over 250	under 250	
Job seniority	**C-Level**	1	6	7
	Manager	20	8	28
	Employee	31	14	45
Total		52	28	80

The respondents also specified the degree of digitisation of the business model (primarily digital business model: 38 respondents; primarily traditional business model: 42 respondents) and the core processes (primarily digital core processes: 55 respondents; primarily analogue / traditional processes: 25 respondents). Table 2 below contains a cross tabulation of the different levels of digitisation of the business model and core processes.

Table 2 Cross-tabulation of business model and core processes

		Core Processes		Total
		traditional	digital	
Business Model	**traditional**	25	17	42
	digital	0	38	38
Total		25	55	80

For analysing the different levels of digitisation of the organisations, the latter two characteristics were combined to create three groups, i.e. digital business model and digital core processes (“digital”: 38

respondents), traditional business model and digitised core processes (“digitised”: 17 respondents), and finally traditional business model and analogue core processes (“traditional”: 25 respondents).

4.2 Statistical methods

As part of the statistical analysis of the survey, a number of methods was used to derive meaningful insights. Individual items were analysed in regards to their descriptive statistics and group differences in responses based on the level of digitisation. The constructs derived from the literature were tested for their validity and internal consistency. Finally, rank correlations were conducted to specify the influence between the constructs and the level of digitisation. Both Microsoft Excel and IBM SPSS Statistics software were used in order to run the aforementioned tests and to visualise the results.

4.2.1 Statistical investigation on item level

In order to analyse whether the level of digitisation of an organisation had an impact on the 28 surveyed items, first the most suitable statistical test had to be identified. There is an ongoing debate in academia whether the data from Likert questionnaires should be investigated through parametric or nonparametric methods. Based on the findings of de Winter and Dodou (2010) and the risk of Type I and Type II errors with the sample size of this survey, nonparametric procedures were recommended.

The actual data of the survey was however also tested regarding its distribution. To facilitate a clear overview of the survey data, Table 6 shows the relevant descriptive statistics of the 28 items, including the mean, standard deviation, as well as skewness and kurtosis statistics. When dividing the skewness statistic through the standard error of .269, five items showed significant asymmetry of the distribution ($\wp < .05$); Items 1, 2, 3, 5 and 21 were skewed to the left. The kurtosis statistic, which indicates the heaviness of the tails, when divided through the standard error of .532, showed that five items had non-normal heaviness of the tails ($\wp < .05$): Item 1 was fat-tailed, while Items 9, 10, 11 and 23 were thin-tailed (Idre, 2018). These findings indicated that for all following analysis using statistical tests that do not require normal distributions would be required.

Hence, the Kruskal-Wallis H test was conducted to determine if the variable “level of digitisation” had an effect on the ordinal variable, i.e. the level of agreement on the 28 different statements in the questionnaire.

The test formula was corrected for ties in the ranking of the data, and hence the reported H values include this adjustment. Due to the large sample size for this specific test, the chi-square distribution (χ^2) with the appropriate degrees of freedom was used to determine the significance of the test, instead of the critical H values table. Furthermore, epsilon square (ε^2) is provided as an indication of effect size.

When the Kruskal-Wallis test returned a significant result, meaning at least one group stochastically dominated the other group (Kruskal & Wallis, 1952), a pairwise Mann-Whitney U test was employed as post-hoc test to locate for which pairs this difference occurred, so for example regarding the level of digitisation of the organisation: *traditional vs. digital, traditional vs. digitised, and digitised vs. digital* (Conover & Iman, 1979).

To summarise the findings, 26 of the 28 items returned a significant result of the Kruskal-Wallis test, meaning there were statistically significant differences between the groups based on the level of digitisation ($p < .05$). The vast majority of items was hence well-suited to discriminate between the groups.

The subsequent pairwise Mann-Whitney U test then provided where those differences where located: 26 items returned statistically significant differences between the groups of *traditional vs. digital* organisations, 13 items between *traditional* and *digitised*, and 10 items between *digitised* and *digital*. Overall, these results indicate that differences between organisations become smaller with increasing level of digitisation.

The detailed results of the Kruskal-Wallis test and Mann-Whitney U tests are enclosed in Appendix B.

In Appendix D of this dissertation, the detailed results for each of the 28 items are described, visualised, and analysed to provide further insights.

The survey data was also checked regarding potential influences through the different job seniority of the respondents and sizes of the organisation, but as some of the combinations between those characteristics and the level of digitisation were very small in this sample ($n < 5$), these group differences were disregarded in the further analysis.

As described in chapter 3, the survey was designed to include items from the different dimensions and connectors of the constructs to cover all their facets, but due to the necessary reduction in items overall, based on the pre-test, the individual dimensions could not be analysed separately, but were of course part of the overall construct level analyses, which will follow in the next section.

4.2.2 Statistical investigation on construct level

A confirmatory factor analysis was also conducted to test whether the data of the 28 manifest variables could be reduced to the previously identified latent variables (Idre, 2018), i.e. in the case of this dissertation the four constructs of strategy, organisational structure, culture and IT. All responses could be used in the factor analysis, since there were no incomplete data on variables in the sample, hence the number of cases was n = 80.

In the factor analysis, the individual item loadings on the factors are investigated to check for homogeneity of measuring one construct; Items 5 and 7 were removed as they did not correlate significantly with the other items of the strategy construct.

Based on Idre (2018), all factors fulfilled the minimum suggested requirement on the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO > .6), and strategy, culture, and IT scored very well with values of KMO > .8 and above.

Also, all four factors returned a significant result ($\wr$ < .001) of Bartlett's test of Sphericity, hence the null hypothesis that the correlation matrix equals an identity matrix could be rejected (Idre, 2018).

Furthermore, Cronbach's Alpha was calculated as the coefficient of reliability, measuring the internal consistency of the items in the groups, and hence the scale reliability. Item 8 was deleted on the strategy construct to improve Cronbach's Alpha. This resulted in all four constructs showing acceptable (α > .70) to high values for Cronbach's alpha (Idre, 2018).

Based on these analyses, all four constructs could be confirmed with the following results as shown below in table 3. By reducing the data of the items into four constructs the explained variance was still satisfactory given the subject matter (Hair et al., 2016). The single factors still explain .58 to .65 of the variability in the original items. For detailed results of the factor analysis including the component matrix, please refer to Appendix C.

Finally, a Spearman correlation was run to rank correlate the constructs with the level of digitisation to assess their respective relationships. All four constructs correlated significantly ($\wr$ < .001); two constructs, i.e. strategy and culture, with moderate, positive correlations and two constructs, namely IT and

organisational structure with strong, positive correlations (ρ_s > .60). The highest correlation to the level of digitisation was with organisational structure, followed by IT, culture and strategy.

Table 3 Factor analysis with relevant statistical indicators

	Items	KMO	Explained Variance	Cronbach's Alpha	Spearman's rho with level of digitisation
Strategy	1, 2, 3, 4, 6, 23	.826	.581	.853	.491
Organisational Structure	9, 10, 25, 26	.625	.597	.775	.649
Culture	15, 16, 17, 18, 19, 20, 21, 22, 24	.922	.617	.920	.570
IT	11, 12, 13, 14, 27, 28	.819	.654	.894	.602

After confirming the factors, some additional analyses were conducted to allow a clearer interpretation of results and derivation of the proposed framework, which will be explained in chapter 4.3.

First, a rank correlation using Spearman's test was conducted between all four constructs, resulting in four strong, positive correlations and two very strong positive correlations (r_s > .80). The strongest correlation was between organisational structure and culture. All correlations were significant (ρ <.001) and are displayed in table 4 below.

Table 4 Spearman's rank correlations between factors

	Strategy	Structure	Culture	IT
Strategy		.720	.729	.685
Structure	.720		.855	.797
Culture	.729	.855		.819
IT	.685	.797	.819	

Second, the means of the constructs by level of digitisation were calculated to indicate the development status within the different areas of interest. Higher values indicated a more advanced development in terms of digitisation. Table 5 shows the results: digital organisations scored highest across the board, followed rather closely by digitised organisations and with considerable space by traditional companies.

The biggest delta between digital and traditional companies overall with 1.5 was on the structure construct, followed by 1.3 on IT, and strategy and culture with both 1.1. Digital and digitised companies scored much closer with only .2 difference on strategy and .6 on the other three constructs. These results are hence in line with the results on item level and indicate that differences between organisations become smaller with increasing level of digitisation.

Table 5 Means of constructs by level of digitisation

	traditional	digitised	digital
Strategy	2.8	3.7	3.9
Organisational Structure	2.1	3.1	3.7
Culture	2.8	3.3	3.9
IT	2.5	3.2	3.8

4.3 Answering of Research Questions and Framework

RQ1: Does strategy contribute positively to digital transformation?

From the research results, it can be deduced for RQ1 that there is a positive contribution, in terms of a positive correlation, between strategy and the level of digitisation (.491). This correlation is reflected, above all, in the fact that digital companies, in comparison to traditional companies, are significantly more likely to be using data-based analyses (see Item 2) and corresponding IT systems as the basis for their strategic processes (see Item 1). The differentiation becomes apparent, for example, in the IT-based analysis of the business environment in order to be able to adapt the strategy on the basis of the gained information and insights. The high correlative relationship (.685) between IT and strategy can thus be explained with the data-driven analyses as part of the strategy development process and the IT systems required for this process.

This approach can be seen as a prerequisite for gaining a more concrete understanding of a changing business environment, hence a futurity view (see Items 3 and 4), with which previous routines and corresponding thought patterns can be broken. Digital companies also scored significantly higher on proactiveness and thus usually being the first to induce new services, products, or brands to the market (see Item 6). A further difference between digital and traditional companies, in the context of strategy, is the

involvement of employees in the corresponding strategy processes of the company. Digital companies, for example, offer their employees more opportunities to pass on strategic ideas to management (see Item 23). For this reason, there is not only a positive correlative relationship between strategy and IT, but also between the factor culture (.729).

RQ2: Does organisational structure, in terms of decentralised structures, contribute positively to digital transformation?

RQ2 can also be answered positively in favour of the structure as a strong contributor to the level of digitisation (.649). In fact, organisational structure had the highest correlation with the degree of digitisation of all four factors. The organisational structure of digital enterprises is characterised by a much greater degree of decentralisation than that of traditional enterprises, which have much more centralised structures (see Items 9 and 10).

This is particularly evident in the greater degrees of freedom that digital workers enjoy, as their work is less dictated by rules and regulations (see Item 9), and more decisions can be made without supervisors having to review and approve every single step (see Item 10). The results also indicate that the structures of digital companies are less formal, e.g. strategic management is actively seeking cross-departmental insights (see Item 25).

Another major difference is the agility of the organisational structure, not only in terms of its generally lower degree of formal structure in digital companies, but also because the structures tend to be adapted more easily, when required by new strategic decisions (see Item 26), hence the relationship between structure and strategy is also strongly positive (.720).

RQ3: Does culture contribute positively to digital transformation?

Since there is also a clear positive relationship between culture and the level of digitisation (.570), RQ3 can also be affirmed positively. As the data analysis has shown, the corporate culture in digital companies promotes cross-departmental learning and communication more strongly than in traditional companies (see

item 15). Taking this together with a stronger capability in adapting to competitors and other changes in the external business environment (see item 16), explains the strong link between culture and structure (.855), which can be traced back to the powerful interaction that a less formal, and decentralised corporate structure can have with the corporate culture, in terms of allowing the necessary freedom for people to form interdepartmental communication networks. In terms of involvement, digital companies also scored significantly higher in feeling part of a team and acting on one's own by delegating sufficient authority (see items 17 and 18). Digital companies also championed in having a clear mission that gives meaning and direction to the employees' work and having a shared vision about the organisations' future (see items 19 and 20). In regards to consistency, digital organisations also scored significantly higher than traditional organisations in sharing a common perspective across different organisational units and having a clear and consistent set of values that governs the way to do business (see items 21 and 22 respectively). Digital organisations also excelled over traditional companies in terms of prompt acceptance of strategic changes by the employees (see item 24), which can in part explain the high positive correlative relationship between culture and strategy (.729).

RQ4: Does IT contribute positively to digital transformation?

There is a strong positive, correlative relationship between IT and the level of digitisation (.602), thus the response to RQ4 is also affirmative. IT systems are used much more frequently by digital companies to enable and effectively promote interdisciplinary work, the exchange of knowledge, and communicating transparently (see items 11, 12 and 28 respectively). IT systems allow a more decentralised structure to function effectively, hence this helps in explaining the very high correlative relationship between IT and structure (.797).

Digital companies also showed a significantly higher propensity to adapt IT systems to the wishes and requirements of its employees (see item 27). For this reason, there is also a high correlative relationship between the two factors IT and culture (.819). There is also a relatively strong effect on the agility of IT systems, as digital enterprises can adapt their systems to new requirements more quickly than traditional companies (see item 13). This is also visible in the capacity to promptly provide all required data to employees (see item 14).

RQ5: Are there synergies between strategy, organisational structure, culture and IT in digitally transformed organisations?

By answering research questions RQ1 to RQ4 and considering the correlations shown in Tables 4 and 5, RQ5 can also be positively answered as to whether there are synergies between strategy, organisational structure, culture and IT in digitally transformed organisations.

The influences of the four factors strategy, organisational structure, culture and IT, as well as the synergies between these four factors, are presented in figure 1 below:

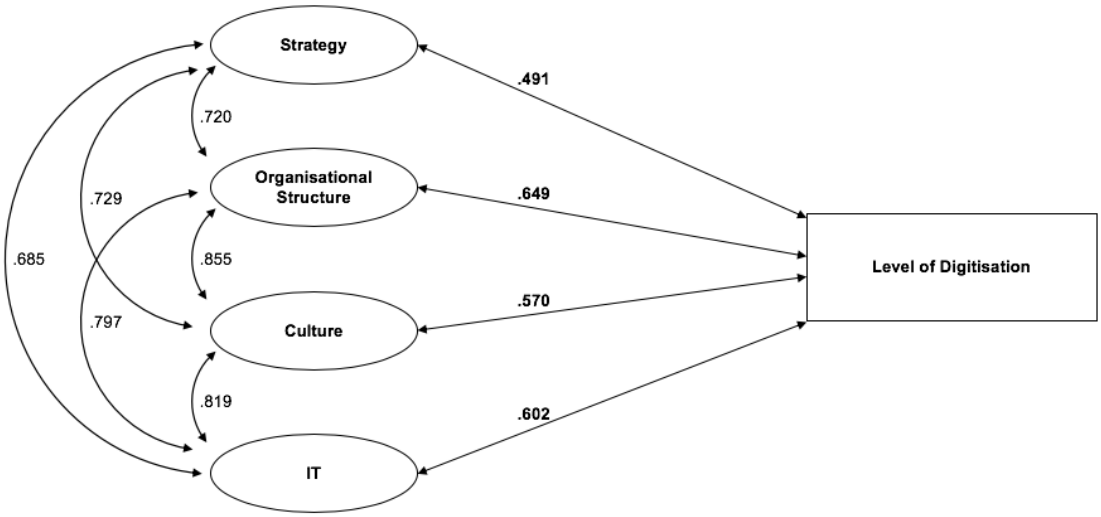

Figure 1 Framework of factors and level of digitisation incl. Spearman's correlation coefficients

The framework displays the connections between the level of digitisation and the four factors strategy, organisational structure, IT and culture, as well as the synergetic connections between these four factors.

The aim of figure 2 is enhancing the understanding of the factors (highlighted diagonal cells) and providing recommendations for improving the interplay of two factors with each other and hence promote a higher level of digitisation.

	Strategy	Structure	Culture	IT
Strategy	Consider strategy as a data-driven process that includes the business environment and a bottom-up flow of information.	Enable bottom-up information flow as part of the decentralised organisational structure to include more perspectives in the strategy process.	Include also lower level employees in the strategy process by promoting the passing of ideas and information to the management.	Select and implement IT systems to perform internal and external data-driven analysis.
Structure	Enable bottom-up information flow as part of the decentralised organisational structure to include more perspectives in the strategy process.	Decentralise the structure in order to achieve a high density of networking with a corresponding increase in diversity and transparency.	Develop a common value and norm system, create transparency, and empower employees, along with reducing rules and regulations to enable an effective decentralised corporate structure.	Select and implement IT systems that enable the flow of information across departments and hierarchies.
Culture	Include also lower level employees in the strategy process by promoting the passing of ideas and information to the management.	Develop a common value and norm system, create transparency, and empower employees, along with reducing rules and regulations to enable an effective decentralised corporate structure.	Develop a culture with a focus on common values and norms, a common vision, empowerment, error tolerance, and a relatively low level of restrictive rules and regulations.	Include employees in the requirements definition of IT systems. IT systems are not efficient without a culture that gives employees the freedom to act and be creative, and that encourages the sharing of knowledge and information.
IT	Select and implement IT systems to perform internal and external data-driven analysis.	Select and implement IT systems that enable the flow of information across departments and hierarchies.	Include employees in the requirements definition of IT systems. IT systems are not efficient without a culture that gives employees the freedom to act and be creative, and that encourages the sharing of knowledge and information.	Use IT systems to enable cross-departmental and cross-hierarchical information flows and knowledge exchange as well as data-driven internal and external analyses, with a high degree of IT-based information and system agility.

Figure 2 Understanding of constructs and guidelines for advancing their interplay

4.4 Discussion and Recommendations

In the context of digital transformation, many companies still see technologies not as a component in a systemic view with other enablers, but rather as an aspired isolated business solution. Through analysing not only IT, but also the relevance of strategy, structure and culture as organisational enablers for digital transformation, this dissertation draws attention to approaching the digital transformation from a systemic point of view, i.e. digital transformation is not a question of IT alone, but can only be tackled through the interplay of internal organisational aspects, also including strategy, structure and culture.

The results of this study show that in traditional companies, i.e. those that have neither a digital business model nor digital core processes, the factors strategy, structure, culture, and IT all score relatively low compared to digital companies. Traditional companies exhibited a strong tendency for centralised structures, which is why networks, diversity, and transparency can hardly evolve there, and consequently also the scope for innovation that could facilitate digital transformation. In addition, traditional companies realised only low values on their corporate culture, which was indicated by unclear values and visions, and by a lack of communication, transparency, cross-functional learning and collaborative work. Finally, also IT was neither sufficiently utilised for open communications across hierarchies or organisational silos, nor for knowledge management, or the development of decentralised organisational structures.

On the other hand, and in contrast to traditional companies, digital companies are characterised by high values in the four factors strategy, structure, culture and IT. Striking are the high values indicating a strong decentralised corporate structure, as well as a culture characterised by common values and a common vision. The results also indicate, in line with the literature research, that strong relationship between IT and culture enables the employees to communicate and share knowledge across the organisational units, which could not happen successfully if only the IT systems were in place without the appropriate corporate culture promoting the exchange, and vice versa.

The statement of Main et al. (2018) that "digital transformation is not just about technology" is thus confirmed by the results of the study. So, the findings of the survey indicate that digital organisations build strong networks within their organisations compared to traditional companies, and thus have more diversity and transparency, which can be seen as a basis for breaking through existing stable patterns. Above all, this design of networks is made possible by less regulations and rules, by more decentralised structures, by a common vision and common value and standard systems, by empowerment and involvement of employees, as well as by IT systems that enable cross-departmental and cross-hierarchical flow of information, data analysis, and also by the strong integration of internal and external information flows into strategy processes.

Hence, the findings of this study convey an understanding of the necessary systemic connection between strategy, structure, culture and IT, and suggest that, in order to develop a corresponding self-organising system, as part and driver of digital transformation, these factors must not be viewed in isolation from each other.

Yet, even if companies have a great desire for successful digitisation, often combined with the unrealistic wish that the transformation should not be accompanied by uncertainties and risks, there can be no universally applicable, precise and clear guidance for a successful digital transformation (Bain & Company, 2015). This is, of course, partly due to the specific and complex conditions of each individual company and its individual internal and external organisational conditions. Above all, however, this complexity is accompanied by unforeseeable conditions within the scope of digital developments.

Similar to how this dissertation questions target setting, in terms of projecting measures based on present conditions into the future in times of digitisation, frameworks that refer to today's situation are just as inappropriate to serve as a precise recipe for mastering a future digital transformation.

Exactly for this reason, the results of this work are to be understood, from a business point of view, as a broadening of understanding for the fact that the organisation must not be presumed as an instrument with which products, processes, services, or the entire business model can simply be digitised, but that the organisation itself must be subjected to a digital transformation in the systemic sense, in order to be able to create the prerequisites for being able to use technology effectively as a business solution.

This maxim can be illustrated with the famous quote by Antoine de Saint-Exupery: "If you want to build a ship, don't drum up people to collect wood and don't assign them tasks and work, but rather teach them to long for the endless immensity of the sea" (Cottmeyer, 2016, n.p.). A descriptive example that underlines this importance is the analogy to Christopher Columbus, who set off with his ship to find a faster route to India, without even knowing whether such a route existed. Movement was the only possible determinable destination, and the belief in a faster route was the driving fascination, what corresponds to the vision. Visions are not to be confused with goals, and it is known that Columbus did not reach India despite his intentions, but he discovered a new world, even without having any plan to do so.

What does this mean for companies in the context of digital transformation, especially against the background of the gained findings of this dissertation? The disruption of the existing system is a necessary prerequisite for the success of changes, and thus for the success of a digital transformation. Existing stable patterns must be broken up in favour of the dynamics of a self-organising company. Because stability and order, to which systems by their nature always strive for, render the system or company incapable of action,

while only instability gives the company the necessary degrees of freedom for enabling creativity, innovation, change and thus digital transformation.

This means, in concrete terms, that companies must accept, and not oppose disturbances arising in the course of digital transformation, as basic impulses for action. Disruptions must be facilitated by networks in decentralised structures, a supportive corporate culture based on transparency, shared values, and a shared vision, and IT systems that enable horizontal and vertical exchange of information and knowledge.

This also means that the corresponding costs, associated with digital transformation, must also be accepted. This includes, in addition to traditional costs, such as those arising from new IT systems and personnel, also opportunity costs.

Since, as described above, in the course of digitisation, which is a complex and unstable system for a company, target values cannot be planned in the same way as in a simple and stable system. It is for this very reason that a culture of error is needed that enables the company to try out creative processes and ideas, even when expected returns are not certain. Existing patterns that have become established through predominating thought patterns, formal structures, operative routines as well as strict rules and regulations, must therefore be actively destabilised, otherwise a transition to a new pattern is not possible and hence also no digital transformation.

Values, visions, and emotional connections with the organisation can be seen as prerequisites for being able to break through existing patterns, since these factors act as a driving force for change. It is important that these are not just internal "slogans" without any substance, but that these values and visions are communicated so concretely, officially and transparently that they represent a clear orientation for the actions of the company and thus for the actions of each individual employee.

For the effectiveness of a self-organising company, i.e. for the ability of the organisation to develop its own dynamics, the involvement of the employees is a prerequisite. This means not only empowerment, but also active exchange, which is the most important characteristic of a network. For traditional companies, this leads to the recommendation to shift focus from building up and maintaining formal organisational structures, to enabling decentralised and informal structures. Employees must be given more responsibility and more freedom to creatively integrate themselves into strategic solution processes. From the management, this requires a renunciation of the self-image of an omniscient leader, who has more

knowledge and insight than his employees, at any time and on any subject. Different opinions and perspectives must not only be accepted, but also encouraged, in favour of disrupting existing patterns, even when it comes to the fixed pattern of one's own self-image.

IT systems also play an important role in setting up decentralised networks: For example, companies should use IT systems that enable employees to communicate their expert knowledge across departments. This means that the flow of information must not be based on the formal organisational structure, but on when and where the need for information arises, so that every employee can always receive the information whenever and wherever he or she needs it.

This also implies that corresponding IT systems must not only serve the pure direct exchange of information, but also the storage and sharing of explicit and implicit knowledge, as part of a learning organisation. Especially for this, a corporate culture is necessary in which employees receive the security and emotional incentives in order to share their knowledge openly. A clear vision and a commitment to common values are just as much a prerequisite for this as a lived culture of error and corresponding leadership behaviour.

Hence in order to create the organisational prerequisites for a digital transformation, neither the mere isolated development of a corresponding corporate culture nor the mere isolated implementation of corresponding IT systems is sufficient, but both factors need to be regarded as synergistic. In addition to this synergistic relationship between IT and culture, IT-dependent system agility must also be considered, since strategic and structural changes can also change the demand for information, and despite these dynamic changes it must be ensured that employees and departments always have efficient access to the information they need.

IT-dependent system agility hence refers to the organisation's ability to make necessary changes to information systems with the help of system developments, system implementations, system modifications and system maintenance. From this, the necessary interlocking of IT, business and HR strategy is derived, as well as the fundamental question of the right sourcing strategy.

Chapter 5. CONCLUSIONS

5.1 Lessons Learned

Already in an early phase of literature research, the focus was placed on the view of the systems theory. Instead of viewing digital transformation and IT as isolated business solutions, this view has proven to be suitable way for understanding the matter as a holistic organisational principle. In this holistic principle, or in this systemic approach, IT does not lose its unique significance through the consideration of further factors, but equally this unique significance of IT does not diminish the equally high significance and necessity of the other organisational factors, as discussed in chapter 4.4.

Hence, one of the central learnings was therefore the apprehension of the systemic understanding of an organisation, and that an organisation is thus the solution of a digital transformation, and not only the tool with which the digital transformation can be initiated and carried out.

This theoretical understanding was confirmed through the conducted study, and thus deepens the understanding of the necessity of a combination of IT and business, which in many traditional companies are still regarded as two isolated areas.

5.2 Academic Application and Limitations

Previous studies on the subject of digital transformation have focused primarily on the investigation of individual factors, such as the technological level, the employee level or the management level. The investigation within this dissertation however examined several factors simultaneously from a systemic point of view and hence at the same time looked into their interrelationship with each other.

In order to do so, existing frameworks for the individual constructs were adapted and questions were fitted to the context of digital transformation. Besides two items, 26 items proved significant in discriminating between the different levels of digitisation, hence this survey design can lend itself to future research within this field.

In addition, the results of this study make it possible to deduce additional questions for future academic work, such as how, beyond the context of the individual factors, the factors in their interaction affect the success of a digital transformation.

Also, the developed framework builds a basis for prospective research, for example, in an international setting.

A meaningful limitation of the study is the lack of explaining the exact causal relationships between the level of digitisation and the four factors strategy, structure, IT and culture. Although the reported rank correlations suggest that there are strong relationships between the individual factors, the nominal and ordinal data of this study was inapplicable to parametric statistical methods such as multivariate regression. These methods would be required however to examine questions such as how does strategy, organisational structure, culture, and IT directly influence the level of digitisation, or how does IT, for instance, influence the strategy or structure of a digitised organisation?

Finally, a further limitation in the results is the sample size of n = 80. While running the factor analysis was computationally possible, the technique is typically recommended, when higher number of cases are available to stabilise the results (Idre, 2018). Within the scope and timeframe of this dissertation and due to the lack of funding for the research, obtaining a larger sample was however not feasible.

5.3 Business Application and Limitations

Concrete guidelines for promoting the interplay of individual factors have already been presented in Figure 2 and discussed in chapter 4.4. From a practical point of view however, the question arises as to how the digital transformation can be started, if all factors are interrelated and interdependent, but with the systemic connection still missing at the beginning of the transformation this will cause the attempt to transform the organisation to fail? So, for instance, how can a factor such as strategy be developed if it is dependent on culture, while culture in turn is dependent on strategy or IT?

Due to the particularly strong connection between organisational structure and culture, the development of these two factors should be placed at the beginning of the transformation process. This means that the norm and value system should be reviewed first, and to what extent these value and norm systems are

internalised and understood by the employees, or whether such value and norm systems exist at all. This is important since corresponding values and norms influence the degree of involvement, which in turn affects the willingness to learn informally as well as the willingness to communicate and to share knowledge - all components of an informal and thus decentralised structure.

Also, the existence of clear visions, which can serve as a driving force and orientation for an organisation and its employees, should also be verified. It is also crucial to clarify the question of how high the degree of freedom is with which employees can act and decide without the superior having to control and approve every single step. This is also accompanied by a clarifying examination of the extent to which rules and regulations restrict the work of employees to such an extent that they have little room for thought or action. A precise recording and examination of the corporate culture also serves as a basis for a critical self-reflection of management and leadership behaviour.

The definition of a sound norm and value system, as well as the development of a common sustainable vision should take place together with the employees, instead of a top-down approach by the management. Because if the values, norms and vision are not co-developed by the employees, then they may not support them. This should be avoided, since it is the values, standards and vision that give employees and departments autonomy and creative scope for action. The elimination or reduction of rules and regulations alone does not offer the creative scope of a self-regulating network, but only in connection with common values, standards and a common vision.

Against this background, the formal organisational structure must be reviewed, in order to find an answer to the extent to which the formal organisational structure permits or does not permit the cross-departmental exchange of knowledge and information, and to what extent the flow of information runs in both directions, i.e. both bottom-up and top-down. As stated above, such a more decentralised structure is an important prerequisite for ensuring that the corporate culture, which promotes the formation of a network, and thus diversity and creativity, receives its physical development structure.

IT systems play an important role in the flow of information, both in terms of informal exchange, storing, sharing and making knowledge accessible, and in the bottom-up flow of information as part of the strategy process. Employees and management both need to be considered equally, when defining appropriate IT system requirements.

Ultimately, all measures must aim to increase the density of the network within the organisation. This cannot be accomplished through only the strategy, only the structure, only the culture or only the IT - it requires that all factors that are connected in a synergistic way. The greater the density of networking in a company, the better it is able to adapt to the new framework conditions resulting from digitisation, to regulate itself, and to process the digital transformation. Everything that fosters network building is part of shaping a culture of digital transformation.

5.4 Prospects for Future Research

Although the relationship between strategy, organisational structure, culture, and IT with the level of digitisation has been pointed out, as well as the systemic link between the four factors, future research must examine how precisely these factors, and their respective characteristics, affect the success of a digital transformation. The difficulty of such research will be to operationalise the variable “success” accordingly, as success depends strongly on different components, such as industry, company size, cost structure, and competitive environment. This also means that corresponding homogeneous segments must be examined.

In addition, future research should also be carried out in an international setting, in order to investigate whether cultural or social influences impact the readiness and ability of digital transformations in the corporate context.

REFERENCES CITED

Adler, P., Heckscher, C. (2013) *The Collaborative, Ambidextrous Enterprise*. Universia Business Review, (40), pp. 34–51.

Ahmadi, S., Salamzadeh, Y., Daraei, M., Akbari, J. (2012) *Relationship between Organizational Culture and Strategy Implementation: Typologies and Dimensions.* Global Business & Management Research, 4 (3/4), pp. 286-299.

Ale, M., Toledo, C., Chiotti, O, Galli, M. (2014) *A conceptual model and technological support for organizational knowledge management.* Science Of Computer Programming, 95 (1), pp. 73-92.

Arévalo, B. Esperanza, L. (2016) *The absence of response of organizations to changing business environment conditions: a complex management problem*. Pensamiento & Gestión, (41), pp. 13–35.

Azhari, P., Faraby, N., Rossmann, A., Steimel, B., Wichmann, K. S. (2014) *Digital Transformation Report 2014*. neuland digital vision & transformation, pp. 1-156.

Bain & Company (2015) *Global Digital Insurance Benchmarking Report 2015.* [online] Available at: https://www.bain.com/insights/global-digital-insurance-benchmarking-report-2015/ [Accessed 7 Nov. 2018].

Bleicher, J., Stanley, H. (2016) *Digitization As A Catalyst For Business Model Innovation A Three-Step Approach To Facilitating Economic Success*. Journal Of Business Management, 12, pp. 62-71.

Boumgarden, P., Nickerson, J., Zenger, T. (2012) *Sailing into the wind: Exploring the relationships among ambidexterity, vacillation, and organizational performance*. Strategic Management Journal, 33 (6), pp. 587-610.

Bughin, J., Catlin, T., Hirt, M., Willmott, P. (2018) *Why digital strategies fail.* McKinsey Quarterly, 1, pp. 61-75.

Cambra-Fierro, J. J., Centeno, E., Olavarria, A., Vazquez-Carrasco, C. (2017) *Success factors in a CRM strategy: technology is not all.* Journal of Strategic Marketing, 25 (4), pp. 316-333.

Chandler, A. D. (1962) *Strategy and Structure: Chapters in the History of the American Industrial Enterprise*, Cambridge, MA: MIT Press.

Chen, C., Huang, J., Hsiao, Y. (2010) *Knowledge management and innovativeness: the role of organizational climate and structure*. International Journal Of Manpower, 31 (8), pp. 848-870.

Cianni, M., Steckler, S. (2017) *Transforming Organizations to a Digital World. People & Strategy*, 40 (2), pp. 14-19.

Ćirić, Z., Raković, L. (2010) *Change management in information system development and implementation projects.* Management Information Systems, 5(2), pp. 23-28.

Comelli, G., von Rosenstiel, L. (2003). *Führung durch Motivation. Mitarbeiter für Organisationsziele gewinnen* [in German]. 3rd ed. Munich, Germany: Vahlen.

Conover, W. J., Iman, R. L. (1979) *On Multiple-Comparisons Procedures.* [online] Available at: https://permalink.lanl.gov/object/tr?what=info:lanl-repo/lareport/LA-07677-MS [Accessed 14. Oct. 2018]

Costanza, D., Blacksmith, N., Coats, M., Severt, J., DeCostanza, A. (2016) *The Effect of Adaptive Organizational Culture on Long-Term Survival*. Journal Of Business & Psychology, 31 (3), pp. 361-381.

Cottmeyer, M. (2016) *Longing for the Endless Immensity of the Sea - LeadingAgile.* [online] Available at: https://www.leadingagile.com/2016/01/longing-for-the-endless-immensity-of-the-sea/ [Accessed 9 Nov. 2018].

Cunha, M., Rego, A. (2010) *Complexity, simplicity, simplexity.* European Management Journal, 28 (2), pp. 85-94.

De Clercq, D., Thongpapanl, N., Dimov D. (2014) *Contextual ambidexterity in SMEs: the roles of internal and external rivalry.* Small Business Economics, 42 (191 - 205), pp. 191 - 205.

De Winter, J., Dodou, D. (2010) *Five-Point Likert Items: t test versus Mann-Whitney-Wilcoxon*. Practical Assessment, Research & Evaluation, 15 (11), pp. 1- 16.

Denison, D. R., Neale, W. S. (1999) *Denison Organizational Culture Survey - Facilitator Guide*. Ann Arbor, MI: Denison Consulting.

Dong, J., Yang, C. (2015) *Information technology and organizational learning in knowledge alliances and networks: Evidence from U.S. pharmaceutical industry.* Information & Management, 52 (1), pp. 111-122.

Farjoun, M. (2010) *Beyond Dualism: Stability And Change As A Duality.* Academy Of Management Review, 35 (2), pp. 202-225.

Fink, L., Neumann, S. (2007) *Gaining Agility through IT Personnel Capabilities: The Mediating Role of IT Infrastructure Capabilities.* Journal Of The Association For Information Systems, 8 (8), pp. 440-462.

Global Center For Digital Business Transformation (2015) *Digital Vortex - How Digital Disruption Is Redefining Industries.* [online] Available at: https://www.cisco.com/c/dam/en/us/solutions/collateral/industry-solutions/digital-vortex-report.pdf [Accessed 18 Jun. 2018].

Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E. (2016) *Multivariate Data Analysis.* 7th ed. Harlow: Pearson.

Heavin, C., Power, D. J. (2018) *Challenges for digital transformation - towards a conceptual decision support guide for managers.* Journal of Decision Systems, (27), p. 38-44.

Heracleous, L., Papachroni, A., Andriopoulos, C., Gotsi, M. (2017) *Structural ambidexterity and competency traps: Insights from Xerox PARC*. Technological Forecasting and Social Change, 117, pp. 327-338.

Hess, T., Matt C, Benlian A., Wiesböck, F. (2016) *Options for Formulating a Digital Transformation Strategy.* Mis Quarterly Executive, 15 (2), pp. 123-139.

Hirt, M., Willmott, P. (2014) *Strategic Principles For Competing In The Digital Age.* [online] Available at: https://digitalstrategy.nl/files/McK-Strategic-principles-for-competing-in-the-digital-age-by-McKinsey-2014.pdf [Accessed 19 Jun. 2018].

Iansiti, M., Lakhani, K. R. (2014) *Digital ubiquity: how connections, sensors, and data are revolutionizing business.* Harvard Business Review, 92 (11), pp. 1 - 11.

Idre (2018) *Institute for Digital Research and Education: Annotated SPSS output* [online] Available at: https://stats.idre.ucla.edu/other/annotatedoutput/ [Accessed 15 Oct. 2018].

Intezari, A., Taskin, N., Pauleen, D. (2017) *Looking beyond knowledge sharing: an integrative approach to knowledge management culture*. Journal Of Knowledge Management, 21 (2), pp. 492-515.

Islam, M., Hasan, I., Jasimuddin, S. (2015) *Organizational culture, structure, technology infrastructure and knowledge sharing: Empirical evidence from MNCs based in Malaysia.* Vine, 45 (1), pp. 67-88.

Issa, R., Haddad, J. (2008) *Perceptions of the impacts of organizational culture and information technology on knowledge sharing in construction*. Construction Innovation, 8 (3), pp. 182-201.

Joshi, K. D., Chi, L., Datta, A., Han, S. (2010) *Changing the Competitive Landscape: Continuous Innovation Through IT-Enabled Knowledge Capabilities.* Information Systems Research, 21(3), pp. 472-495.

Jost, J. (2015) *Resistance To Change: A Social Psychological Perspective*. Social Research, 82 (3), pp. 607-636.

Kane, G. C., Palmer, D., Phillips, A. N., Kiron, D., Buckley, N. (2015) *Winning The Digital War For Talent*. MITSloan Management Review, pp. 1-25.

Kolarić, B, Petrović, S. (2013) *Relationship Between Organizational Design And Relationship Between Organizational Design Organizational Learning.* Journal Of Process Management. New Technologies. 1 (4), pp. 96-100.

Kruse, P. (2004) *Erfolgreiches Management von Instabilität* [in German]. 8th ed. Offenbach am Main, Germany: GABAL.

Kruskal, W. H., Wallis, W. A. (1952). *Use of ranks in one-criterion variance analysis.* Journal of the American Statistical Association, 47(260), pp. 583-621.

Lenkenhoff, K., Wilkens, U., Zheng, M., Süße, T., Kuhlenkötter, B., Ming, X. (2018) *Key challenges of digital business ecosystem development and how to cope with them*. Procedia CIRP,73, pp. 167-172.

Libert, B., Beck, M., Wind, Y. (2016) *7 Questions to Ask Before Your Next Digital Transformation*. Harvard Business Review Digital Articles, pp. 2-5.

Lindner, F., Wald, A. (2011) *Success factors of knowledge management in temporary organizations.* International Journal of Project Management, 29 (7), pp. 877-888.

Lowry, P, Wilson, D. (2016) *Creating agile organizations through IT: The influence of internal IT service perceptions on IT service quality and IT agility.* Journal Of Strategic Information Systems, 25 (3), pp. 211-226.

Luhmann, N. (2011) *Organisation und Entscheidung* [in German]. 3rd ed. Wiesbaden, Germany: Springer VS.

Lukić, L. (2014) *The Impact Of Information And Communication Technology On Decision Making Process In The Big Data Era.* UDC, 11 (2), pp. 221-234.

Main, A., Lamm, B. and McCormack, D. (2018) *What Boards Need to Know About Digital Transformation.* Corporate Governance Advisor, 26(1), pp. 18–22.

Mazzone, D. M. (2014) *Digital or Death: Digital Transformation - The Only Choice for Business to Survive Smash and Conquer*. 1st ed. Mississauga, Ontario: Smashbox Consulting Inc.

Meyer, J., Hecht, T., Gill, H., Toplonytsky, L. (2010*) Person-organization (culture) fit and employee commitment under conditions of organizational change: A longitudinal study.* Journal Of Vocational Behavior, 76 (3), pp. 458-473.

Miller, G. A., Galanter, E., Pribram, K. H. (1960). *Plans and the structure of behavior*. New York, NY: Henry Holt and Co.

Nagel, R., Wimmer, R. (2014) *Systemische Strategieentwicklung: Modelle und Instrumente für Berater und Entscheider* [in German]. 6th ed. Stuttgart, Germany: Schäffer-Poeschel Verlag.

Naranjo-Valencia, J., Jiménez-Jiménez, D., Sanz-Valle, R. (2016) *Studying the links between organizational culture, innovation, and performance in Spanish companies.* Revista Latinoamericana De Psicología, 48, pp. 30-41.

Neus, A., Buder, F., Galdino, F. (2017) *Are You Too Successful to Digitalize? How to Fight Innovation Blindness.* Gfk-Marketing Intelligence Review, 9 (1), pp. 31-35.

Ning, N., Tanriverdi, H. (2017) *Unifying The Role Of IT In Hyperturbulence And Competitive Advantage Via A Multilevel Perspective Of IS Strategy*. MIS Quarterly, 41 (3), pp. 937-958.

Pálka, L., Hajkrová, R. (2015) *IT Tools and their Use in Strategy Creation in Respect of Economic Results of a Company*. Trends: Economics & Management. 9 (24), pp. 44-52.

Roberts, N., Galluch, P., Dinger, M., Grover, V. (2012) *Absorptive Capacity And Information Systems Research: Review, Synthesis, And Directions For Future Research.* MIS Quarterly, 36 (2), pp. 625-648.

SAP (2017). *Digital Transformation Executive Study: 4 Ways Leaders Set Themselves Apart* [online] Available at: https://a0fe7bd3fd2cedd98b78-c81b5f39a3b932e2153be28026f8e821.ssl.cf2.rackcdn.com/SAP%20Digital%20Transformation%20Executive%20Study%204%20Ways%20Leaders%20Set%20Themselves%20Apart.pdf [Accessed 27 Sep. 2018].

Schoeneborn, D. (2011) *Organization as Communication: A Luhmannian Perspective. Management Communication Quarterly:* An International Journal. 25 (4), pp. 31 - 39.

Schwertner, K. (2017) *Digital Transformation Of Business.* Trakia Journal of Sciences, 15 (1), pp. 388-393.

Sezgin, Y., Kasap, N., Bozkaya, B. (2010) *A Conceptual Model For Assessing Managerial Implications Of Changes In Information Technologies*. Dogus University Journal. 11 (2), pp. 257-268.

Shibata, T., Baba, Y., Kodama, M., Suzuki, J. (2018) *Managing ambidextrous organizations for corporate transformation: a case study of Fujifilm*. R&D Management, pp. 1-15.

Siachou, E., Gkorezis, P. (2018) *Empowering leadership and organizational ambidexterity: a moderated mediation model.* Evidence-based HRM: a Global Forum for Empirical Scholarship, 6 (1), pp. 94-116.

Sirén, C., Hakala, H., Wincent, J., Grichnik, D. (2017) *Breaking the routines: Entrepreneurial orientation, strategic learning, firm size, and age.* Long Range Planning, 50 (2), pp. 145-167.

Smith, F., Stone, T., Kisamore, J., Jawahar, I. (2010) *Decision-making biases and affective states: their potential impact on best practice innovations*. Canadian Journal Of Administrative Sciences, 27 (4), pp. 277-291.

Szczepanska-Woszczyna, K. (2018) *Strategy, corporate culture, structure and operational processes as the context for the innovativeness of an organization*. Foundations of Management, 10, pp. 33-44.

Tambe, P., Hitt, L., Brynjolffson (2012) *The Extroverted Firm: How External Information Practices Affect Innovation and Productivity.* Management Science,58 (5), pp. 843-859.

Teece, D., Linden, G. (2017) *Business models, value capture, and the digital enterprise.* Journal Of Organization Design, 6 (1), pp. 1-14.

Thoene, M., Buszko, A. (2014) *Quantitative Model of Tacit Knowledge Estimation for Pharmaceutical Industry.* Engineering Economics, 25 (1), pp. 40-46.

Veiwey, S., Davis, C. (2011) *Sociocybernetics and autopoiesis - new laws of organisational form*. Communicare, 30 (2), pp. 1-26.

Volkema, R. J. (2010) *Unifying Principles of Organizational Behavior.* Journal Of The Academy Of Business Education, 11, pp. 70-92.

von Leipzig, T., Gamp, M., Manz, D., Schöttle, K., Ohlhausen, P., Oosthuizen, G., Palm, D., von Leipzig, K. (2017) *Initialising Customer-orientated Digital Transformation in Enterprises.* Procedia Manufacturing, 8, pp. 517-524

Warrick, D. (2017) *What leaders need to know about organizational culture*. Business Horizons, 60 (3), pp. 395-404.

Yeow, A., Soh, C., Hansen, R. (2018) *Aligning with new digital strategy: A dynamic capabilities approach.* The Journal of Strategic Information Systems, 27 (1), pp. 43-58.

Zakrzewska-Bielawska, A. (2016) *Perceived mutual impact of strategy and organizational structure: Findings from the high-technology enterprises*. Journal of Management and Organisation, 22 (5), pp. 599-622.

Zheng, W., Yang, B., McLean, G. (2010) *Linking organizational culture, structure, strategy, and organizational effectiveness: Mediating role of knowledge management.* Journal Of Business Research, 63, pp. 763-771.

Appendix A. DESCRIPTIVE STATISTICS

Table 6 Factor and dimension classification of items and their descriptive statistics

	Factor	Dimension	N	Mean	Std. Deviation	Skew-ness	Kurtosis
Item1	Strategy	Analysis (& IT connection)	80	4.20	1.095	-1.417	1.074
Item2	Strategy	Analysis (& IT connection)	80	3.71	1.127	-.657	-.400
Item3	Strategy	Futurity	80	3.91	.957	-.532	-.627
Item4	Strategy	Futurity	80	2.98	.981	-.280	-.610
Item5	- deleted	Proactiveness	80	3.88	1.048	-.556	-.861
Item6	Strategy	Proactiveness	80	2.70	1.095	.153	-.417
Item7	- deleted	Riskiness	80	2.60	1.063	.023	-.999
Item8	- deleted	Riskiness	80	2.65	.995	.521	-.432
Item9	Structure	Centralisation	80	2.76	1.295	.206	-1.172
Item10	Structure	Centralisation	80	2.86	1.430	.115	-1.382
Item11	IT	Communication (& Structure connection)	80	3.44	1.189	-.265	-1.096
Item12	IT	Communication (& Structure connection)	80	3.58	1.188	-.415	-.766
Item13	IT	Agility	80	2.90	1.154	.048	-.761
Item14	IT	Agility	80	3.25	1.175	-.409	-.680
Item15	Culture	Adaptability (& Structure connection)	80	3.41	1.177	-.335	-.936
Item16	Culture	Adaptability (& Structure connection)	80	3.31	.963	-.321	-.557
Item17	Culture	Involvement	80	3.74	1.088	-.423	-.855
Item18	Culture	Involvement	80	3.34	1.321	-.449	-1.005
Item19	Culture	Mission	80	3.58	.897	-.339	-.110
Item20	Culture	Mission	80	3.31	.988	-.347	-.381
Item21	Culture	Consistency	80	3.28	.993	-.582	-.416
Item22	Culture	Consistency	80	3.49	1.158	-.395	-.738
Item23	Strategy	Strategy & Culture connection	80	3.50	1.312	-.448	-1.094
Item24	Culture	Strategy & Culture connection	80	3.30	.863	-.386	.050
Item25	Structure	Strategy & Structure connection	80	3.38	1.286	-.410	-.849
Item26	Structure	Strategy & Structure connection	80	3.28	1.180	-.462	-.848
Item27	IT	Culture & IT connection	80	3.14	1.156	-.174	-.832
Item28	IT	Culture & IT connection	80	3.54	.993	-.305	-.633

Appendix B. ITEM-LEVEL TESTS

B.1 Kruskal-Wallis Test

Table 7 Mean ranks and Kruskal-Wallis test

	Mean Ranks			Kruskal-Wallis Test		
	traditional N=25	digitised N=17	digital N=38	Chi-Square	df	Asymp. Sig.
Item1	29.12	38.68	48.80	13.299	2	.001
Item2	28.36	42.24	47.71	11.514	2	.003
Item3	26.38	46.68	47.03	14.880	2	.001
Item4	30.18	48.65	43.64	8.452	2	.015
Item5	37.60	38.15	43.46	1.296	2	.523
Item6	21.06	43.38	52.00	29.558	2	.000
Item7	32.74	40.50	45.61	4.956	2	.084
Item8	26.54	53.29	43.96	17.052	2	.000
Item9	26.02	35.85	52.11	21.064	2	.000
Item10	22.00	38.26	53.67	29.586	2	.000
Item11	25.90	32.71	53.59	25.578	2	.000
Item12	23.90	36.50	53.21	26.218	2	.000
Item13	26.38	39.85	50.08	16.703	2	.000
Item14	24.14	41.26	50.92	21.569	2	.000
Item15	28.68	41.91	47.64	10.896	2	.004
Item16	26.74	36.94	51.14	19.090	2	.000
Item17	25.94	37.00	51.64	20.413	2	.000
Item18	23.96	33.71	54.42	29.698	2	.000
Item19	29.82	44.06	45.93	8.761	2	.013
Item20	25.10	43.18	49.43	18.581	2	.000
Item21	26.10	36.47	51.78	21.689	2	.000
Item22	30.50	36.76	48.75	10.541	2	.005
Item23	23.14	44.91	49.95	22.362	2	.000
Item24	28.52	34.59	51.03	17.758	2	.000
Item25	24.58	43.62	49.58	18.827	2	.000

Item26	24.40	47.71	47.87	19.367	2	.000
Item27	28.32	36.56	50.28	15.013	2	.001
Item28	25.18	48.56	46.97	17.438	2	.000

B.2 Mann-Whitney U Tests

Table 8 Mean ranks and Mann-Whitney U test (traditional vs. digital)

	Mean Ranks		Mann-Whitney U Test		
	traditional N=25	digital N=38	Mann-Whitney U	Z	Asymp. Sig. (2-tailed)
Item1	23.06	37.88	251.5	-3.488	.000
Item2	22.92	37.97	248	-3.309	.001
Item3	22.10	38.51	227.5	-3.646	.000
Item4	25.30	36.41	307.5	-2.460	.014
Item6	17.82	41.33	120.5	-5.138	.000
Item8	23.38	37.67	259.5	-3.279	.001
Item9	20.08	39.84	177	-4.298	.000
Item10	17.46	41.57	111.5	-5.223	.000
Item11	19.34	40.33	158.5	-4.610	.000
Item12	18.36	40.97	134	-4.948	.000
Item13	20.40	39.63	185	-4.215	.000
Item14	19.90	39.96	172.5	-4.389	.000
Item15	23.24	37.76	256	-3.179	.001
Item16	20.72	39.42	193	-4.170	.000
Item17	19.92	39.95	173	-4.412	.000
Item18	18.02	41.20	125.5	-5.089	.000
Item19	24.24	37.11	281	-2.886	.004
Item20	20.80	39.37	195	-4.097	.000
Item21	20.46	39.59	186.5	-4.354	.000
Item22	23.42	37.64	260.5	-3.113	.002
Item23	19.28	40.37	157	-4.622	.000
Item24	21.44	38.95	211	-3.958	.000
Item25	20.60	39.50	190	-4.101	.000

Item26	20.64	39.47	191	-4.181	.000
Item27	21.74	38.75	218.5	-3.724	.000
Item28	21.44	38.95	211	-3.875	.000

Table 9 Mean ranks and Mann-Whitney U test (traditional vs. digitised)

	Mean Ranks		Mann-Whitney U Test		
	traditional N=25	digitised N=17	Mann-Whitney U	Z	Asymp. Sig. (2-tailed)
Item1	19.06	25.09	151.5	-1.657	.098
Item2	18.44	26.00	136	-2.041	.041
Item3	17.28	27.71	107	-2.807	.005
Item4	17.88	26.82	122	-2.407	.016
Item6	16.24	29.24	81	-3.595	.000
Item8	16.16	29.35	79	-3.687	.000
Item9	18.94	25.26	148.5	-1.726	.084
Item10	17.54	27.32	113.5	-2.678	.007
Item11	19.56	24.35	164	-1.319	.187
Item12	18.54	25.85	138.5	-1.966	.049
Item13	18.98	25.21	149.5	-1.675	.094
Item14	17.24	27.76	106	-2.808	.005
Item15	18.44	26.00	136	-2.045	.041
Item16	19.02	25.15	150.5	-1.677	.093
Item17	19.02	25.15	150.5	-1.650	.099
Item18	18.94	25.26	148.5	-1.694	.090
Item19	18.58	25.79	139.5	-1.969	.049
Item20	17.30	27.68	107.5	-2.818	.005
Item21	18.64	25.71	141	-1.921	.055
Item22	20.08	23.59	177	-0.937	.349
Item23	16.86	28.32	96.5	-3.050	.002
Item24	20.08	23.59	177	-1.007	.314
Item25	16.98	28.15	99.5	-2.987	.003
Item26	16.76	28.47	94	-3.141	.002
Item27	19.58	24.32	164.5	-1.284	.199
Item28	16.74	28.50	93.5	-3.169	.002

Table 10 Mean ranks and Mann-Whitney U test (digitised vs. digital)

	Mean Ranks		Mann-Whitney U Test		
	digitised N=17	digital N=38	Mann-Whitney U	Z	Asymp. Sig. (2-tailed)
Item1	22.59	30.42	231	-1.963	.050
Item2	25.24	29.24	276	-.911	.362
Item3	27.97	28.01	322.5	-.010	.992
Item4	30.82	26.74	275	-.934	.350
Item6	23.15	30.17	240.5	-1.614	.107
Item8	32.94	25.79	239	-1.611	.107
Item9	19.59	31.76	180	-2.692	.007
Item10	19.94	31.61	186	-2.567	.010
Item11	17.35	32.76	142	-3.444	.001
Item12	19.65	31.74	181	-2.723	.006
Item13	23.65	29.95	249	-1.406	.160
Item14	22.50	30.46	229.5	-1.835	.067
Item15	24.91	29.38	270.5	-.999	.318
Item16	20.79	31.22	200.5	-2.458	.014
Item17	20.85	31.20	201.5	-2.347	.019
Item18	17.44	32.72	143.5	-3.450	.001
Item19	27.26	28.33	310.5	-.248	.804
Item20	24.50	29.57	263.5	-1.183	.237
Item21	19.76	31.68	183	-2.844	.004
Item22	22.18	30.61	224	-1.889	.059
Item23	25.59	29.08	282	-.799	.425
Item24	20.00	31.58	187	-2.693	.007
Item25	24.47	29.58	263	-1.142	.253
Item26	28.24	27.89	319	-.081	.936
Item27	21.24	31.03	208	-2.179	.029
Item28	29.06	27.53	305	-.353	.724

Appendix C. FACTOR ANALYSIS

Table 11 Factor analysis with component matrix

	Factor Strategy	Factor Structure	Factor Culture	Factor IT
Item 1	.798			
Item 2	.833			
Item 3	.680			
Item 4	.765			
Item 6	.731			
Item 9		.773		
Item 10		.815		
Item 11				.785
Item 12				.855
Item 13				.833
Item 14				.816
Item 15			.800	
Item 16			.834	
Item 17			.817	
Item 18			.843	
Item 19			.763	
Item 20			.812	
Item 21			.755	
Item 22			.786	
Item 23	.756			
Item 24			.640	
Item 25		.806		
Item 26		.692		
Item 27				.820
Item 28				.737

Appendix D. DETAILED ANALYSIS AND VISUALISATION OF ITEMS

Item 1: Acquiring, collecting and evaluating data from the corporate environment by using IT systems is very important in order to adapt our strategy.

Especially the group of digital companies agrees to a large extent that an IT-supported analysis of the corporate environment is very important for strategy adaptation, whereas this is much less important for traditional companies. The results are presented in the following compound bar chart:

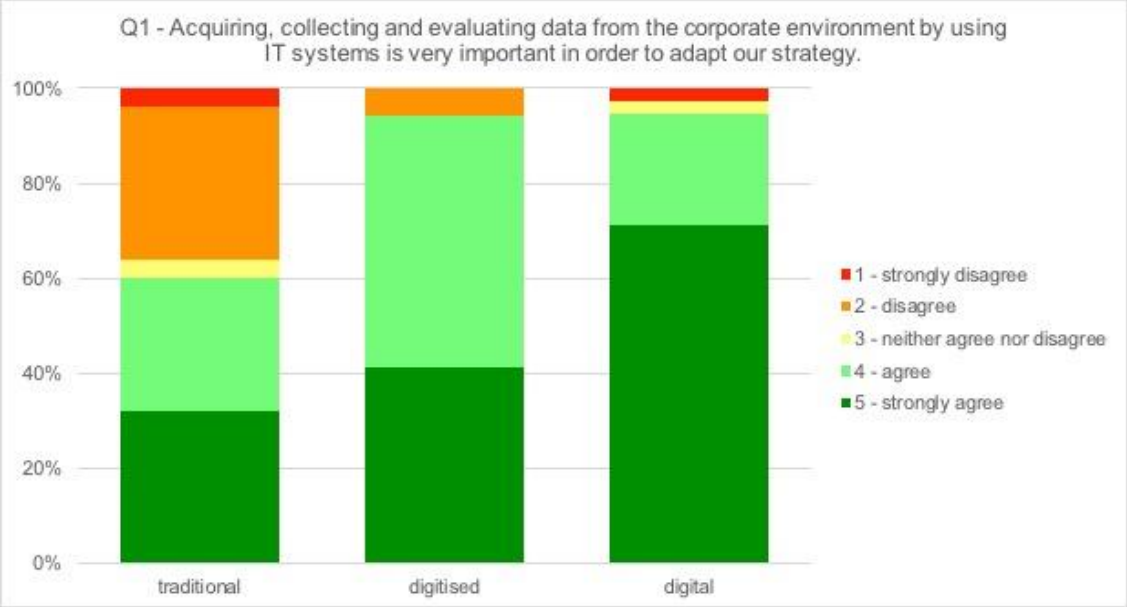

Figure 3 Compound Bar Chart of Item 1: Strategy / Analysis (& IT connection)

The Kruskal-Wallis test showed that the level of digitisation has a significant relatively strong effect on how companies use IT systems to adapt their strategy, $\chi^2(2) = 13.30$, $p < .001$, $\varepsilon^2 = .17$.

The Mann-Whitney U test showed that traditional and digitised organisations agreed to significantly lower extent on this item when compared to digital organisations ($U = 251.5$, $p < .001$; $U = 231$, $p = .05$). There was no statistically significant difference between traditional and digitised companies ($U = 151.5$, $p = .098$).

Item 2: When confronted with major strategic decision, we usually try to develop through data-based analysis.

The data indicated that digital companies use data-based analyses for their strategy processes to a greater extent than traditional companies. The compound bar chart below shows an overview of the responses:

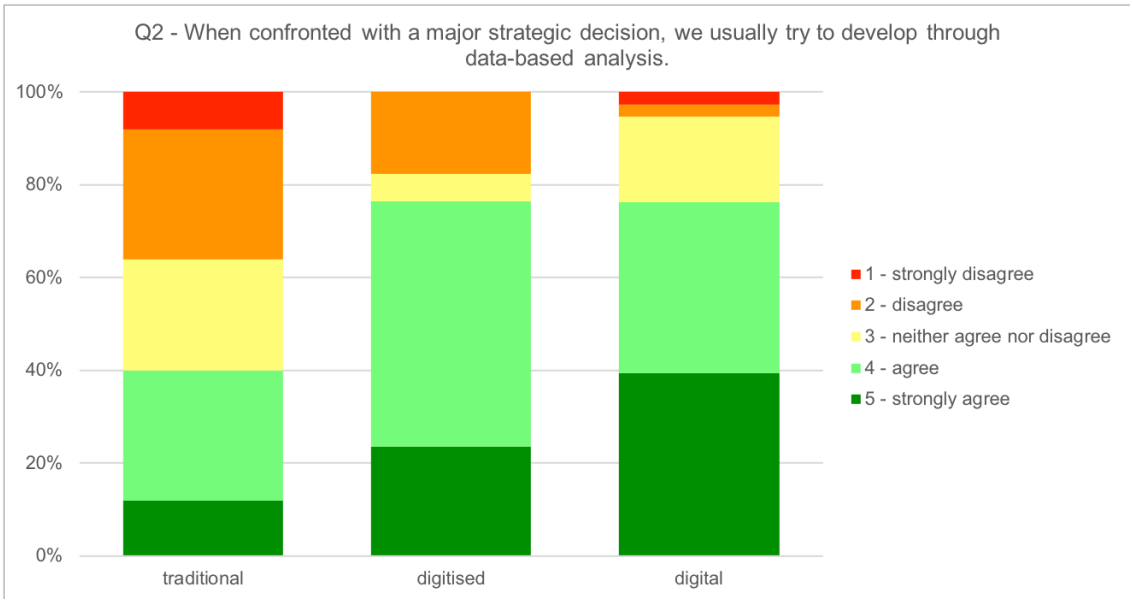

Figure 4 Compound Bar Chart of Item 2: Strategy / Analysis (& IT connection)

The Kruskal-Wallis test showed that the degree of digitisation has a significant moderate effect on how data-based analysis are used in strategic decision-making, $\chi^2(2) = 11.51$, $p = .003$, $\varepsilon^2 = .15$.

The Mann-Whitney U test showed that traditional organisations agreed to significantly lower extent on this item when compared to digital and digitised organisations ($U = 248$, $p = .001$; $U = 136$, $p = .041$). There was no statistically significant difference between digitised and digital companies ($U = 276$, $p = .362$).

Item 3 - Formal tracking of significant general trends is common.

The group of digitised companies and digital companies are tracking significant general trends to large extent, whereas this is much less important for traditional companies. The results are visualised in the following compound bar chart:

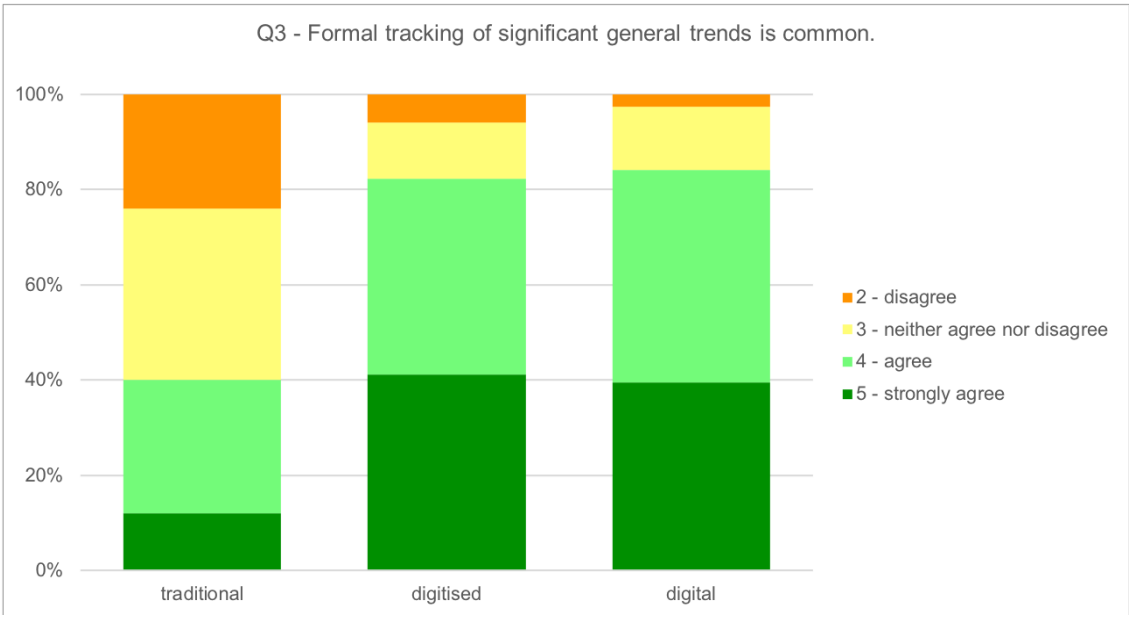

Figure 5 Compound Bar Chart of Item 3: Strategy / Futurity

The Kruskal-Wallis test showed that the level of digitisation has a significant relatively strong effect on how common formal tracking of trends is in organisations, $\chi^2(2) = 14.88$, $p < .001$, $\varepsilon^2 = .19$.

The Mann-Whitney U test showed that traditional organisations agreed to significantly lower extent on this item when compared to digital and digitised organisations ($U = 227.5$, $p < .001$; $U = 107$, $p = .005$). There was no statistically significant difference between digitised and digital companies ($U = 322.5$, $p = .992$).

Item 4 - We often conduct 'what if' analyses of critical issues.

The tendency to conduct "what if" analyses of critical issues showed a rather atypical pattern, as can be seen in the following compound bar chart:

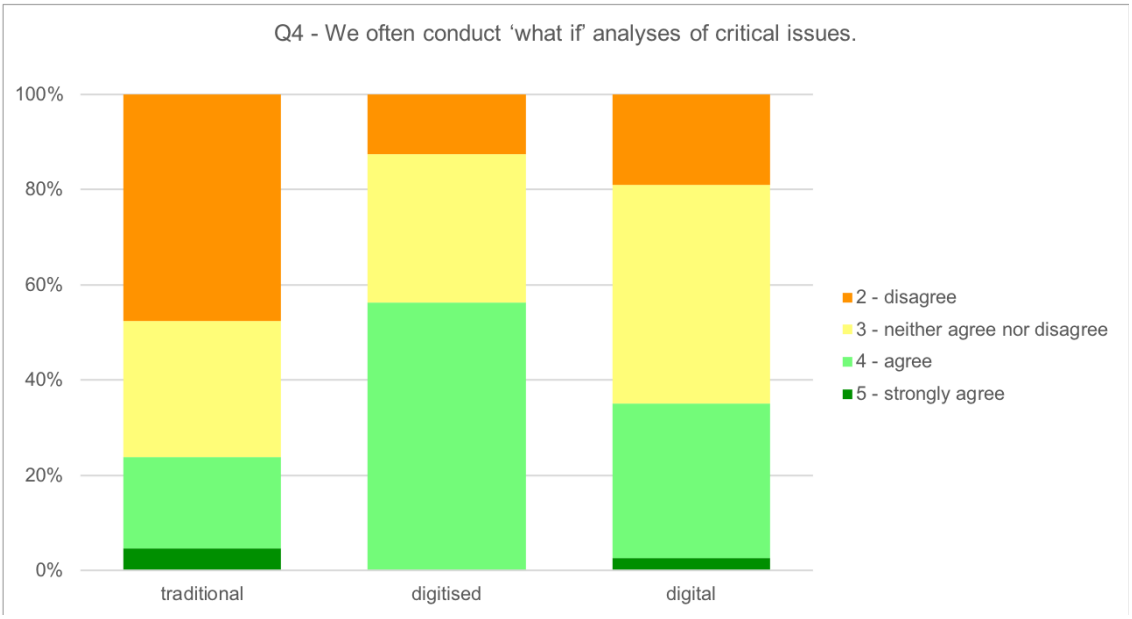

Figure 6 Compound Bar Chart of Item 4: Strategy / Futurity

The Kruskal-Wallis test showed that the degree of digitisation has a significant moderate effect on the likelihood of conducting "what if" analyses, $\chi^2(2) = 8.45$, $p = .015$, $\varepsilon^2 = .11$.

The Mann-Whitney U test showed that traditional organisations agreed to significantly lower extent on this item when compared to digital and digitised organisations ($U = 307.5$, $p = .014$; $U = 122$, $p = .016$). Interestingly, the respondents of digitised companies agreed to a higher degree in this item than those of digital organisations, however there was no statistically significant difference between digitised and digital companies ($U = 275$, $p = .350$).

Item 5 - We are constantly seeking new opportunities related to present operations.

Traditional, digitised and digital companies all showed a similar pattern regarding the propensity to pursue new opportunities related to present operations, as can be seen in the following compound bar chart:

Figure 7 Compound Bar Chart of Item 5: Strategy / Proactiveness

The Kruskal-Wallis test showed that the level of digitisation has no significant effect on seeking new opportunities related to present operations, $\chi^2(2) = 1.30$, $p = .523$. Hence, this item could not be confirmed as separating the organisations significantly, but rather indicates that this type of proactiveness is nowadays required from all organisations to survive on the market.

Item 6 - We are usually the first to introduce new services, products, or brands in the market.

It is striking how often respondents from the group of traditional companies expressed their disagreement or even strong disagreement regarding being the first to introduce new services, products, or brands in the market. In contrast, digital companies tend to be more on the forefront. The results are presented in the following compound bar chart:

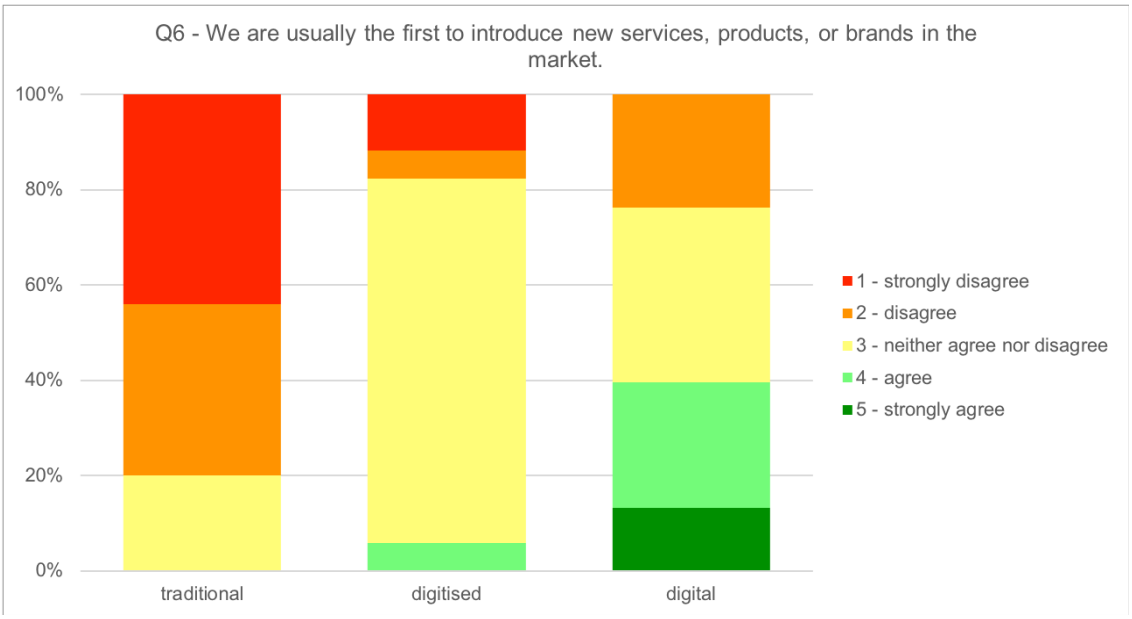

Figure 8 Compound Bar Chart of Item 6: Strategy / Proactiveness

The Kruskal-Wallis test showed that the degree of digitisation has a significant strong effect on being a first mover in regards to introducing new services, products or brands, $\chi^2(2) = 29.56$, $p < .001$, $\varepsilon^2 = .37$.

The Mann-Whitney U test showed that traditional organisations agreed to significantly lower extent on this item when compared to digital and digitised organisations ($U = 120.5$, $p < .001$; $U = 81$, $p < .001$). There was no statistically significant difference between digitised and digital companies ($U = 240.5$, $p = .107$).

Item 7 - New projects are usually approved on a "stage-by-stage" basis rather than with "blanket" approval.

As presented in the compound bar chart below, the general approach to approval processes showed a rather similar patterns across the different organisations.

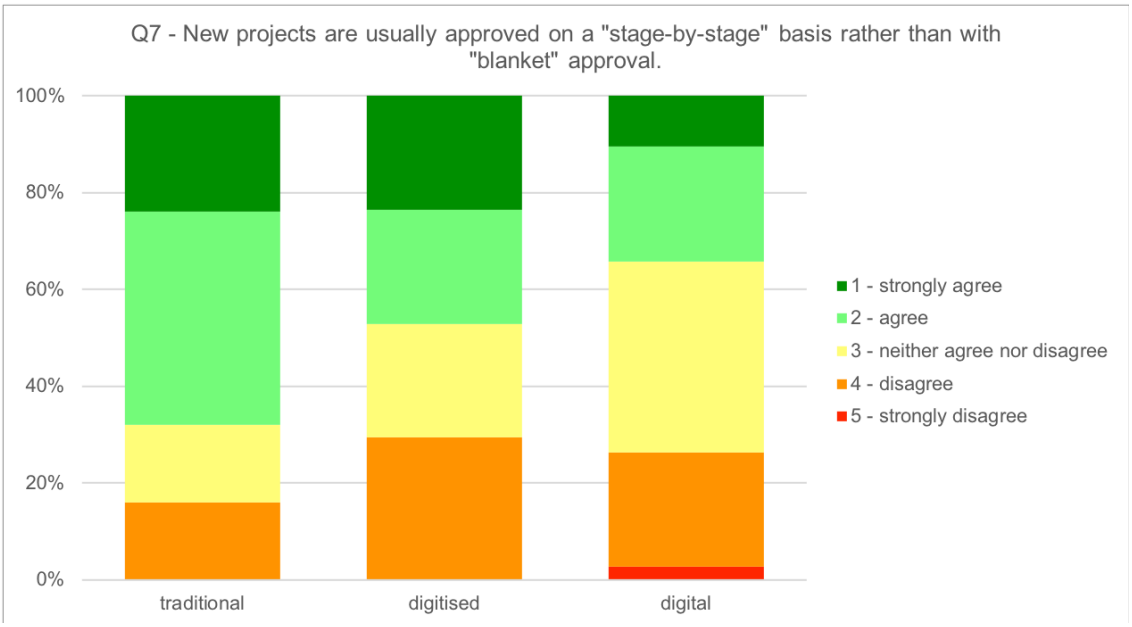

Figure 9 Compound Bar Chart of Item 7: Strategy / Riskiness

The Kruskal-Wallis test showed that the level of digitisation has no significant effect on the approval process of new projects, $\chi^2(2) = 4.96$, $p = .084$. Hence, this item could not be confirmed as separating the organisations significantly, but rather indicates that this type of taking risks is nowadays required across organisations to sustain on the market.

Item 8 - We tend to support projects where expected returns are certain.

Especially the group of traditional companies tends to support project where expected returns are certain, whereas digital companies tend to be more willing to take risks. The compound bar chart below shows an overview of the responses:

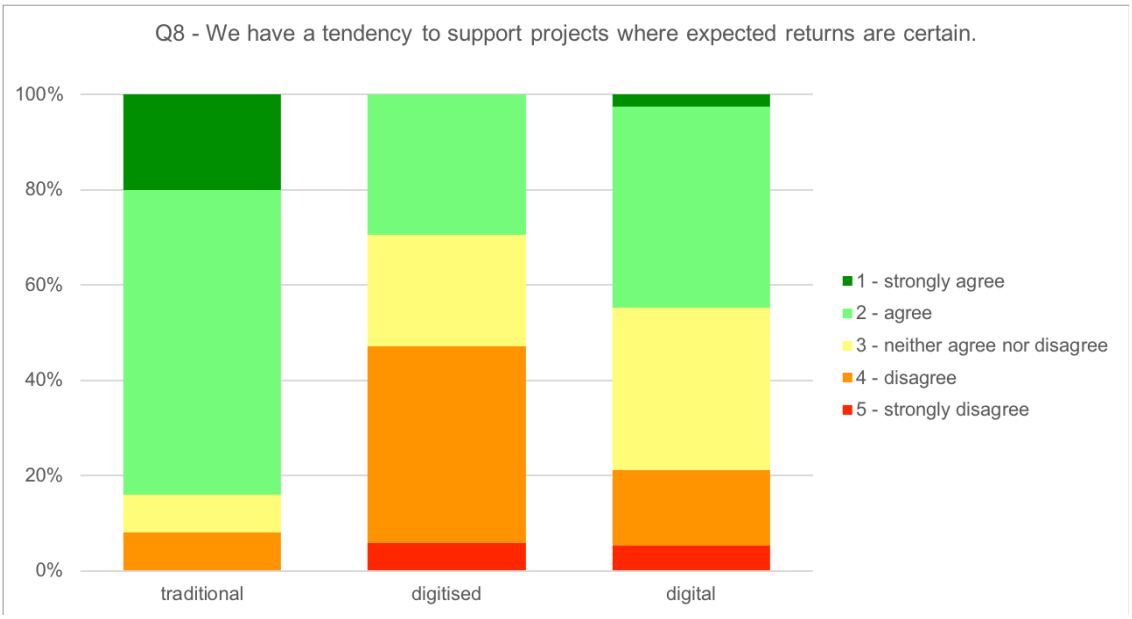

Figure 10 Compound Bar Chart of Item 8: Strategy / Riskiness

The Kruskal-Wallis test showed that the degree of digitisation has a significant relatively strong effect on whether projects where returns are certain are supported, $\chi^2(2) = 17.05$, $p < .001$, $\varepsilon^2 = .22$.

The Mann-Whitney U test showed that traditional organisations agreed to significantly lower extent on this item when compared to digital and digitised organisations ($U = 259.5$, $p = .001$; $U = 79$, $p < .001$). The outranking of digitised to traditional organisations is the absolute highest in the data set. Also, interestingly, digitised companies outranked digital organisations in this item - the outranking is the highest of this very rare occurrence in this data set - only Item 4 and Item 28 also show a similar pattern, but to a much lower extent. The outranking was however, also here, not statistically significant ($U = 239$, $p = .107$).

Item 9 - This organisation tends to be driven by many rules and procedures that define how various aspects of a job are to be done.

Traditional organisations gravitated to a large extent towards being driven by many rules and procedures that define how various aspects of a job are to be done. In contrast, a larger percentage of digital companies disagreed, hence showed a tendency towards less structured conditions. The results are shown in the following compound bar chart:

Figure 11 Compound Bar Chart of Item 9: Organisational Structure / Centralisation

The Kruskal-Wallis test showed that the level of digitisation has a significant relatively strong effect on whether rules and official procedures govern how jobs are to be done, $\chi^2(2) = 21.06$, $p < .001$, $\varepsilon^2 = .27$.

The Mann-Whitney U test showed that traditional and digitised organisations agreed to significantly lower extent on this item when compared to digital organisations ($U = 177$, $p < .001$; $U = 180$, $p = .007$). There was no statistically significant difference between traditional and digitised companies ($U = 148.5$, $p = .084$).

Item 10 - Little action can be taken until the management has approved it.

The group of traditional companies agrees to a large extent that little action can be taken until the management has approved it, whereas digital companies tend to agree only in rare cases. This indicates that employees in digital companies have more room for manoeuvre and decision-making. The compound bar chart below shows an overview of the responses:

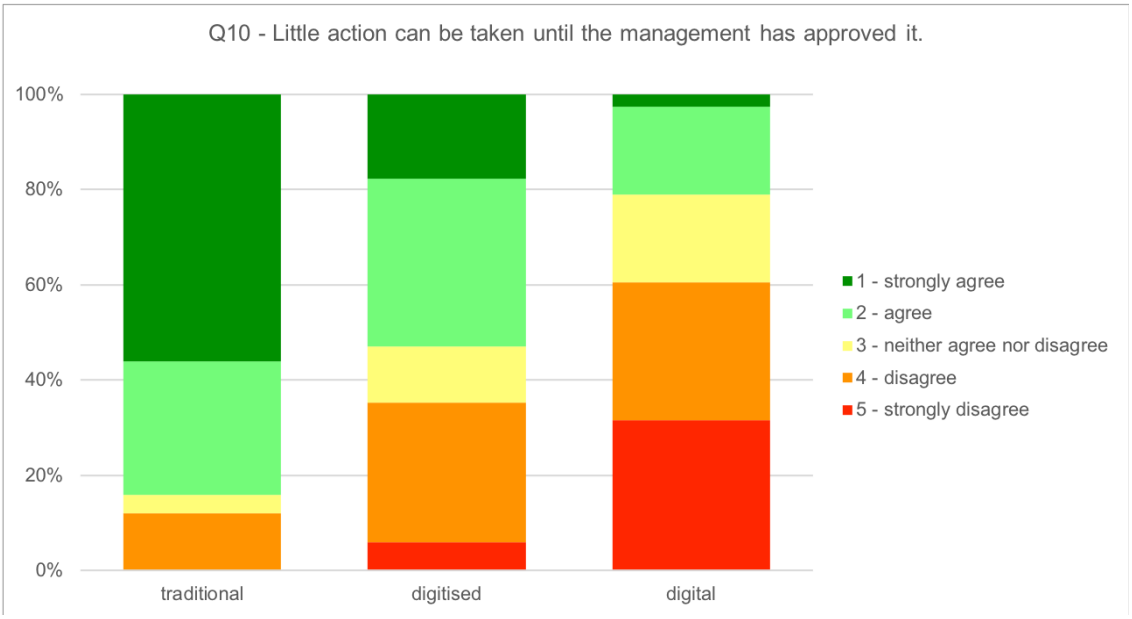

Figure 12 Compound Bar Chart of Item 10: Organisational Structure / Centralisation

The Kruskal-Wallis test showed that the degree of digitisation has a significant strong effect on the dependency on management approval, $\chi^2(2) = 29.59$, $p < .001$, $\varepsilon^2 = .37$.

The Mann-Whitney U test showed significant differences between all three groups. Traditional organisations agreed to significantly lower extent on this item when compared to digital and digitised organisations ($U = 111.5$, $p < .001$; $U = 113.5$, $p = .007$), and digitised companies scored significantly lower than their digital counterparts ($U = 186$, $p = .01$).

Item 11 - We use IT systems to promote collaborative work sufficiently.

Compared to traditional companies, digital companies agree much more often that they use IT systems to promote collaborative work sufficiently. This indicates, on the one hand, that IT is used in digital companies to maintain decentralised structures and, on the other hand, that IT is combined with a more participative culture. The results are presented in the following compound bar chart:

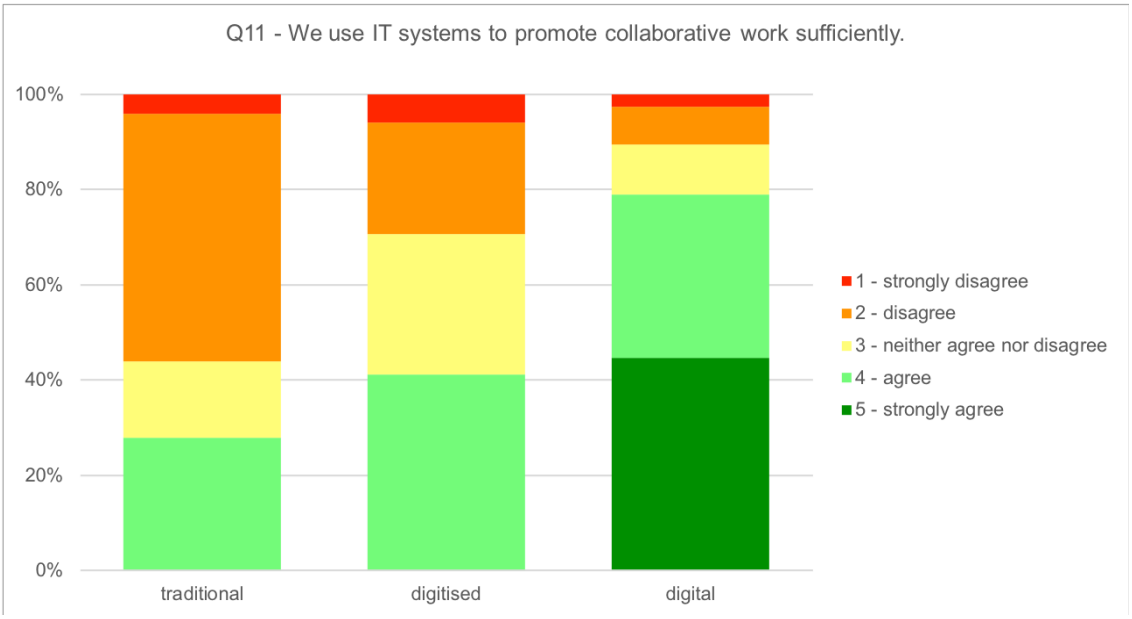

Figure 13 Compound Bar Chart of Item 11: IT / Communication (& Structure connection)

The Kruskal-Wallis test showed that the level of digitisation has a significant relatively strong effect on the usage of IT system for promoting collaborative work, $\chi^2(2) = 25.58$, $p < .001$, $\varepsilon^2 = .32$.

The Mann-Whitney U test showed that traditional and digitised organisations agreed to significantly lower extent on this item when compared to digital organisations ($U = 158.5$, $p < .001$; $U = 142$, $p = .001$). There was no statistically significant difference between traditional and digitised companies ($U = 164$, $p = .187$).

Item 12 - We use IT systems to enhance knowledge sharing effectively.

Compared to traditional companies, digital companies agree more often that they use IT systems to enhance knowledge sharing effectively. The compound bar chart below shows an overview of the responses:

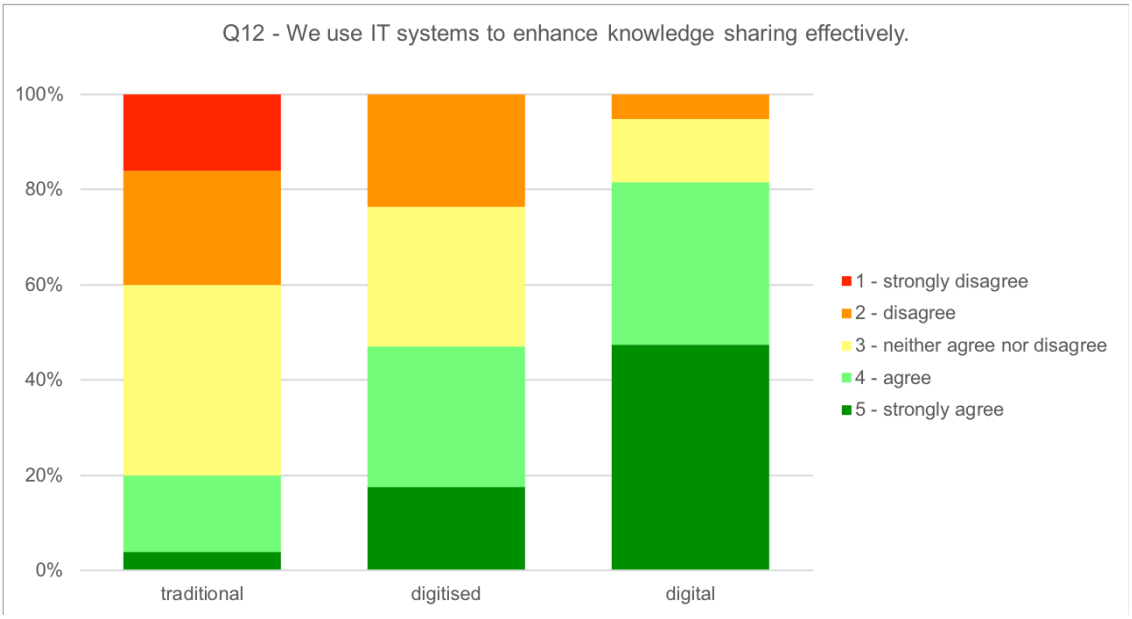

Figure 14 Compound Bar Chart of Item 12: IT / Communication (& Structure connection)

The Kruskal-Wallis test showed that the degree of digitisation has a significant relatively strong effect on the usage of IT system for enhancing knowledge sharing, $\chi^2(2) = 26.22$, $p < .001$, $\varepsilon^2 = .33$.

The Mann-Whitney U test showed significant differences between all three groups. Traditional organisations agreed to significantly lower extent on this item when compared to digital and digitised organisations ($U = 134$, $p < .001$; $U = 138.5$, $p = .049$), and digitised companies scored significantly lower than their digital counterparts ($U = 181$, $p = .006$).

Item 13 - Our IT systems can be quickly adapted to new business requirements.

Digital companies agree to a larger extent that their IT systems can be quickly adapted to new business requirements than traditional companies do. This result indicates that digital companies have a higher level of IT-dependent system agility than traditional enterprises. The results are presented in the following compound bar chart:

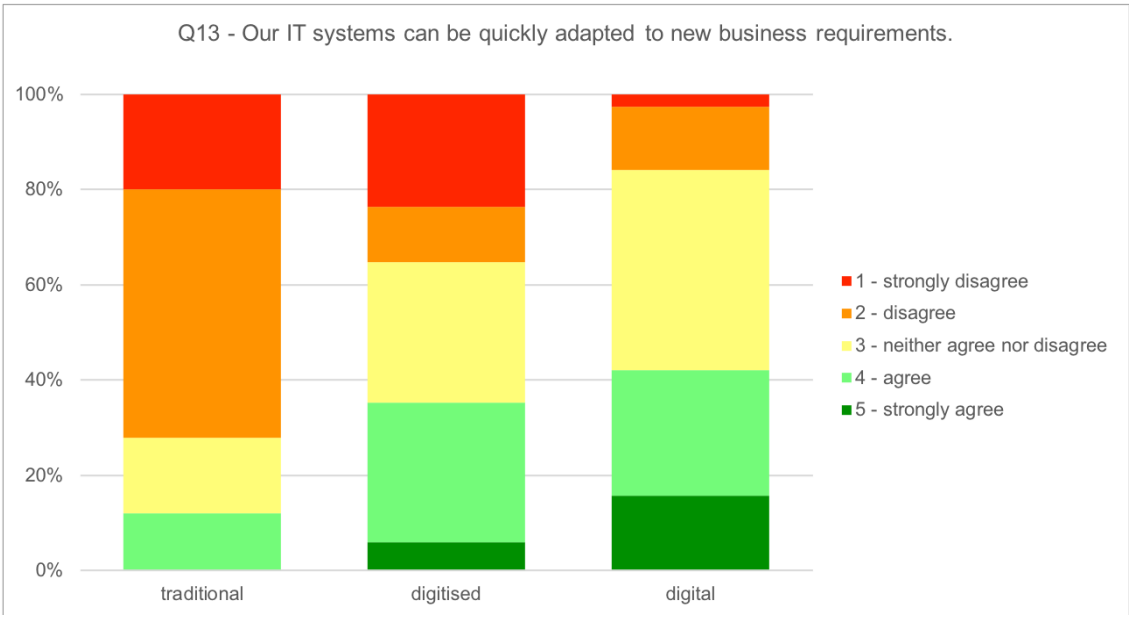

Figure 15 Compound Bar Chart of Item 13: IT / Agility

The Kruskal-Wallis test showed that the level of digitisation has a significant relatively strong effect on the speed of adaptability of IT systems, $\chi^2(2) = 16.70$, $p < .001$, $\varepsilon^2 = .21$.

The Mann-Whitney U test showed that traditional organisations agreed to significantly lower extent on this item when compared to digital organisations ($U = 185$, $p < .001$). There was no statistically significant difference between traditional and digitised companies ($U = 149.5$, $p = .094$), nor between digitised and digital companies ($U = 249$, $p = .160$).

Item 14 - This organisation can promptly provide all required data to its employees.

Digital companies have a much higher tendency to be able to promptly provide all required data to their employees than traditional companies, as can be seen in the compound bar chart below:

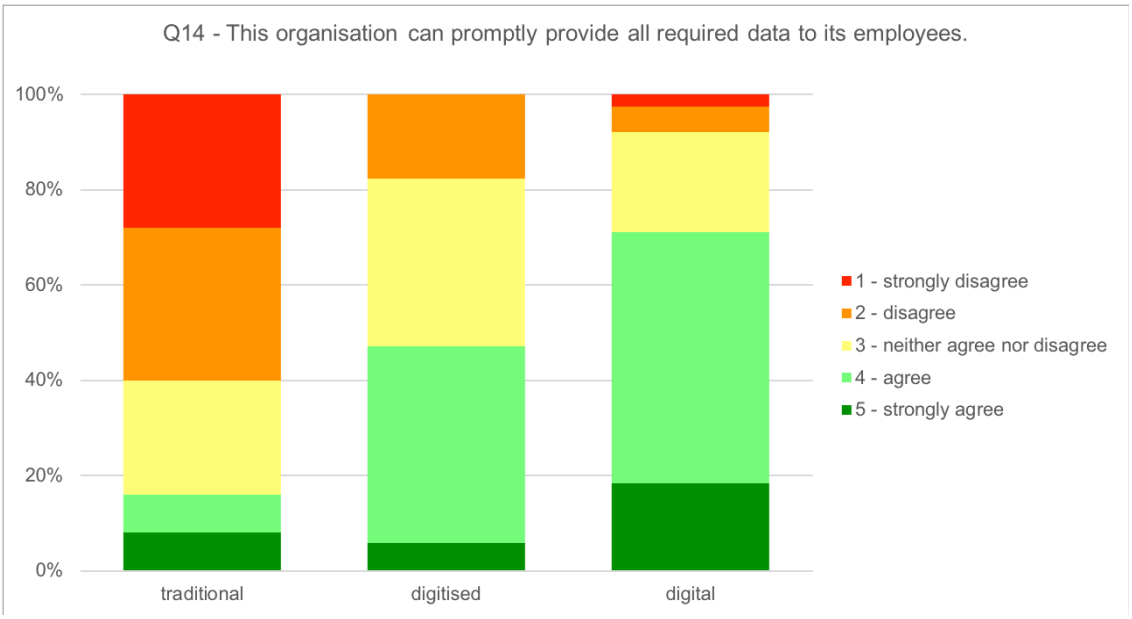

Figure 16 Compound Bar Chart of Item 14: IT / Agility

The Kruskal-Wallis test showed that the degree of digitisation has a significant relatively strong effect on the prompt provision of data to staff, $\chi^2(2) = 21.57$, $p < .001$, $\varepsilon^2 = .27$.

The Mann-Whitney U test showed that traditional organisations agreed to significantly lower extent on this item when compared to digital and digitised organisations ($U = 172.5$, $p = .001$; $U = 106$, $p = .005$). There was no statistically significant difference between digitised and digital companies ($U = 229.5$, $p = .067$).

Item 15 - Cross-functional learning is encouraged by this organisation.

The group of digital companies agrees to a large extent that they encourage cross-functional learning which, compared to traditional companies, is an indicator of a more decentralised structure. The results are visualised in the following compound bar chart:

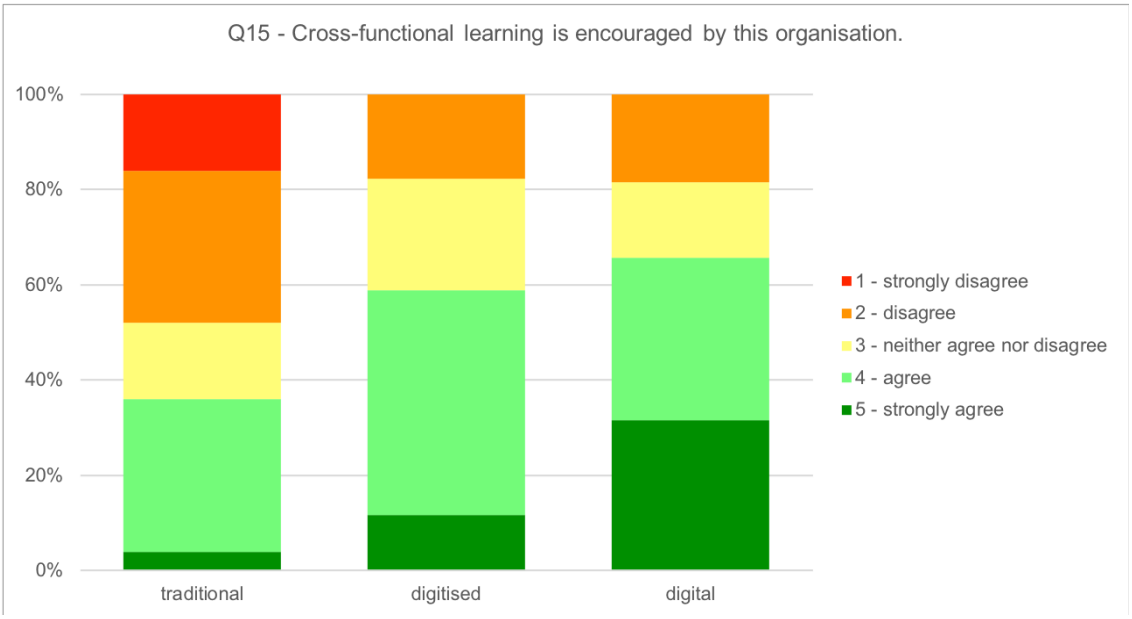

Figure 17 Compound Bar Chart of Item 15: Culture / Adaptability (& Structure connection)

The Kruskal-Wallis test showed that the level of digitisation has a significant moderate effect on the encouragement of cross-functional learning, $\chi^2(2) = 10.90$, $p = .004$, $\varepsilon^2 = .14$.

The Mann-Whitney U test showed that traditional organisations agreed to significantly lower extent on this item when compared to digital and digitised organisations ($U = 256$, $p = .001$; $U = 136$, $p = .041$). There was no statistically significant difference between digitised and digital companies ($U = 270.5$, $p = .318$).

Item 16 - The organisation typically responds well to competitors and other changes in the external business environment.

Compared to traditional companies, digital companies tend to agree much more regarding responses to competitive or other changes in the external business environment. This indicates a higher level of agility for digital companies compared to traditional companies. The compound bar chart below shows an overview of the responses:

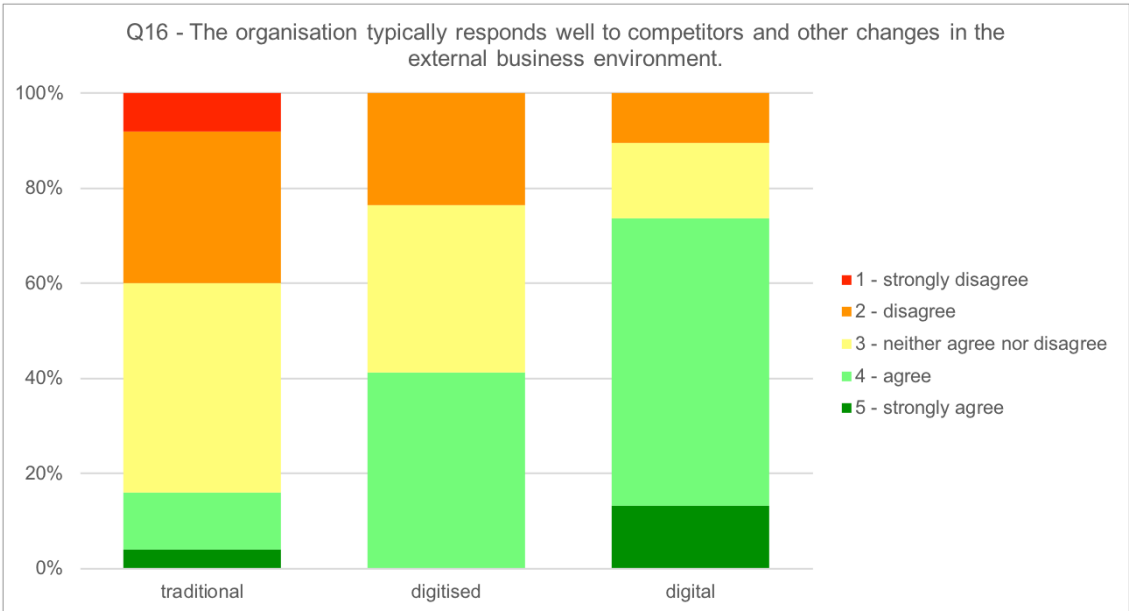

Figure 18 Compound Bar Chart of Item 16: Culture / Adaptability (& Structure connection)

The Kruskal-Wallis test showed that the degree of digitisation has a significant relatively strong effect on the propensity to respond to competitive or other external changes, $\chi^2(2) = 19.09$, $p < .001$, $\varepsilon^2 = .24$.

The Mann-Whitney U test showed that traditional and digitised organisations agreed to significantly lower extent on this item when compared to digital organisations ($U = 193$, $p < .001$; $U = 200.5$, $p = .014$). There was no statistically significant difference between traditional and digitised companies ($U = 150.5$, $p = .093$).

Item 17 - Working in this organisation is like being part of a team.

In contrast to the respondents of traditional companies, the respondents of the group of digital companies agrees to a larger extent that working in this company is like being part of a team. This points to a corporate culture, in which employees are more involved and in which cooperative work, transparency, and shared values and visions are key. The data are presented in the following compound bar chart:

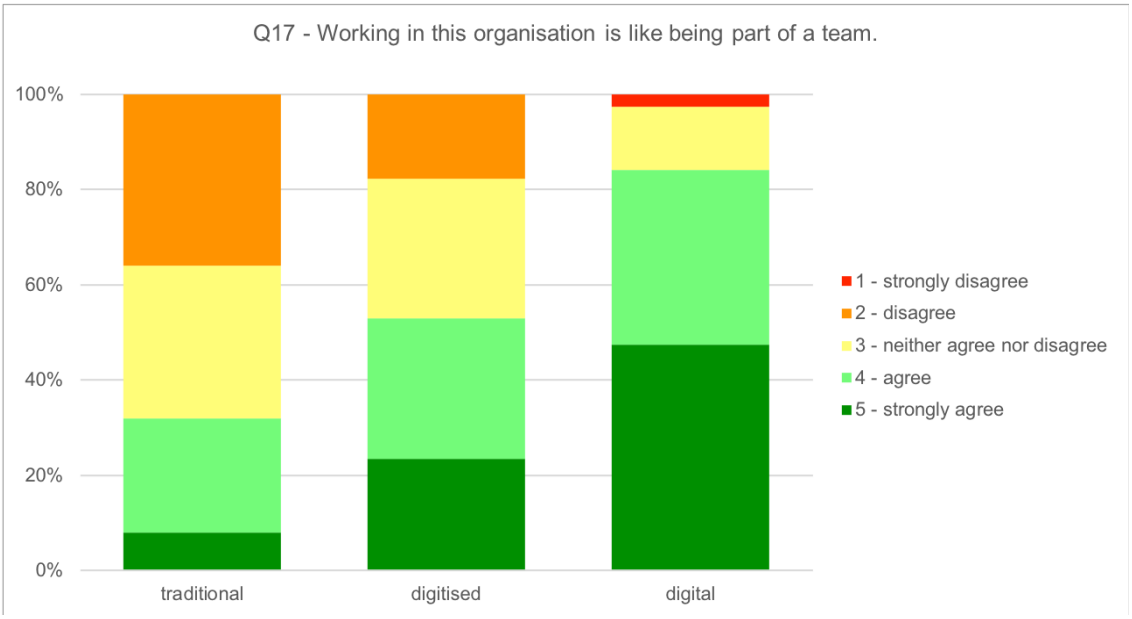

Figure 19 Compound Bar Chart of Item 17: Culture / Involvement

The Kruskal-Wallis test showed that the level of digitisation has a significant relatively strong effect on feeling part of a team, $\chi^2(2) = 20.41$, $p < .001$, $\varepsilon^2 = .26$.

The Mann-Whitney U test showed that traditional and digitised organisations agreed to significantly lower extent on this item when compared to digital organisations ($U = 173$, $p < .001$; $U = 201.5$, $p = .019$). There was no statistically significant difference between traditional and digitised companies ($U = 150.5$, $p = .099$).

Item 18 - This organisation delegates sufficient authority so that people can act on their own.

Particularly the respondents of the group of digital companies agrees or even strongly agrees that their organisation delegates sufficient authority, so that people can act on their own. From this result, it can be deduced that empowerment is more characteristic for digital companies than for traditional companies. The results are presented in the following compound bar chart:

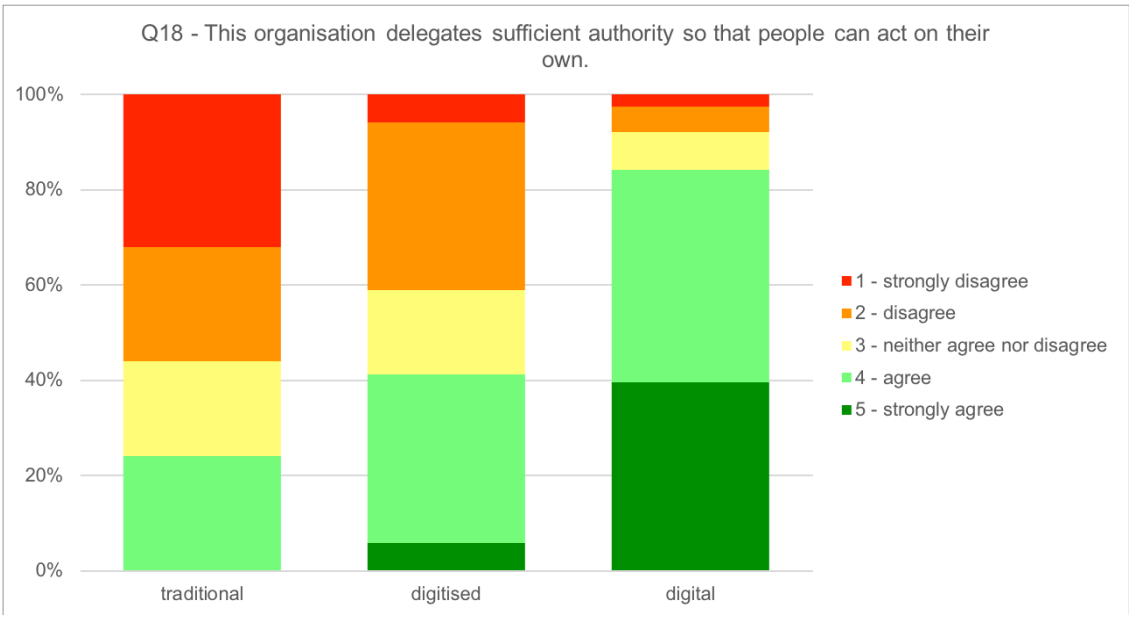

Figure 20 Compound Bar Chart of Item 18: Culture / Involvement

The Kruskal-Wallis test showed that the degree of digitisation has a significant strong effect on the delegation of authority, $\chi^2(2) = 29.70$, $p < .001$, $\varepsilon^2 = .38$.

The Mann-Whitney U test showed that traditional and digitised organisations agreed to significantly lower extent on this item when compared to digital organisations ($U = 125.5$, $p < .001$; $U = 143.5$, $p = .001$). There was no statistically significant difference between traditional and digitised companies ($U = 148.5$, $p = .09$).

Item 19 - This organisation has a clear mission that gives meaning and direction to our work.

Both digitised and digital companies agree or strongly agree to a large extent that they have a clear mission that gives meaning and direction to their work, providing them with a clearer orientation for action than traditional companies. The compound bar chart below shows an overview of the responses:

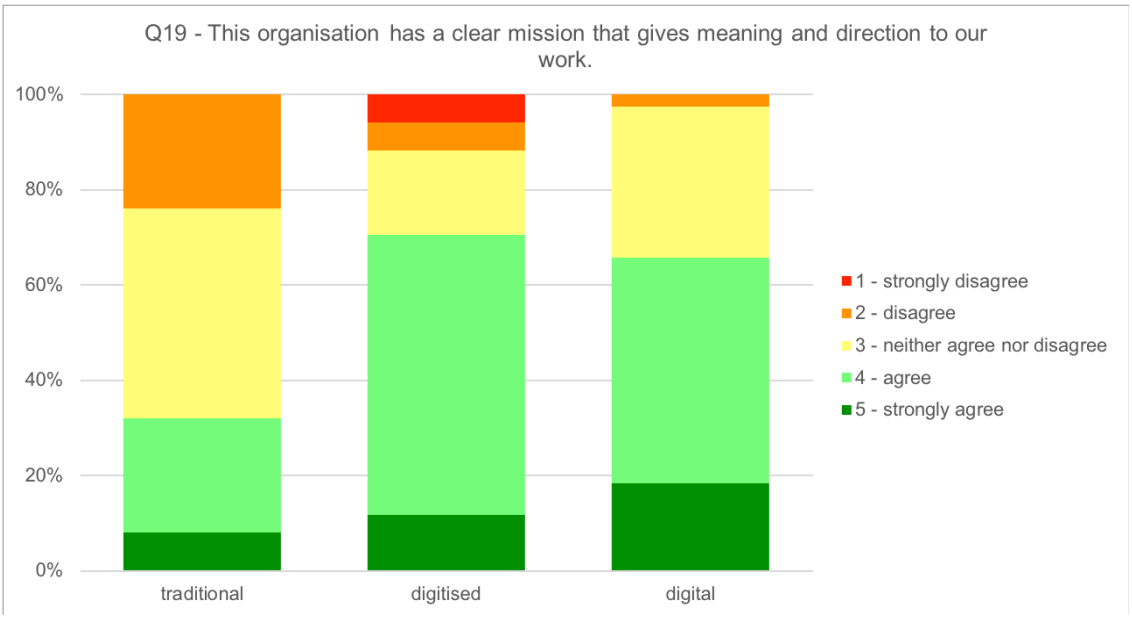

Figure 21 Compound Bar Chart of Item 19: Culture / Mission

The Kruskal-Wallis test showed that the level of digitisation has a significant moderate effect on whether a clear mission provides meaning and direction, $\chi^2(2) = 8.76$, $p = .013$, $\varepsilon^2 = .11$.

The Mann-Whitney U test showed that traditional organisations agreed to significantly lower extent on this item when compared to digital and digitised organisations ($U = 281$, $p = .004$; $U = 139.5$, $p = .049$). There was no statistically significant difference between digitised and digital companies ($U = 310.5$, $p = .804$).

Item 20 - We have a shared vision of what this organisation will be like in the future.

There is an eye-catching difference in the pattern of agreement between traditional and both digitised and digital companies regarding having a shared vision. It can be concluded that the shared vision gives digital and digitised enterprises a clearer orientation and that this shared vision also reduces internal tensions due to different opinions among employees and management. The results are presented in the following compound bar chart:

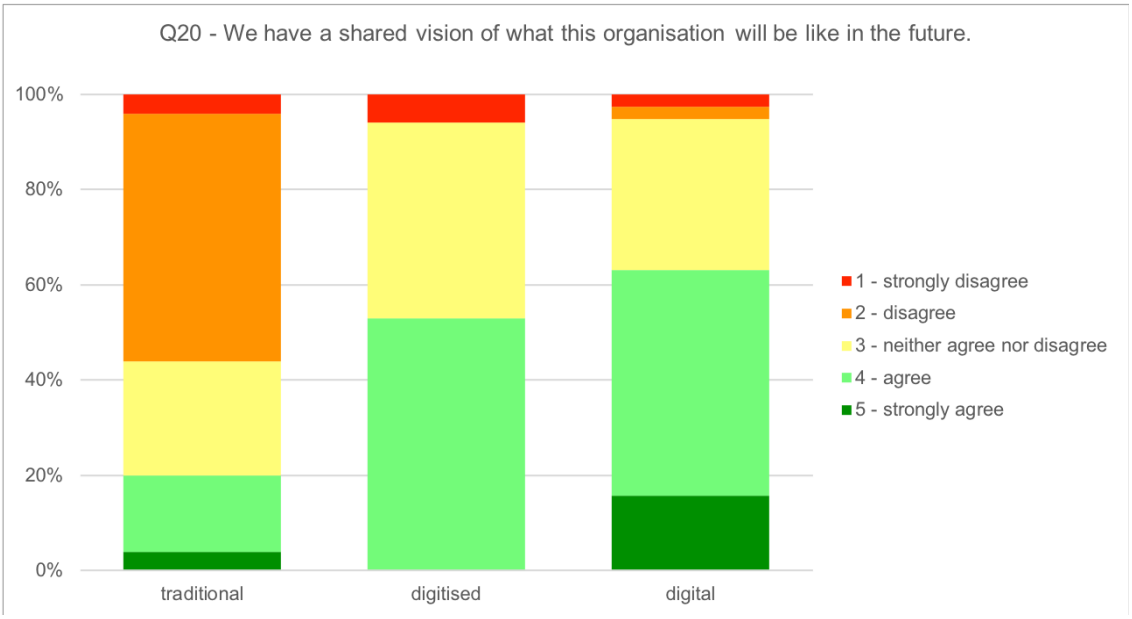

Figure 22 Compound Bar Chart of Item 20: Culture / Mission

The Kruskal-Wallis test showed that the degree of digitisation has a significant relatively strong effect on the vision of the organisations' future, $\chi^2(2) = 18.58$, $p < .001$, $\varepsilon^2 = .24$.

The Mann-Whitney U test showed that traditional organisations agreed to significantly lower extent on this item when compared to digital and digitised organisations ($U = 195$, $p < .001$; $U = 107.5$, $p = .005$). There was no statistically significant difference between digitised and digital companies ($U = 263.5$, $p = .237$).

Item 21 - People from different organisational units still share a common perspective.

Especially the group of digital companies agrees to a large extent that people from different organisational units still share a common perspective. This is an indicator that the management ensures transparency and enters into a communicative exchange with the employees, and that the exchange does not only take place at the central level, but in a decentralised structure. The responses are visualised in the following compound bar chart:

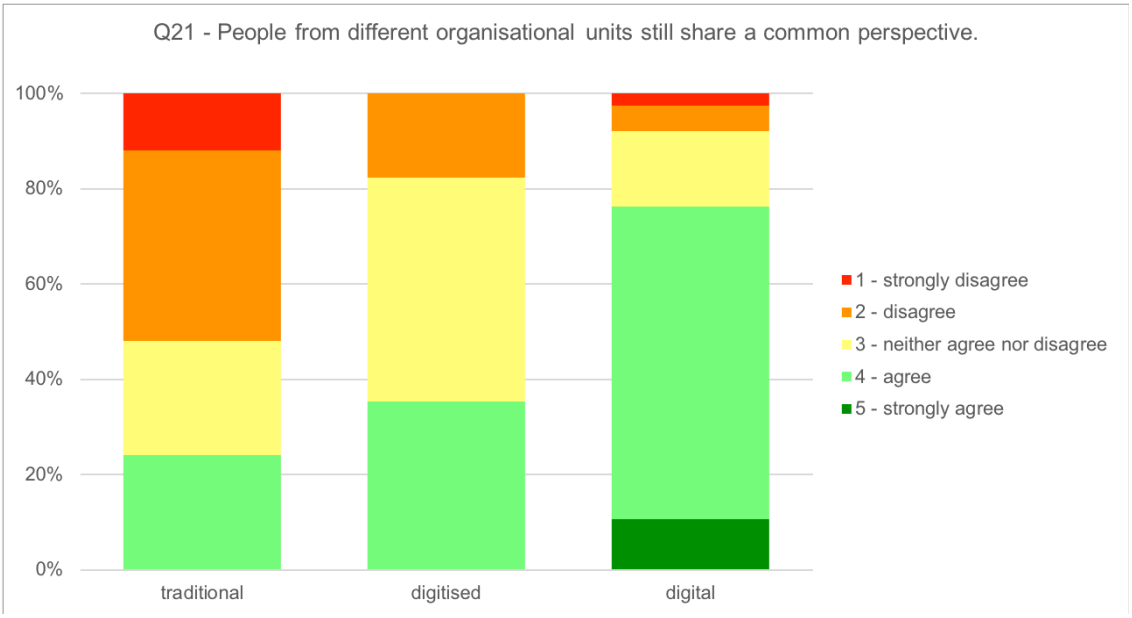

Figure 23 Compound Bar Chart of Item 21: Culture / Consistency

The Kruskal-Wallis test showed that the level of digitisation has a significant relatively strong effect on a common perspective across an organisation, $\chi^2(2) = 21.69$, $p < .001$, $\varepsilon^2 = .27$.

The Mann-Whitney U test showed that traditional and digitised organisations agreed to significantly lower extent on this item when compared to digital organisations ($U = 186.5$, $p < .001$; $U = 183$, $p = .004$). There was no statistically significant difference between traditional and digitised companies ($U = 141$, $p = .055$).

Item 22 - There is a clear and consistent set of values in this company that governs the way we do business.

Compared to traditional companies, digital companies tend to agree more often that they have a clear and consistent set of values that governs the way they do business. The data is shown in the compound bar chart below:

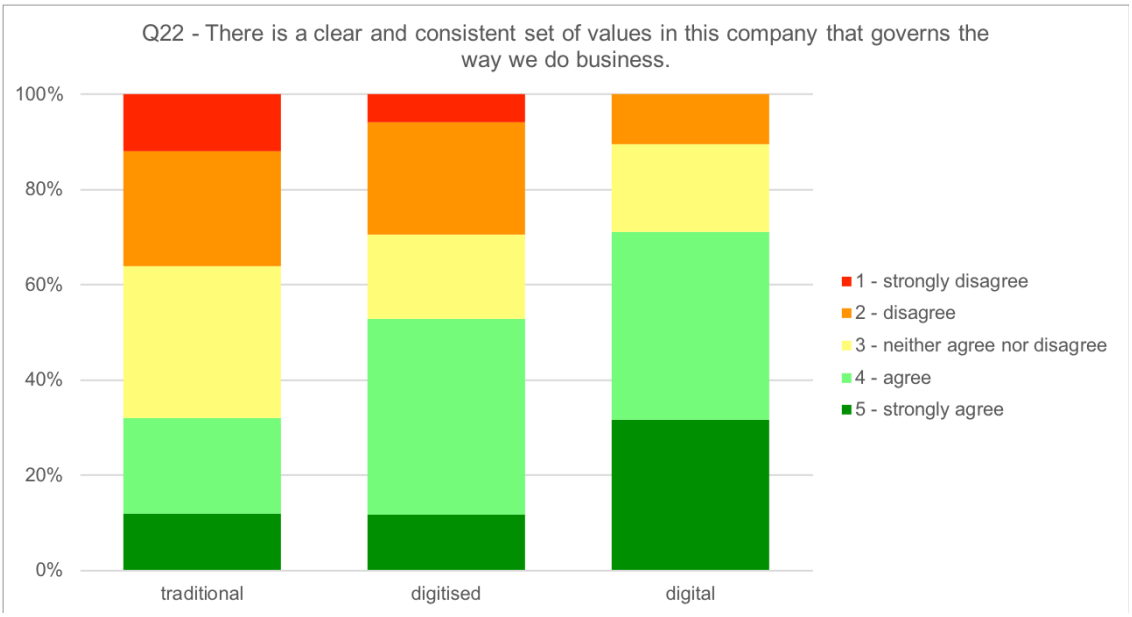

Figure 24 Compound Bar Chart of Item 22: Culture / Consistency

The Kruskal-Wallis test showed that the degree of digitisation has a significant moderate effect on how clear and consistent values govern business operations, $\chi^2(2) = 10.54$, $p = .005$, $\varepsilon^2 = .13$.

The Mann-Whitney U test showed that traditional organisations agreed to significantly lower extent on this item when compared to digital organisations ($U = 260.5$, $p = .002$). There was no statistically significant difference between traditional and digitised companies ($U = 177$, $p = .349$), nor between digitised and digital companies ($U = 224$, $p = .059$).

Item 23 - This organisation actively offers official opportunities for employees to pass on strategic ideas to the management.

There is a noteworthy difference between digital and traditional companies regarding whether there exist official opportunities for employees to pass on strategic ideas to the management. This result indicates that digital employees are more strongly involved in strategic processes, and that the corporate culture in digital companies is much more participative. The details of the responses are presented in the following compound bar chart:

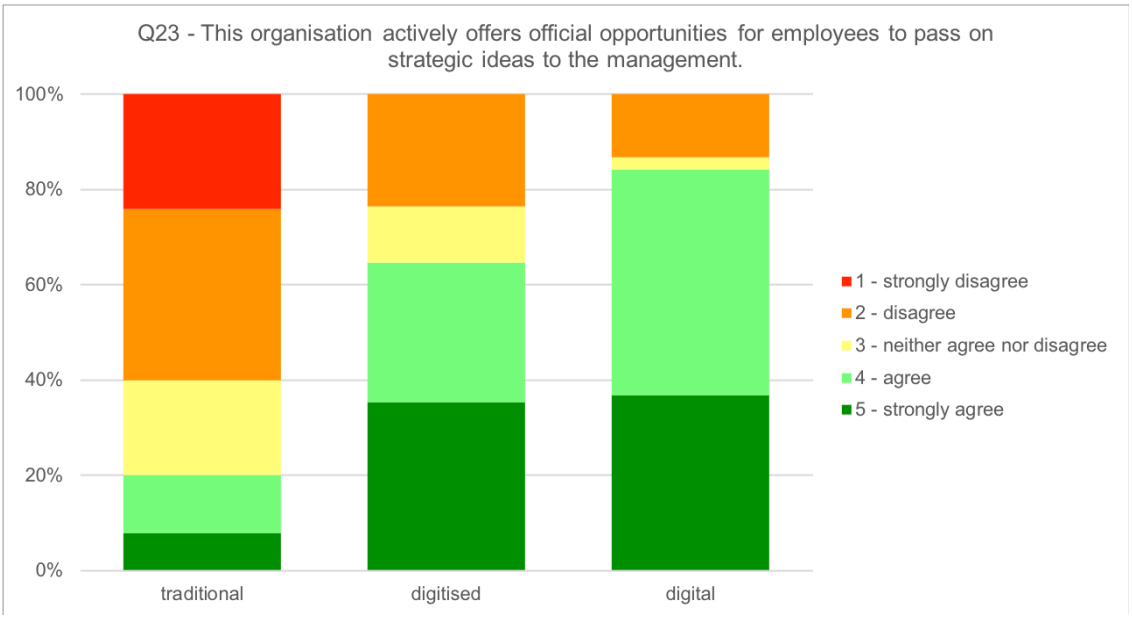

Figure 25 Compound Bar Chart of Item 23: Strategy & Culture connection

The Kruskal-Wallis test showed that the level of digitisation has a significant relatively strong effect on offering official opportunities for sharing strategic ideas, $\chi^2(2) = 22.36$, $p < .001$, $\varepsilon^2 = .28$.

The Mann-Whitney U test showed that traditional organisations agreed to significantly lower extent on this item when compared to digital and digitised organisations ($U = 157$, $p < .001$; $U = 96.5$, $p = .002$). There was no statistically significant difference between digitised and digital companies ($U = 282$, $p = .425$).

Item 24 - Strategic changes are typically met with prompt acceptance by the employees.

The group of digital companies agrees to a large extent that strategic changes are typically met with prompt acceptance by the employees, whereas traditional companies agree much less. This result is a clear indicator that due to the participatory character of the corporate culture and the corresponding decentralised structure, employees and management in digital companies tend to be more on a same page, compared to traditional companies. The results are shown in the following compound bar chart:

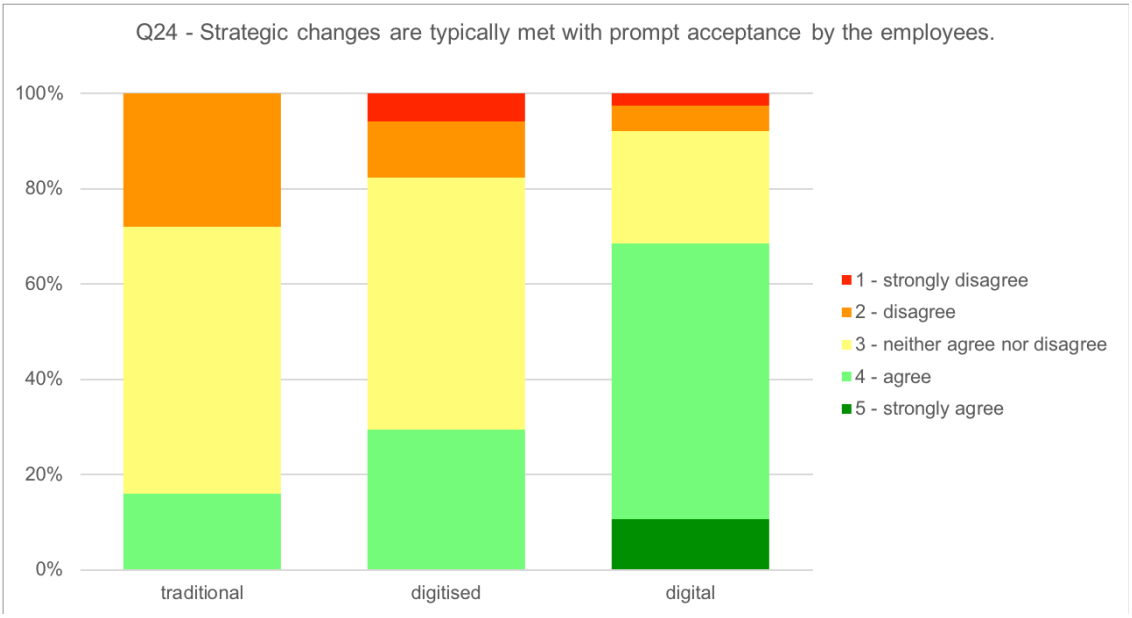

Figure 26 Compound Bar Chart of Item 24: Strategy & Culture connection

The Kruskal-Wallis test showed that the degree of digitisation has a significant relatively strong effect on the prompt acceptance of strategic changes, $\chi^2(2) = 17.76$, $p < .001$, $\varepsilon^2 = .22$.

The Mann-Whitney U test showed that traditional and digitised organisations agreed to significantly lower extent on this item when compared to digital organisations ($U = 211$, $p < .001$; $U = 187$, $p = .007$). There was no statistically significant difference between traditional and digitised companies ($U = 177$, $p = .314$).

Item 25 - Our strategy development actively seeks out insights from across the organisation.

Especially the group of digital companies agrees to a large extent that their strategy development actively seeks out insights from across the organisation, whereas this is much less prevalent for traditional companies. This indicates that the corporate structure of digital companies is less strongly shaped by central structures in the sense of the top-down approach, but also by bottom-up information flows. The compound bar chart below shows an overview of the responses:

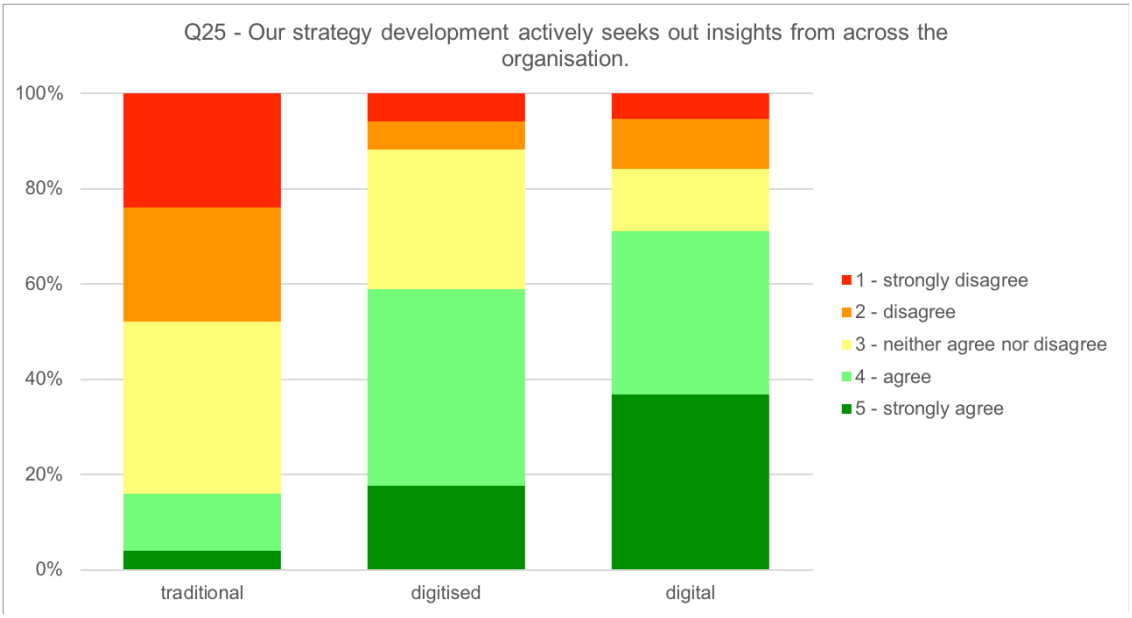

Figure 27 Compound Bar Chart of Item 25: Strategy & Structure connection

The Kruskal-Wallis test showed that the level of digitisation has a significant relatively strong effect on seeking out insights across the company, $\chi^2(2) = 18.83$, $p < .001$, $\varepsilon^2 = .24$.

The Mann-Whitney U test showed that traditional organisations agreed to significantly lower extent on this item when compared to digital and digitised organisations ($U = 190$, $p < .001$; $U = 99.5$, $p = .003$). There was no statistically significant difference between digitised and digital companies ($U = 263$, $p = .253$).

Item 26 - Our organisational structure tends to be adapted after strategic decisions.

The groups of digitised and digital companies agree almost equally often that their organisational structure tends to be adapted after strategic decisions, whereas this is much less the case for traditional companies. The corporate structure of digitised and digital enterprises, hence, seems much more dynamic than that of traditional enterprises. The results are shown in the following compound bar chart:

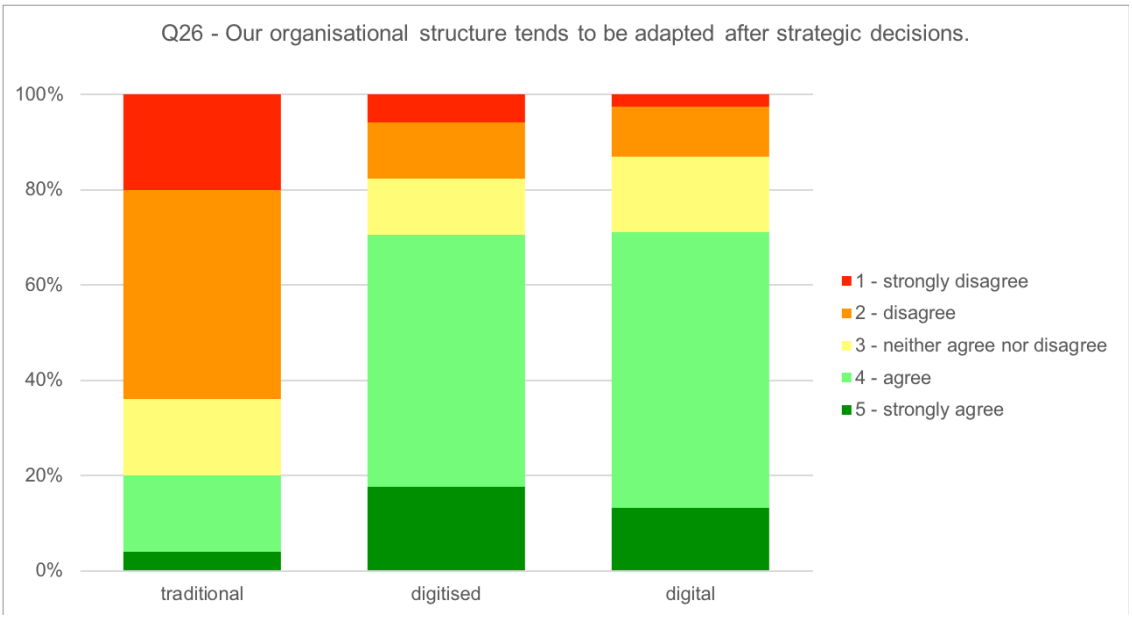

Figure 28 Compound Bar Chart of Item 26: Strategy & Structure connection

The Kruskal-Wallis test showed that the degree of digitisation has a significant relatively strong effect on the tendency to strategically adapt organisational structures, $\chi^2(2) = 19.37$, $p < .001$, $\varepsilon^2 = .25$.

The Mann-Whitney U test showed that traditional organisations agreed to significantly lower extent on this item when compared to digital and digitised organisations ($U = 191$, $p < .001$; $U = 94$, $p = .002$). There was no statistically significant difference between digitised and digital companies ($U = 319$, $p = .936$).

Item 27 - This organisation tends to adapt IT systems to the wishes and requirements of its employees.

The respondents from digital companies agreed to a larger extent that their organisations tend to adapt IT systems to the wishes and the requirements of its employees. So, not only the agility of the IT systems tends to be higher, but also the involvement of the employees in the development and adaptation of the IT systems. The responses are visualised in the following compound bar chart:

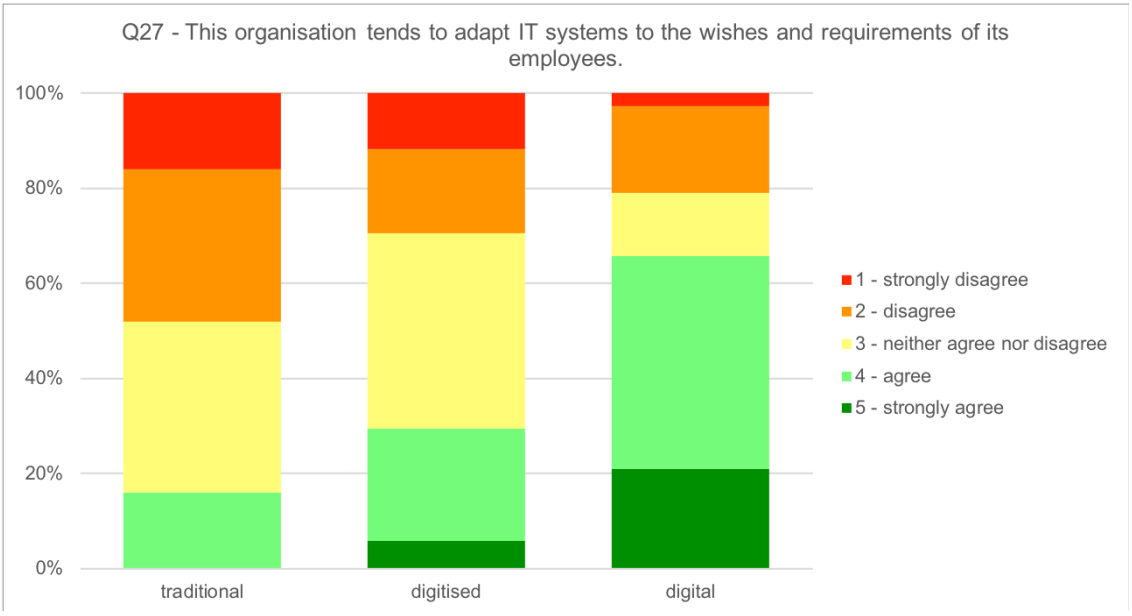

Figure 29 Compound Bar Chart of Item 27: Culture & IT connection

The Kruskal-Wallis test showed that the level of digitisation has a significant relatively strong effect on the tendency to adapt IT systems to the wishes of employees, $\chi^2(2) = 15.01$, $p < .001$, $\varepsilon^2 = .19$.

The Mann-Whitney U test showed that traditional and digitised organisations agreed to significantly lower extent on this item when compared to digital organisations ($U = 218.5$, $p < .001$; $U = 208$, $p = .029$). There was no statistically significant difference between traditional and digitised companies ($U = 164.5$, $p = .199$).

Item 28 - This organisation uses IT systems to communicate transparently about relevant business-related topics with its employees.

Finally, both digitised and digital companies agreed to a larger extent that their organisations use IT systems to communicate transparently about relevant business-related topics, compared to traditional companies. This result indicates a much higher degree of management transparency. The compound bar chart below shows an overview of the responses:

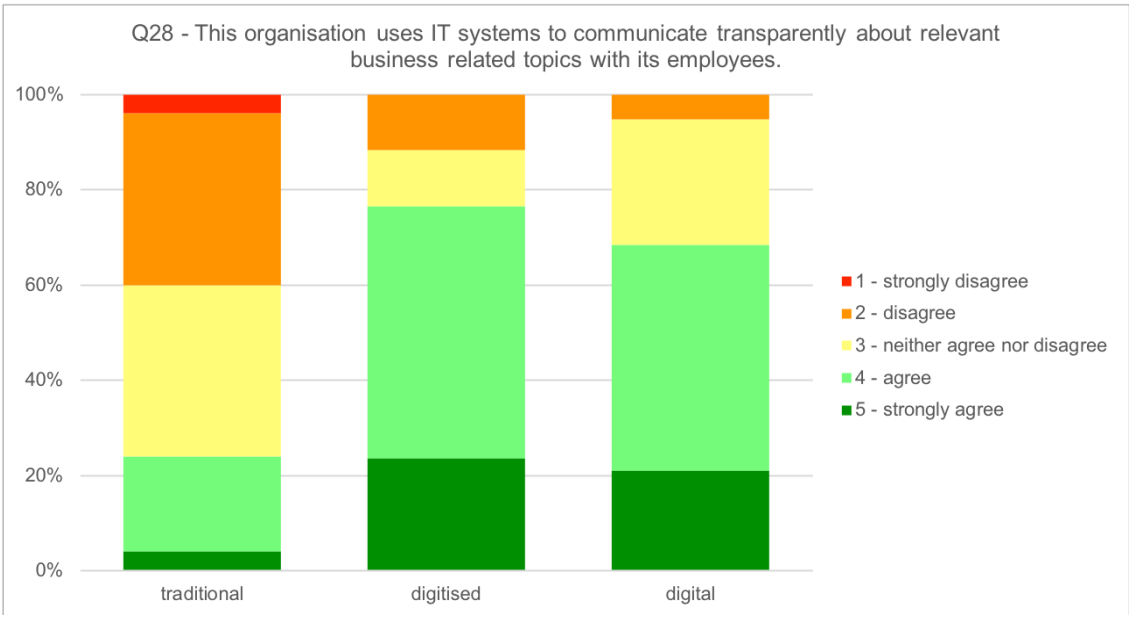

Figure 30 Compound Bar Chart of Item 28: Culture & IT connection

The Kruskal-Wallis test showed that the degree of digitisation has a significant relatively strong effect on the usage of IT systems to communicate topics transparently with employees, $\chi^2(2) = 17.44$, $p < .001$, $\varepsilon^2 = .22$.

The Mann-Whitney U test showed that traditional organisations agreed to significantly lower extent on this item when compared to digital and digitised organisations ($U = 211$, $p < .001$; $U = 93.5$, $p = .002$). Interestingly, digitised companies outranked digital organisations slightly in this item, but the difference was not statistically significant ($U = 305$, $p = .724$).