

Why should Incumbent Firms jump on the Start-up Bandwagon in the Digital Era? – A Qualitative Study

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Abstract. Due to ongoing digitalization, the traditional business models of incumbent firms are threatened by the innovation performance of start-ups. Therefore, a few incumbent firms have established programs to collaborate with start-ups in order to receive relevant impulses from them. However, empirically, there has barely been any insight into the specific role that start-ups play for incumbent firms. For this purpose, we present the key findings of our qualitative study, which has been built on interviews (n=35) with experts. Our results reveal that incumbent firms and start-ups have equally environmental factors affecting their decision-making in pursuit of digitalization. However, they differ in their technological and organizational factors. According to our findings, we have emphasized that collaboration between incumbent firms and start-ups could be an opportunity to meet the challenges of the digital era. They can build on these identified enabling factors of the partner and overcome their own inhibiting factors.

Keywords: Digitalization, Enabling and Inhibiting Factors, TOE Framework, Collaboration between Incumbent Firms and Start-ups, Qualitative Study

1 Introduction

Over recent years, new digital technologies have enabled lots of physical products and services to be turned into intangible digital content, such as the integrated usage of maintenance recommendations based on the vehicle data of a connected car in real time. Another example is the payment via a mobile wallet that promises infinitely more comfort in the daily life of consumers [1], [2]. The work environment has changed significantly as well. In particular, work models have become flexible and mobile, opened up by smartphones, tablets, and laptops so that individuals are no longer bound to any specific work space [3]. Last but not least, our present modes of communication have created a space for sharing and exchanging information on social media platforms [4].

The growing opportunities due to digital technologies – characterized by trends in information technology such as Social, Mobile, Analytics, and Cloud [5] – are forcing incumbent firms to rethink and realign their business models, and especially to change their operational processes and functional structures [6], [7]. Various conferences and expos focus on this issue, for example, Thinking Digital 2016 in the UK, Cebit 2016

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in Germany, the CEO2CEO Summit 2015 in the US, and even the annual meeting of the world economic forum in 2016. What is new in these discussions is that digital technologies have become the primary driver of innovation and reach the sphere of all industries and dissolve the market boundaries between industries. In particular, innovative products and services – especially those in digital form – have increasingly been placed in the center of consideration and are becoming a critical factor for success in the digital era [7], [8]. In addition, new entrants – especially start-ups from various industries – are represented in greater numbers than ever before. For instance, in 2015, the number of start-ups rose sharply, and it has been rising especially in Silicon Valley, London, and Berlin for the last several years [9]. Thereby, while start-ups are known as a major source of innovation because they use new technologies to invent products and services, and especially to develop digital innovations, incumbent firms are beginning to address the opportunities and challenges of digitalization [6], [10], [11], [12].

In the literature, the topic of digitalization in organizations is reflected in different ways. However, a holistic view of the connection between incumbent firms and start-ups in the context of digitalization has barely been investigated. As digital innovation is seen as crucial to the success of firms in creating new value for their business [8], a study is needed in order to analyze the pursuit of digitalization in incumbent firms and start-ups. Against this background, we have approached this field of interest with an observation about the causes of their opportunities and challenges in context of digitalization. In our study, we have used the adoption of digital technologies to create digital innovation as an outcome measure of digitalization. Information Systems (IS) research has broadly researched technology adoption at the individual and organizational levels. However, none of these studies have explained the adoption of digital technologies with specific relevance to creating digital innovation by comparing incumbent firms with start-ups. By taking these observations together, the addressed research question is: ***What factors influence the decision to adopt digital technologies in order to create digital innovations by incumbent firms and start-ups?*** To generate insights into this emergent phenomenon of digitalization and an understanding of the different perspectives of experts, we conducted an exploratory study based on interviews with 23 executive managers (most of them CEOs and CIOs) from various incumbent firms, as well as with 12 founders of start-ups. The objective of this study was to retain the richness of the phenomenon while studying the linkage between known but less researched factors of incumbent firms' and start-ups' decision-making in the context of digitalization. Thereby, the variety of the identified factors was sorted by the technology-organization-environment (TOE) framework, which is suited to our understanding of the affects of these factors. In particular, based on our findings, we have illustrated what role start-ups play for incumbent firms and why collaboration between both is a great opportunity to meet the challenges of the digital era.

The paper is structured as follows: First, we provided a brief overview of the theoretical background and related work to mark off the research field. Then, we described how the exploratory study was designed and how the interviews were executed. Thereby, we have presented our sample of 23 executive managers of incumbent firms and 12 founders of start-ups. In addition, we have presented the empirical results and integrated our findings by utilizing the TOE framework in a

sorted form. Therefore, the results of our paper provide a holistic view of the enablers and inhibitors that are relevant for incumbent firms and start-ups in the digital era. Afterwards, we discussed our key findings and illustrated an approach to future work. Finally, we concluded by describing the limitations of and contributions to research and practice.

2 Theoretical Background and Related Work

The sociotechnical process of applying new technologies to broader social and institutional contexts comprises the term “digitalization” [2], [13]. Currently, there is a new wave of digitalization because the growing role of digital technologies is changing the way firms relate to their customers [14]. The objective of today’s discourse on digitalization is not only to improve efficiency based on new technologies, but also to create new business value with innovative products, services, or business models – especially in the form of digital innovation, which is embodied in or enabled by IT [8], [12]. In particular, SMAC can serve as a holistic basis and equip an organization to create digital innovations in context of digitalization [5]. Thereby, an organizational innovation is defined as the first use of an idea in terms of a product, process, or service that is new or improved to the organization adopting it [15], [16], [17].

In IS research, there have been some studies conducted and empirical evidence found for the impacts of digitalization on organizations. For instance, IS researchers have investigated the IT-enabled transformational change in organizations, the importance of a digital business strategy, changes in the producer-consumer relationship, and the managerial tasks of a chief digital officer [6], [7], [18], [19]. In addition, there are concepts for classifying organizations into types of digital maturity levels [e.g. 20]. However, research in the field of digitalization with a focus on whether incumbent firms and start-ups – despite culture clashes – fit together well can hardly be found. Only a few studies exist that have made collaboration between incumbent firms and start-ups a subject of discussion; however, the specific role of start-ups for incumbent firms has not been investigated in this context. Rather, it has been found by researchers that, when both work together, it is a balancing act, as it is a cooperation and competition at the same time. In addition, it is also about strategies for dealing with emerging cooperative competitive tensions [21]. Although some incumbent firms have a great interest in cooperating and although they have great advantages in open innovation [22], [23]; another study has resulted in a more differentiated result: The choice of the wrong cooperation partner does not promote the innovation of both sides. Above all, startups, by and large, are dissuaded from cooperation with multinational firms [24].

To illustrate the specific characteristics of start-ups related to incumbent firms, the life-cycle approach could be used. This approach is based on the assumption of the ideal-type stages of a firm: introduction, growth, maturity, and decline. Start-ups can be categorized into the introduction and growth stages. These stages characterize high investment costs via extraction of necessary resources, which usually causes low turnover [25]. Besides that, there are lots of start-ups that have very low investment costs, as they only sell digitized products or services without huge production costs.

Generally, start-ups are not bound to a specific industry. However, a distinguishing characteristic of start-ups can be the degree of innovation. An innovative start-up has a solid foundation for creating technology-specific innovation. In particular, high flexibility and digital know-how enable start-ups to quickly implement ideas as the innovative digital products and services [26], [27], [28]. In the growth stage, firms successfully penetrate the market. The growing size of firms indicates the standardization and professionalization of all the operational systems and processes. Incumbent firms are located at the end of this growth stage when reaching the maturity stage [25]. Thereby, incumbent firms are characterized by their good position in the market [29]. Despite incumbent firms and start-ups differing on characteristics, it can be assumed that both address the opportunities and challenges of digitalization [30]. With this in mind, a holistic view of the factors influencing the adoption of digital technologies in consideration could be useful for understanding the decision-making in the context of digitalization from the two parties' perspectives. A broadly used framework in the field of organizational technology adoption is the TOE framework. Accordingly, technological innovation decision-making is influenced by technological development, organizational, and environmental dimensions. The TOE provides a set of factors that are relevant: The technological context includes the availability and characteristics of technologies. Factors in the organizational context are formal and informal linking structures, communication processes, firm size, and slack. The environmental context describes factors outside of the organization. These include in particular industry characteristics and market structure, technology support infrastructure, and government regulation [31]. Previous studies provide relevant factors as well [32], [33], [34], [35], [36], [37]. However, a holistic view of the factors that influence a specific kind of organization's adoption, such as that which compares incumbent firms with start-ups directly of a particular technological innovation (e.g., digital innovation), is missing. Furthermore, to our knowledge, existing studies have not focused on incumbent firms and start-ups with a holistic view or with the aim to analyze how these different factors of incumbent firms and start-ups could fit together. Following this line of thought, the applicability of the TOE framework supports our research by integrating our findings in a sorted form.

3 Research Study

The qualitative study presented here was a research project that investigated effects on and outcomes of digitalization in business and science. In this paper, we have presented relevant factors influencing decision-making in the context of digitalization – identified by statements from incumbent firms and start-ups – with the aim to gain insights about the role of start-ups for incumbent firms.

As described earlier, this study is focused on a relatively new phenomenon. Against this background, we decided on qualitative research with an explorative design. The explorative approach allowed us to analyze data material in areas in which only limited knowledge exists [38], [39]. Our qualitative study has been built on interviews with experts. Generally, an expert is a person with special knowledge of a subject area [40]. For the interviews, a semi-structured guideline was used with questions that were designed to generate comparability of results and were selected in

order to preserve the exploratory character [38]. This guideline ensured that all interviews covered the main topic, and it allowed us to address the peculiarities of the respective firms' contexts.

In the following, the sample and data collection process, as well as the data analysis method, are described in detail.

3.1 Sample and Data Collection Process

The focus of this paper is to present the differences between incumbent firms and start-ups by identifying the influencing factors for adopting digital technologies in the context of digitalization.

Interviewees were first asked about the importance of digitalization in their organizations, then about the activities in the areas of projects in terms of digital innovations, strategy, processes, leadership style, and culture. Thereby, the interviewees would give insights into their own field of activities, as well as a holistic view of their organization across all departments.

Firstly, we concentrated on interviews with executive managers (most of them CEOs and CIOs) of well-known and well-established firms from various industries, such as consulting, product-oriented, and service-oriented firms. With the intention of developing a uniform and industry-nonspecific picture of firms, experts were selected from various industries. Within the incumbent firms, we decided to interview managers from the strategic level because they determine the strategy of the firm and have a holistic cross-functional organizational overview. This view is crucial, as digitalization affects all functions of a firm [6], [7]. In addition to these interviews with managers of incumbent firms, we conducted interviews with founders of various start-ups. The start-ups interviewed were required to have technology-based business models with the focus on business-to-business (B2B) and business-to-consumer (B2C). This was because of the assumption that they would demonstrate a high degree of innovation performance in context of B2B and B2C [10], [11].

The expert interviews were conducted during the period between June 2015 and August 2015. In total, the sample was comprised of 35 interviews with 23 executive managers (hereby abbreviated as "IF" for "incumbent firm") and 12 founders of start-ups (hereby abbreviated as "SU" for "start-up"). All the interviewees from the incumbent firms had a proactive role and extensive staffing/budget responsibility within their firms at the time of the interview. Beyond that, all the founders of start-ups interviewed had been managing their business for at least one year. Table 1 provides an overview of the 35 experts interviewed. Thereby, we ranked each group by founding year, because, in all likelihood, the older the organization, the more established the existing business model.

Table 1. Overview of experts interviewed

Group IF: Executive managers of incumbent firms									
ID	Respondent's Position	Firm Sector	Founding Year	Employees (in 2015)	ID	Respondent's Position	Firm Sector	Founding Year	Employees (in 2015)
IF-01	CIO	Banking & Finance	1870	101.104	IF-13	CEO	Consulting	1992	280
IF-02	CEO	Manufacturing	1895	5.600	IF-14	Senior Vice President	Transport	1994	300.000
IF-03	Board IT	Insurance	1922	14.505	IF-15	Head of Global IT Enterprise	Pharmaceutical	1995	39.639
IF-04	CEO	Manufacturing	1945	5.700	IF-16	CEO	Enterprise Software	1998	400
IF-05	Division Manager	Transport	1947	20.720	IF-17	CEO	Software	1998	250
IF-06	CIO	Transport	1953	119.559	IF-18	Division Manager IT	Energy Supplier	1998	2.732
IF-07	Regional CEO	Manufacturing	1953	6.831	IF-19	Senior Vice President IT	Consulting	2000	45.990
IF-08	CEO	Enterprise Software	1969	4.421	IF-20	Executive Partner	Consulting	2000	60
IF-09	Senior Vice President	Enterprise Software	1972	76.986	IF-21	CEO	Enterprise Software	2000	50
IF-10	CEO	Manufacturing	1976	1.120	IF-22	CEO	Consulting	2002	65
IF-11	Chairman of the Board	Consulting	1989	400.000	IF-23	CEO	Consulting	2007	50
IF-12	Managing Partner	Consulting	1989	212.000					
Group SU: Founders of start-ups									
ID	Business Field	Business Model Orientation	Founding Year	Employees (in 2015)	ID	Business Field	Business Model Orientation	Founding Year	Employees (in 2015)
SU-01	IT Security	B2C	2012	3	SU-07	Big Data	B2B	2014	6
SU-02	Legal Tech	B2B	2013	4	SU-08	Mobile App	B2B	2014	4
SU-03	Online Marketing	B2B	2013	14	SU-09	IT Security	B2B	2015	4
SU-04	Digital Printing	B2C	2014	2	SU-10	IT Security	B2B	2015	2
SU-05	Online Recruiting	B2B	2014	24	SU-11	IT Energy	B2C	2015	2
SU-06	Online Training	B2B	2014	10	SU-12	Mobile App	B2C	2015	6

The interviews were held in private spaces and lasted an average of 45 minutes. All interviews were recorded. For easier analysis, the recorded material was transcribed. This process resulted in 309 DIN A4 format pages of transcripts.

3.2 Data Analysis Method

The aim of the data analysis was to retain and provide essential contents by abstracting a manageable collection of data that still illustrated a reflection of the data material. Characteristic of this type of examination is the methodological technique “content analysis” [41]. Thereby, we have used an inductive approach, as we have not had theoretical assumptions in context of our research. Against this background, the categories were derived inductively from the transcribed interviews and, thus, were not predefined or derived from existing theory. Based on the content analysis technique and following the reducing code rules, the data material was reduced into an abstract form in order to paraphrase and generalize the data material by maintaining only the parts of substantial content, which was finally divided into categories [42], [43]. For instance, the quotation of an expert “*Each new project, such as one based on digitalization to create digital innovation, always presupposes a well-realized application platform. [...] we have a well-functional basis that provides a functional IT System within our firm.*” (IF-19)” was coded – after a paraphrasing and generalizing process – to category ‘Solid IT Infrastructure’. As required, corresponding points in the material were assigned to the newly formed categories.

To achieve reliability in our analysis, multiple people (three in total) coded and analyzed the data material by using a software tool [44]. Thereby, we have combined

all the categories together and marked only those that were coded by all. Afterwards, we have filtered them by factors that are relevant in each respective incumbent firm and start-up. Finally, the categories were filtered again by relevance in terms of representing insights into factors influencing incumbent firms' and start-ups' decision-making in context of digitalization.

4 Empirical Results

To illustrate our key findings in a comprehensive view, the relevant categories were summarized into thematically related groups. For instance, the categories 'solid IT infrastructure' and 'access to broadband' were summarized into '**Available Technical Equipment**'. As a result, these groups stand for 15 influencing factors for each respective incumbent firm and start-up that exist across all industries. In particular, we found that factors can be enablers or inhibitors and differ partially, depending on the incumbent firm or start-up. Thereby, enablers help to promote the adoption of digital technologies, while inhibitors prevent their adoption [45]. It is possible that the same factors may be rated differently depending on the organization in which they occur, as is presented in our study.

Due to the variety of the identified factors, in the following, the influencing factors have been sorted into an aggregated form based on the TOE framework. Accordingly, the factors were classified as technology, organization, and environment, whereby these mutually influence each other. As illustrated in Figure 1, the factors of incumbent firms and start-ups have been sorted by enabling factors (the symbol "+") and inhibiting factors (the symbol "-"). Thereby, the symbol "+" means that the identified factor has an enabling effect, and the symbol "-" means that the factor has an inhibiting effect on the decision-making of incumbent firms and start-ups in the context of digitalization.

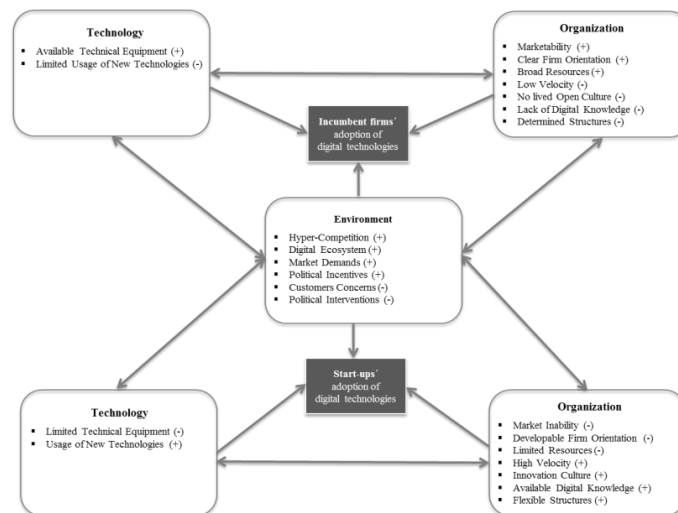


Figure 1. Influencing factors for decision-making in the context of digitalization

The factors illustrated above mark the enablers and inhibitors that pave the way for understanding the similarities and differences between incumbent firms and start-ups. As the factors originate from the statements from the interviews, the definitions of the factors can be derived from the explanations of the experts interviewed. In the following, we have described some examples of each technological, organizational, and environmental factor in incumbent firms and start-ups.

The technological context includes the internal and external technologies that are available for an organization and that fit with an organization's current technology. For many IT solutions to work, firms need '**Available Technical Equipment**', which allows the performing of digital-based projects. Some experts from incumbent firms stated that a 'solid IT infrastructure' is a highly relevant enabler for them to operate without problems. Furthermore, 'access to a broadband connection' is a basic prerequisite for and enabler of efficient use of modern IT solutions in the digital era. In particular, for projects to develop digital products and services, available technical equipment is needed in order to build upon on this foundation. In contrast, '**Limited Technical Equipment**' causes start-ups to be restricted in their business actions. Some start-up interviewees stated that their 'IT infrastructure was not comprehensive' and hindered them in implementing further digital solutions based on existing ideas. Furthermore, some founders of start-ups stated that a 'reduced broadband connectivity' led to fewer additional digital services within their business models.

The organizational context encompasses the characteristics and resources of an organization. Thereby, '**Marketability**' is an essential factor for incumbent firms. This means that 'capability due to experience in business' enables incumbent firms to operate in the market with perseverance. Moreover, they have an understanding of environmental dynamics. Furthermore, 'product and service portfolio' is an enabler that represents a solid foundation for extending functional business to a digital business model. However, start-ups are not able to act in their business field due to '**Market Inability**'. This is attributable to their 'lack of experience in business' and 'difficult access to customers', as mentioned by some founders of start-ups interviewed.

The environmental context includes, among others, the competition pressure in the course of ongoing digitalization. Thereby, '**Hyper-Competition**' especially leads to the rapid escalation of competitive tactics. Against this background, the executive managers of incumbent firms indicated that there were 'new entrants from various industries'. The founders of start-ups used the same line in relation to 'other start-ups'. Both indicated that hyper-competition enables the adoption of digital technologies, as it is crucial to keep a competitive advantage.

For a closer look at the results, we compared the factors of incumbent firms and start-ups and analyzed our key findings with a focus on the role of start-ups for incumbent firms. In the following, the factors are represented with sub-factors in order to highlight the relevance – stated by the interviewees – of the enabling and inhibiting factors. Thereby, relevance has been considered based on the following point-allocation: ■ = very high relevance (p=4), ▣ = high relevance (p=3), □ = low relevance (p=2), and ◻ = very low relevance (p=1). The findings have been rated according to the following formula: $\sum p/n$, with n=number of mentions per executive manager with respect to start-ups. In Table 2, the average relevance is shown for each respective factor.

Table 2. Merging both groups*

		Technology								
Incumbent Firms	Enabler	<input checked="" type="checkbox"/>	Solid IT Infrastructure	Available Technical Equipment	↔	Limited Technical Equipment	<input checked="" type="checkbox"/>	No comprehensive IT Infrastructure	Inhibitor	
		<input checked="" type="checkbox"/>	Access to Broadband Connection				<input checked="" type="checkbox"/>	Reduced Broadband Connection	Inhibitor	
		<input checked="" type="checkbox"/>	Legacy IT Systems	Limited Usage of New Technologies	↔	Usage of New Technologies	<input checked="" type="checkbox"/>	IT-Based Innovative Tools	Inhibitor	
		<input checked="" type="checkbox"/>	No Broad Utilization of Cloud Computing				<input checked="" type="checkbox"/>	Full Utilization of Cloud Computing	Inhibitor	
	Organization									
	Incumbent Firms	Enabler	<input checked="" type="checkbox"/>	Capability Due to Experience in Business	Marketability	↔	Market Inability	<input checked="" type="checkbox"/>	Lack of Experience in Business	Inhibitor
			<input checked="" type="checkbox"/>	Product and Service Portfolio				<input checked="" type="checkbox"/>	Difficult Access to Customer	Inhibitor
			<input checked="" type="checkbox"/>	Digital Business Strategy	Clear Firm Orientation	↔	Developable Firm Orientation	<input checked="" type="checkbox"/>	Strategic Goal Still in Development	Inhibitor
			<input type="checkbox"/>	Process Orientation				<input type="checkbox"/>	Non-professional Flowcharts	Inhibitor
			<input checked="" type="checkbox"/>	Comprehensive Workforce	Broad Resources	↔	Limited Resources	<input type="checkbox"/>	Mini Manpower	Inhibitor
			<input type="checkbox"/>	Available Budget				<input checked="" type="checkbox"/>	Scarce Budget	Inhibitor
			<input checked="" type="checkbox"/>	Hierarchical Structures	Low Velocity	↔	High Velocity	<input checked="" type="checkbox"/>	Flat Organization	Inhibitor
		<input checked="" type="checkbox"/>	High Quality Requirements	<input checked="" type="checkbox"/>				No Long Discussions	Inhibitor	
		<input checked="" type="checkbox"/>	Longstanding Methods	No Lived Open Culture	↔	Innovation Culture	<input checked="" type="checkbox"/>	Agile Working Methods	Inhibitor	
		<input checked="" type="checkbox"/>	Missing Entrepreneurial Spirit				<input checked="" type="checkbox"/>	Willingness to Dare	Inhibitor	
	<input type="checkbox"/>	Older Top Management	Lack of Digital Knowledge	↔	Available Digital Knowledge	<input checked="" type="checkbox"/>	Trial-and-Error Attitude	Inhibitor		
	<input checked="" type="checkbox"/>	Aging Workforce				<input checked="" type="checkbox"/>	Digital Natives	Inhibitor		
	<input checked="" type="checkbox"/>	Limited Experiences in Big Data	Determined Structures	↔	Flexible Structures	<input checked="" type="checkbox"/>	Deal with Big Data	Inhibitor		
	<input checked="" type="checkbox"/>	Low Availability of IT Professionals				<input checked="" type="checkbox"/>	Jack of All Trades	Inhibitor		
	<input checked="" type="checkbox"/>	Inefficient Interaction of Business and IT				<input checked="" type="checkbox"/>	Co-working Spaces	Inhibitor		
	<input type="checkbox"/>	Fixed Workplaces				<input checked="" type="checkbox"/>		Inhibitor		
Environment										
Incumbent Firms	Enabler	<input checked="" type="checkbox"/>	New Entrants from Various Industries	Hyper-Competition			<input checked="" type="checkbox"/>	Other Start-ups	Inhibitor	
		<input checked="" type="checkbox"/>	Knowledge Exchange with Start-ups	Digital Ecosystem			<input checked="" type="checkbox"/>	Knowledge Exchange with Other Start-ups	Inhibitor	
		<input type="checkbox"/>	Platforms for Digitalization Topics			<input checked="" type="checkbox"/>	Platforms for Start-ups	Inhibitor		
		<input checked="" type="checkbox"/>	Customer Expectations	Market Demands			<input checked="" type="checkbox"/>	Venture Capital Investors	Inhibitor	
		<input type="checkbox"/>	Funding Programs	Political Incentives			<input type="checkbox"/>	User Entrepreneur	Inhibitor	
		<input checked="" type="checkbox"/>	IT Security Concerns	Customers Concerns			<input checked="" type="checkbox"/>	Funding Programs	Inhibitor	
Incumbent Firms	Enabler	<input checked="" type="checkbox"/>	IT Security Concerns	Customers Concerns			<input checked="" type="checkbox"/>	IT Security Concerns	Inhibitor	
		<input checked="" type="checkbox"/>	Law Protection of Data			<input checked="" type="checkbox"/>	No Openness Due to Unknown Name	Inhibitor		
		<input type="checkbox"/>	Regulatory Requirements	Political Interventions			<input checked="" type="checkbox"/>	Law Protection of Data	Inhibitor	
						<input type="checkbox"/>	Bureaucratic Expenditure	Inhibitor		

*A list of all the factors, with corresponding descriptions, is available from the authors upon request.

As seen in Table 2, incumbent firms and start-ups share equal environmental factors in the digital era. For instance, interviewees from both positions stated that ‘**Hyper-Competition**’ is a great enabler for promoting decision-making in the context of digitalization in their own firms. Aside from that, they had been facing ‘Customer Concerns’, which inhibit incumbent firms and start-ups equally. However, although the environmental factors of incumbent firms and start-ups are equivalent, the factors of technology and organization differ significantly. Thereby, the technological and organizational enabling factors identified in incumbent firms are similar to the inhibiting factors of start-ups, and, likewise, the inhibiting factors of incumbent firms are similar to the enabling factors of start-ups. For instance, the organizational enabling factor ‘**Marketability**’ for incumbent firms is missing in start-ups and can be compared with the inhibiting factor ‘**Market Inability**’. Beyond this, there is also the indication that the inhibitors of incumbent firms can correspond directly with the enablers of start-ups. For instance, the technological inhibiting factor ‘**Limited Usage of New Technologies**’ for incumbent firms can be compared with ‘**Usage of New Technologies**’ for start-ups: While incumbent firms would have liked to implement a higher level of cloud computing if they had not had concerns about their data, start-ups did not have concerns about using cloud computing solutions.

5 Discussion of Findings

To illustrate and discuss the new findings of our research, we have compared our results with those of existing studies. We have drawn on relevant studies with respect to the specific context of the organizational adoption of technological innovation, which can be associated with digital technologies. These include in particular adoption of cloud computing, customer-based interorganizational system (IOS), e-business, e-commerce, and mobile business. An overview of the relevant factors is provided in Table 3.

Table 3. Overview of the relevant factors

		Innovation
Technological factors	Complexity [32], [35]	Cloud Computing
		Customer-Based IOS
	Compatibility[32], [35]	Cloud Computing
		Customer-Based IOS
	Technology Competence (e.g., IT-Infrastructure) [33], [36], [34]	E-Business
E-Commerce		
Organizational factors	Unresolved Technical Issue [36]	E-Commerce
	Interoperability [36]	
Organizational factors	Top-Management Support [32]	Cloud Computing
	IS Experience [32]	
	Firm Scope [33], [34]	E-Business
	Top Management Support [36], [35]	Customer-Based IOS
		E-Commerce
	Strategy in terms of Technology [36]	E-Commerce
	Cost-Benefit Assessment [36]	
	Financial Commitment [34]	E-Business
Managerial Obstacles [37]	Mobile Business	
Environmental factors	Competitive Pressure [32], [33], [34], [35], [37]	Cloud Computing
		E-Business
		Customer-Based IOS
		Mobile Business
	Trading Partner Readiness [33]	E-Business
	Consumer Readiness [33]	
	Customer Interaction [35]	Customer-Based IOS
	Legal Issue [36]	E-Commerce
Regulatory Support [34]	E-Business	

In a comparison of the factors presented above with our findings, it can be noted that there is at least one newly identified factor in each dimension of the TOE separated between incumbent firms and start-ups: In the technology context, the factors **‘Limited Usage of New Technologies’** in incumbent firms and **‘Usage of New Technologies’** in start-ups have been identified; **‘Marketability’**, **‘Low Velocity’**, **‘No lived Culture’**, and **‘Determined Structures’** in incumbent firms and **‘Market**

Inability, **High Velocity**, **Innovation Culture**, and **Flexible Structures** in start-ups have been identified as organizational factors; and **Digital Ecosystem** in both represents an environmental factor. The rest of our findings can be found in a similar form in existing literature.

Besides the new identified factors, based on our key findings, we have been able to investigate whether incumbent firms should collaborate with start-ups in the digital era. Basically, the bigger a firm, the higher the probability – despite sufficient relevant resources, such as budget and technical equipment – that they will have lower innovative performance, due to, for example, inertia [29], [46]. In contrast, start-ups have relevant enablers for adopting digital technologies to create digital innovation, which are important in the digital era. However, incumbent firms have several inhibiting factors for adopting digital technologies to create digital innovation; hence, collaboration with start-ups can be an opportunity to balance these factors. In addition, incumbent firms also have relevant enabling factors that start-ups need for expanding their efforts in the field of digital innovations.

It has become visible that incumbent firms and start-ups complement each other perfectly and have the potential to collaborate with each other in an appropriate form. Against this background, the approach of open innovation can be an option for initiating collaborations between incumbent firms and start-ups. This potential was also emphasized by some of the executive managers of the incumbent firms: *“We are definitely interested in working with start-ups”* (IF-18). Start-ups are seen as providing a chance to create innovative products and services, as pointed out by one interviewee in following words: *“It is a great opportunity for large firms to work with start-ups – you can find your missing impulses right there”* (IF-13). These and other quotations paint a picture of incumbent firms being interested in collaborating with start-ups, as well as hoping to learn from them. In particular, incumbent firms can use start-ups to create an entrepreneurial organization with the aim to stimulate the expansion of competence and, across all departments, to build up the ability to act and operate entrepreneurially. Moreover, with collaboration with start-ups, new business areas can be pursued [47], [48].

However, when it comes to a concrete activity on which to collaborate with start-ups, start-ups have criticized incumbent firms’ restricted openness towards collaboration. One founder of a start-up described it this way: *“Cooperation partners are very important for achieving drive in our target market. However, discussions with potential partners do not lead to positive results”* (SU-11). In the same line of thinking, some founders of start-ups stated that incumbent firms had *“difficulties with cooperation because they do not understand our innovative product and services”* (SU-02). This reproach could be explained by the assumption that *“potential cooperation partners do not really see the potential of our business model”* (SU-04). To sum it up, while some incumbent firms want to collaborate with start-ups, there are apparently some noticeable hurdles. This conflicts with some popular views and raises a fundamental question concerning the usefulness of collaboration between incumbent firms and start-ups to pursuing increased innovation performance on both sides. Currently, the design of corporate start-up programs is being intensely examined, especially with regard to the joint development of new and innovative ideas [23]. At the same time, many programs are promising success, in which the start-ups should profit from the experience and resources of the incumbent firms.

Often, however, studies on this topic have mainly been based on the experience of the incumbent firms, or on the prerequisites and recommendations for successful collaboration for managers of incumbent firms [22].

6 Conclusion, Limitation, and Outlook

On the grounds of reflection on the enabling and inhibiting factors influencing the incumbent firms' and start-ups' decision-making in the context of digitalization, we have been able – in our opinion – to present newly identified influencing factors that were sorted by the TOE framework. Alongside this, we have analyzed the similarities and differences between incumbent firms and start-ups: In particular, we have found out that the technological and organizational enabling factors in incumbent firms are similar to the inhibiting factors in start-ups, and the corresponding inhibiting factors in incumbent firms are similar to the enabling factors in start-ups. In consideration of how inhibitors can develop into enablers, incumbent firms as well as start-ups can approach each other to overcome their respective inhibiting factors. There are already a few incumbent firms trying to establish structures in which to collaborate with start-ups. For instance, corporate-startup programs, namely, accelerator programs like the accelerator program “Microsoft Ventures” and the newly founded “InnoJam++” event from SAP in cooperation with Volkswagen. However, there are lots of incumbent firms that have not yet recognized the opportunity of cooperating with start-ups to meet their challenges in the digital era. Against this background, we assume that our results could have an impact on the reinforcement of incumbent firms' willingness to collaborate with start-ups.

As in any study, our qualitative research has been constrained by some limitations. However, at the same time, these limitations provide avenues for further research. Due to the interpretive nature of our research, the results we have described represent the sense-making process of the researchers. Subjective personal judgments cannot be ruled out completely, even though we took great care to reflect the subjects' opinions as correctly as possible. Moreover, the factors have been derived from the views stated by the interviewees. It cannot be ruled out that there are more factors that we have not identified in our study. Besides that, it is difficult to make quantitative predictions. Therefore, it is necessary to validate our results with an extensive investigation based on a quantitative study. Nevertheless, despite the limitations, our study makes three major contributions: *Firstly*, we have illustrated influencing factors that are relevant to incumbent firms' and start-ups' decision-making in pursuit of digitalization. In particular, we have provided new findings related to enabling and inhibiting factors from a holistic viewpoint as a basis for the research discussion. *Secondly*, for practitioners, we have shown the potential of start-ups as cooperation partners and have emphasized that incumbent firms should collaborate with start-ups in order to be competitive in the digital era. *Thirdly*, we have indicated that hurdles exist in efforts to collaborate, which should be investigated in detail in future research. Against this background, it would be interesting to analyze the following main question: What factors, and how do those factors, influence collaboration between incumbent firms and start-ups in the context of the digital era? Thereby, the dyadic relationship should be considered in this investigation, with the primary aim of

figuring out what factors are relevant from a two-sided perspective, as our results have illustrated that there remains an area of tension. Thus, it is advisable to examine precisely which hurdles exist in order to determine a balance that can be crucial for the success of the collaboration between incumbent firms and start-ups.

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