DIGITAL ENTREPRENEURSHIP
CHALLENGES AND IMPACT (VOLUME 2)

TAANI PUROHIT

Digital Entrepreneurship: Challenges and Impact (Volume 2)

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Entrepreneurial mindset and the digital transformation in one Estonian private business school

Mari Kooskora

Abstract

This chapter focuses on entrepreneurial mindset in digital transformation and presents a short case study about leading the digital transformation in one Estonian private business school, where the ongoing digital process has changed the organisation itself and also the ways how students are taught and trained for coping and leading in the digital world. In order to better understand the context and environment, a brief introduction to the digitalisation topic and slightly more detailed overview of digitalising in higher education sector is provided first.

1 Introduction

We can argue that among different transformations taken place within entrepreneurial activities, there has been a major shift to digitalisation that has rapidly intensified especially during the last decade. Different authors have conceptualised and described digitalisation in different ways, but they all have agreed that digitalisation has and still is one of the major transformations which has changed the ways how work and business are done and that affects basically everything around us. Today digitalisation and the need for digitally savvy people is present everywhere. This also applies to the universities, both as organisations and as teaching institutions. Universities need to transform themselves to become more digital and they also need to help their students to cope and lead these digitalisation processes within their own organisations. Estonia is a country that is known for its digital

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development and in very many areas digital services have already practically replaced the traditional paper-form and person-to-person interactions among state, people and businesses and digitalisation in all areas has even become a norm and normative need in the society. Education sector is no different and 'the educational revolution in Estonia aims to implement modern digital technology more efficiently and effectively in learning and teaching' (Education e-estonia 2018). However, digitalisation and digital technologies are just tools, to help people and make interaction and services better and easier for them; the success of the transformation always depends on the culture and mindset, values and ethical considerations of people, especially of those who lead this change. This chapter focuses on entrepreneurial mindset and presents a short case study about leading the digital transformation in one Estonian private business school, where the ongoing digital process has changed the organisation itself and also the ways how students are taught and trained for the changes needed to be coped and lead in the digital world. In order to better understand the context and environment, a brief introduction to the digitalisation topic and slightly more detailed overview of digitalising in higher education sector are provided first.

2 Importance and Impact of Digitalisation

In today's highly competitive business environment, it is vital for organisations, both public and private (Grönroos 2006), to change as the environment and people's needs have already changed significantly and keep changing in the future, and therefore focusing on change processes is extremely important. One of the major transformations of today's world is digitalisation and together with globalisation these have brought along a much faster and less predictable environment whereas today's technology accelerates the speed at which companies make decisions and process information (see Earley 2014).

When trying to create the understanding of digitalisation, we see that it is a wide topic where multiple definitions exist. For example, Patel and McCarthy (2000) were among the first people to mention the concepts of digitalisation and digital transformation, however they did not conceptualise either of the terms. More recently, Ilmarinen and Koskela (2015) describe digitalisation to be the biggest transformation of our generation and see digitalisation as a process where digital technology is used in order to benefit all parts of life, thus enabling both the societies and organisations to create new opportunities to grow, improve, change and renew themselves.

Westerman et al. (2014) define digitalisation as the usage of different digital technologies to change existing business models or provide new revenue and value-producing opportunities, whereas the authors find that replacing workers with automation processes can save significant amounts of time (Westerman and Bonnet 2015). Several authors (e.g. Kvist and Kilpiä 2006; Ilmarinen and Koskela 2015; Matt et al. 2015) see digitalisation as a transformation process, which involves

changing organisation's key business operations into a digital form, while affecting products and processes, but also organisational structures and management concepts.

Digitalisation was made possible by rapid technological progress and devices with increased computing power performing more demanding tasks and enabling digital services of higher quality (Mollick 2006) have accelerated its speed. Besides the higher quality and computing power of devices, the prices of smartphones with complex technological attributes have decreased 50 times from 2007 to 2014 (Ismail 2014). Furthermore, the declining cost of storing, processing, replicating and distributing digits has given the organisations ability to shift their products and services to digital format (Grover and Kohli 2013) and ultimately implement new business strategies that can utilise the opportunities created by digitalisation.

The Internet already plays an indispensable role in the everyday life of billions (Bock et al. 2015). Being connected on the web has became a societal phenomenon and about 3 billion connected consumers and businesses (as well as governments and other organisations) search, shop, socialise, transact, and interact every day using personal computers and, increasingly, a broadening range of mobile devices. The digital economy is growing at 10 per cent a year, significantly faster than the global economy as a whole (ibid). Due to the rapidly increasing number of smartphones and tablets, billions of individuals and organisations have been able to fully take advantage of this digital revolution. Either purchasing music, books, newspapers, or any other item online, making banking transactions, being a communicator, whether through personal email, texting, watching published videos or providing digital services by themselves.

The impact of digitalisation is seen everywhere around the world. Digital technologies have changed operations in organisations and enabled far-reaching social and political changes. Today the digital economy is an increasingly important source of jobs, however also the reason of job losses for millions globally. Rapid and continuous technology developments are transforming the skills required for most existing jobs and creating completely new types of roles, and changing current job functions. Already more than 47% of people, even in remote areas, are online and the development of blockchain, advanced robotics, and the Internet of things presents a profound shift for the future (DMCC 2019). According to Snabe (2015), digitalisation provides a unique opportunity for global leaders to shape our future, however at the same time, also places a momentous responsibility on their shoulders to ensure these transformations will have a positive impact on business and society.

Acknowledging the increased competitiveness of the business world, Day-Yang et al. (2011) state that digital transformation has become increasingly essential for organisations that seek to survive and attain competitive advantage. Furthermore, according to Mok and Leung (2012), digitalisation enhances peoples' economic, political and social lives and thus it is fundamental for organisations to focus on the new trends it brings. While studying the strategies related to digital technology Fitzgerald et al. (2014) found most managers to believe in technology bringing transformative change to businesses and concluded that accomplishing digital transformation is critical for companies wishing to survive.

Therefore as complicated transformations take place, companies need to create management practices to oversee them and as above mentioned authors agree (e.g. Kvist and Kilpiä 2006; Ilmarinen and Koskela 2015; Matt et al. 2015) coordination, prioritisation and implementations of digital transformation can all be done successfully when a digitalisation strategy exists. According to Fitzgerald et al. (2014) technology opens routes to new ways of doing business and a clear plan helps the organisation to avoid mistakes in that process. In addition, Westerman (2016) also points out the new opportunities that digitalisation brings along and lists three technology-driven forces that are transforming the nature of management. These are automation, data-driven management and resource fluidity, whereas technology helps businesses to increase efficiency and productivity as well as innovation and customer satisfaction.

We can discuss further that digitalisation results from multiple different aspects. According to Tolboom (2016), one reason for digitalisation is the changing customer behaviour and demand. Customers today expect to get service faster and this had led organisations to offer online services that are constantly available for customers. Kvist and Kilpiä (2006) found one of the reasons for digitalisation to be companies' willingness and need to be more customer-centric, wanting to focus more on customers' relationships and making customers' lives easier. Ilmarinen and Koskela (2015) state similarly that with the possibilities digitalisation creates, companies can focus more on customer wishes and preferences. Another reason behind digitalisation is that organisations want to end using multiple services and channels for doing business and with digital services, all can be found in one place.

Additionally, Pagani (2013) highlights the competitive advantage, added value and higher profits that can be attained with the use of a digital business strategy. Fosic et al. (2017) acknowledge that while companies have had IT strategies for decades already, these were only to support the business strategy, and propose that companies should no longer have separate IT and business strategies, but just one digital business strategy that applies for both, the IT and business side. Thus by utilising a digital business strategy organisations can be more competitive in today's challenging business world.

3 Opportunities and Threats of Digitalisation

Several authors and also practitioners agree, that digital solutions can simplify systems, provide improvement in services, facilitate trade and make business activities faster and easier. According to Matt et al. (2015), the benefits of digitalisation include increases in sales and productivity and innovations in value creation. With digitalisation stakeholder interaction often increases as well and organisations can spend more time on customers, clients and other stakeholders when certain processes are digitalised. This was also affirmed in Berman's (2012) study which showed that companies wishing to gain opportunities from digitalisation should focus on reshaping customer value propositions and transforming

their operations to offer more customer interaction and collaboration. Furthermore, the research indicated that engaging with customers at every value creation point in the relationship, companies can differentiate themselves from competitors.

However, there are also threats related to digitalisation and one of these is losing customers in this process (Matzler et al. 2015) as not everyone is satisfied with transformation of traditional services into digital ones. The switching costs related to customer changing the supplier can be divided into three categories: financial costs, procedural costs and relationship costs. These switching costs can originate from financial aspects, and time and effort related matters or from old relationships ending and new ones beginning. Multiple studies (e.g. Hsu et al. 2011; Molina-Castillo et al. 2012) found that switching costs occur when a customer changes from one product to another, and customers considering to switch compare the revenue and costs of switching, and decide to stay when the costs of changing would become higher than the original costs. Additionally, Burnham et al. (2003) relate switching costs to switching intentions and behaviour. Further, it is proposed that companies can avoid switching costs by strategic planning and trying to minimise the negative affects of the change on customers.

According to Bentley (2012) modern economies, different industries and governments as well as societies rely on the help of computers and the digital format of text, audio and pictures and the modern world could not operate in the way it does without digitalisation any more. Grönroos (2006) sees one of the threats of digitalisation in the low level of knowledge that regular employees have of the technology they use. As the using new technology and computers have become so easy and intuitive, most people are unaware of the science behind them. Furthermore, Bentley (2012) claims that when technology related problems occur, ordinary employees are unable to fix them and while people with special IT skills are required to help it often takes time and means costs for the organisation. Related concerns are expressed by Fosic et al. (2017), who state that IT and Internet are not sufficient by themselves and that human capital is needed for operating with these devices.

Besides many important opportunities discussed above digitalisation makes people more dependent on technology and thus also more vulnerable. The risk of cyber incidents increases significantly and highlights the importance of cybersecurity. The Internet of things, big data, altering working and business environments, fundamental changes in value-added processes and business as such and the integration of digital and physical worlds in a so-called Industry 4.0 bring along new type of risks and threats. There is the fear of interruption and disruption due to the business and human challenges brought upon us by new business models and increasing competition, often coming from non-traditional players and ‘disruptive’ newcomers. With market entry barriers coming down and (the impact of) digitalisation speeding up, organisations find themselves with the challenge to perform in a volatile, uncertain, complex and ambiguous environment (I-Scoop 2016), and therefore businesses have no option but to be innovative and agile.

4 Entrepreneurial Mindset for Digital Transformation

To better cope with the new challenges related to various changes in the environment there is also a need for a new type of mindset, the way how and why we think about things we do and how we interpret the world, and new set of skills. The uncertainty around us creates high level of risks, but also great opportunities. Innovation starts with the right mindset (Meyers 2016) and according to McGrath and MacMillan (2000), uncertainty can be used for one's benefit when a person employs and develops an entrepreneurial mindset. Furthermore, Morris and Kuratko (2002) emphasise the need for entrepreneurial mindset especially in the current business environment and believe that for sustaining the competitiveness people must unlearn traditional management principles, be creative and innovative and have the ability to rapidly sense, act and mobilise.

Thus, the entrepreneurial mindset can be understood as a person's specific state of mind which orientates towards entrepreneurial activities and outcomes (Financial Times 2019), often in the pursuit of opportunity with scarce, uncontrolled resources. For Senges (2007) people with an entrepreneurial mindset are those who passionately seek new opportunities and facilitate actions aimed at exploiting these opportunities and according to Koe et al. (2012, 198) entrepreneurial people recognise opportunities, take risks, seize opportunities, and ultimately feel satisfaction. In doing so, these opportunities exist for business ideas and individuals who are able to identify them and exploit the ideas through the creation of new businesses to pursue their goals (Bygrave 1997), Kuratko and Hodgetts (2004) also interpret this as a dynamic process of vision, change and creation.

Digital transformation is one of the major changes in current business environment that gives people with entrepreneurial mindset the opportunity to enter the marketplace and provide innovative, often web- or data-based solutions, new products and services. The movement being stimulated by the fast pace of progress in the fields of mobile technology, big data, predictive analytics, cloud infrastructure, self-learning algorithms, personalisation and the growing dominance of information and communication technologies (Digital Transformation Initiative 2015) enables also new, but digitally minded entrepreneurial players to start up their companies and achieve great success, often relatively fast.

However, not all the people with entrepreneurial mindset become successful entrepreneurs, but only those who are really able to launch, manage, grow and promote new business (Humbert and Drew 2010). According to Maltsev (2016), entrepreneurs create and develop their own business using their own expertise and abilities and their own or externally borrowed resources. In doing so, the entrepreneur has to fulfil a wide variety of roles and activities in the creative and development process—from establishing a business development concept to running business processes (such as product manufacturing or customer service). While Coulter (2001) views entrepreneurship as a process in which a person or a group of people uses common efforts and measures to grow and pursues opportunities and goals, to create value through innovation and originality and thereby

fulfil their desires and needs then according to Timmons (1994) an entrepreneur can be considered a person who has the ability to create and construct a vision from virtually nothing and to make it work for his own benefit.

Although becoming a digital entrepreneur seems to be easier than so-called traditional entrepreneur and may be very attractive opportunity for many, it requires certain characteristics that all people with entrepreneurial mindset may not possess. Even when each entrepreneur is unique there are several common features that can be highlighted. Among these, Costin (2012, 14) has listed intelligence, independence, high motivation, energy, initiative, innovation orientation, creativity, desire for success, originality, optimism, self-confidence, dedication, ambition, perseverance, activity, good leadership and leadership qualities, and the willingness and courage to take risks. However, entrepreneurs with right entrepreneurial mindset and required leadership skills and characteristics have better chance to succeed than those without, whether in digital or non-digital businesses.

Moreover, entrepreneurs are increasingly confronted with different precarious situations, while also experiencing a great deal of time stress, fatigue and strong emotions. Even in these intensive circumstances, they are more susceptible to mistakes, both in their decision-making process and in their judgment and reasoning (Baron 1998). This, in turn, may culminate in ethically questionable or unethical behaviour (Rutherford et al. 2009). According to Shane (2003), such tensions when entrepreneurs are more likely to exhibit unethical behaviour are most likely to arise during the foundation or start-up phase of companies, because starting entrepreneurs do not yet have the necessary social connections and feel pressure to prove and establish themselves as successful entrepreneurs.

Payne and Joyner (2006) believe that the propensity to face ethical dilemmas may also stem from the need to balance one's own values, customer needs, employee expectations, and responsibilities towards stakeholders, including shareholders. Likewise, (especially start-up) entrepreneurs can be self-centred and inclined to self-interest (Baron 1998), with a degree of self-justification due to their strong passion and high commitment to their business idea. Being a digital entrepreneur requires strong leadership, focus and discipline, moreover the only way businesses can succeed at digital transformation is to create digital entrepreneurs, people who have the necessary skills and mindset.

Furthermore, the concepts of right principles, values, ethics and responsibility have become even more important with the fast emerging digital transformation (see also Kooskora 2013; BBVA 2012). During the time of great changes it is utmost important to define what is right and wrong, good and bad, acceptable and not acceptable and both in theory and in practice, generally and in specific circumstances. For that people need clear guidelines, that can be helpful in dealing with ethical issues such as fairness, safety, transparency (Kooskora 2012) and the upholding of fundamental rights related to digitalisation. Moreover, especially the digital leaders who are making decisions having great impact on many around them have to consider and stand for the right values that are often at risk and know what must be done to preserve them. With the help of digital ethics, we can ensure that human beings, not technology, remain our primary consideration during this digital age.

Discussing further it should be pointed out that this digital transformation requires new leadership roles, skills and also digitally minded leaders with high level of integrity. Moreover, digital leadership is much more than a job title, it is an entirely new mindset (Kaganer et al. 2013). According to Kerr (2019), the digital mindset requires open mindedness and today's leaders have to be aware and understand all the capabilities that technology has to offer and put it in use. These leaders have focus on better future and constantly seek and find new ways to use technology in order to enhance employee engagement, drive customer satisfaction and unleash competitive advantage.

However, the digital world is not about technology, but people (Becerra 2017). Digital leadership is about empowering others to lead and creating self-organised teams that optimise their day-to-day operations. Leadership today is no longer hierarchical—it needs participation, involvement and contribution from everyone (Dubey 2019), and leaders need to create a compelling vision and communicate with clarity so that everyone understands what the team is trying to achieve and why. Great leaders know that people can achieve great things when they are driven by a strong purpose and find work meaningful. They understand that when people know the why, they figure out the how and can achieve remarkable results.

Furthermore, when organisations create a culture of learning, failures and experiments lead to inventions and innovations, therefore digitally minded and entrepreneurial leaders provide support and energise everyone and inspire them with an inclusive vision. Digital leaders are adaptable and able to handle pressure and constant changes, and to take decisions with agility (Dubey 2019), they understand the value of diversity, inclusion and open-mindedness and can navigate the challenges of technological disruptions.

According to The World Economic Forum's 2018 Future of Jobs (2018) report no less than 54% of all employees will require significant re- and up-skilling by the year 2022 and of these about 35% are expected to require additional training of up to six months, while 9% will require re-skilling lasting 6–12 months and 10% will require additional skills training of more than a year. Therefore, the digital leadership will need to address the skill gaps, prepare themselves and their teams to face the future by creating an environment of lifelong learning and with the adoption of new technology and solutions, new professions, skills and industries will emerge. This is why it is important for companies to identify, develop and place future-oriented innovative, entrepreneurial, critical thinking leaders who are able to create a long-term sustainable value for all stakeholders.

To conclude this brief overview, it can be said that digitalisation is the use of digital technology to provide new opportunities for people and organisations. Smith (2004) views technology as a division of knowledge that deals with the creation and use of technical means and their interrelation with life, society, and the environment. According to Mäkkylä (2017), digitalisation has enabled new concepts, procedures and new agents into different fields and changed people's behaviour. With the help of the Internet, people have become more aware of their preferences, their requirements have increased and knowledge of the available alternatives is greater. Cherif and Grant (2014) suggest that digitalisation has initiated the

Internet's ability to conveniently display information and therefore the communication between service providers and potential customers has changed and improved. Industries' services have been transferred into digital services which has enabled newcomers into the field and forced traditional agents to renew themselves.

5 Case Study

5.1 Leading Digital Transformation at Estonian Business School

5.1.1 Digitalisation in the Higher Education Sector

Similarly to various other sectors, the role of universities in the society and economy and the ways how education is delivered is changing and continues to change in the next decades. Compared to other sectors, the impact of global change is even more present in higher education and the whole nature of higher education changes significantly (Coskun 2015; Bridgstock and Cunningham 2016) as universities need to become more digital learning institutions. Whereas the market has become global everywhere, universities are also competing globally for students, academics and funding, and it is believed that only those that stay relevant and leverage new digital capabilities will benefit in this digital age (PwC 2015; McKinsey 2015).

In order to overcome challenges related to technological changes, universities have to respond digitalisation in a quick and effective way and develop strategies that help to benefit from these changes. Therefore, many universities all over the world are developing digital strategies and invest heavily in IT systems (Jones 2016; Newman and Scurry 2015). Being digitally well-equipped to ensure effective use of modern technology is required for achieving a successful digital transformation, and the whole university including students, staff and academics has to be prepared to work with digital tools and techniques. Universities that efficiently follow a digital framework are equipped with the competencies to drive innovation and disruption approaches (Tapscott and Williams 2010; Khalid et al. 2018).

Whereas twenty-first century students have many expectations of universities, their experiences and expectations of future employability after university education are now more critical and require universities to change. The digital age brings along new challenges and opportunities for university leaders and faculty as teaching methods, ways of learning and research techniques are all changing fast. A digitally sophisticated generation is expecting to learn and to be taught using methods in accordance with their personal preferences, which requires implementing modern technologies, including smart mobile, cloud-based IT, wearable devices and advanced analytics (Kirkwood and Price 2013; McKinsey 2015). Digital technologies are considered as vital elements of student education and linked with substantial changes to the ways students learn and experience (Coskun 2015; Henderson et al. 2017). Moreover, adapting educational institutions and

training providers to the digital age can be regarded as a cornerstone of any long-term strategy to foster digital skills, as formal schooling is still considered the main way how people acquire and develop digital skills.

A core function of academic institutions is to continually update and advance their management and learning process and for a digital success, the right balance and connectivity among students, staff and departments are the key elements for survival. However, the role of senior management in supporting and helping to take most out the substantial benefits linked with the digital change is essential. Khalid et al. (2018) argue that in order to meet the needs of the knowledge society, students' learning preferences, as well as technological development of faculty members, university leaders must be aware of a growing imperative to reshape their structures and processes, pedagogic and curricula practices. Digital skills are developed through life-long learning programmes while adding new techniques and capabilities, and inhibiting culture to accepting modern technologies and development (Hill et al. 2015). The knowledge, skills and competences that such programmes deliver help to shape digital leadership skills and entrepreneurial mindset.

Digital literacy includes skills, knowledge and confidence to use advanced technology and while digitalisation has enabled various innovative teaching techniques, for instance, richer distance learning, flipped classroom and hybrid teaching models, not all universities and faculty members have welcomed these changes. Being omnipresent in social media and active use of innovative interactive techniques for teaching is not too appealing for all academics. Another reason behind this lies in the technological development and required infrastructure, implementing new technologies and digital tools need investing a lot of time and money and supporting leaders with digital mindset.

Nevertheless, e-learning is already widespread and MOOCs (Schuwer et al. 2015) have become popular among students around the world, therefore most universities are interested in developing and creating online learning opportunities. However, some of the leading universities, including Cambridge and Oxford (Berger and Frey 2016), have found more useful and implement blended learning models, where online learning is complemented with face-to-face interaction helping students to develop relevant skills while tackling real-world challenges. Problem-based learning (PBL) is often used to foster critical thinking, problem-solving, and interpersonal skills (Frey and Osborne 2013), the skills needed to compete in the twenty-first century labour market and MOOCs to improve the learning experience rather than wholly shifting the provision of education online.

Moreover, the senior management must consider that universities those are not adopting new digital change will not be able to fully compete in the contemporary digital era. Therefore, to implement this change within the universities, it is critical to create a high level of digital awareness, develop digital vision and determine how to gain the necessary digital capabilities and develop entrepreneurial mindset. To avoid falling behind competition, universities must rethink how they should operate in the evolving digital era.

Digitalisation is deeply embedded also in the Estonian educational sector. The educational digital revolution in Estonia aims to implement digital technology more efficiently and effectively in learning and teaching, and to improve the digital skills of the entire nation (e-Estonia 2019). Estonia can be happy for its developments in this sector, with being first in Europe in the OECD PISA test, having 100% of schools using e-school solutions, and every 10th student studying IT every year. Digital solutions and tools are widely used in all other educational forms and it is ensured that every student receives the necessary knowledge and skills to access modern digital infrastructure for future use. One example of the digital transformation in the education system is that by 2020 all study materials in Estonia will be digitised and available through an online e-schoolbag.

In 2005, Estonian state created a database named Estonian Education Information System (EHIS) that brings together all the information related to education in Estonia (ehis.ee). The database stores details about education institutions, students, teachers and lecturers, graduation documents, study materials and curricula. The service is intended for anyone in education, whether students enrolled in general, vocational, higher or hobby programmes, or the teachers and academic staff providing that education. It is also possible to access information on the qualifications and further training completed by teachers and academics. EHIS is also part of monitoring the education system so that the authorities can make sure it prepares people for the labour market of the future. Higher education is free in Estonia at public universities and applying for university studies by simply transferring one's details to the desired university is the most common use of the EHIS database (EHIS 2019). Availability of numerous of education e-solutions is definitely very helpful for Estonians as most of them believe that raising smarter kids is the smartest investment a country can make and for staying smart life-long learning is a must.

5.2 Leading the Digital Transformation at Estonian Business School

5.2.1 Brief Introduction to Estonian Business School

Founded in 1988, Estonian Business School (EBS) is the oldest privately owned business university in the Baltics (see ebs.ee) educating and training current and future managers in the areas of business administration, leadership and entrepreneurship and conducting research in related fields. With more than 1500 students, EBS's goal is to provide enterprising people with academic knowledge, skills and values for its successful implementation and offering degrees at Bachelor's, Master's as well as Doctoral levels. When EBS was founded in 1988, it was the first institution in Estonia to introduce diploma business education and since business administration did not exist in soviet universities, there was no teaching tradition, no faculty and no textbooks: a difficult starting position.

However, the size of the country and its orientation towards the West has meant that EBS has stressed the international and innovation perspectives from the start,

and the rapidly changing environment has encouraged EBS to respond and adapt at an adequate speed. Starting from the scratch can also be seen as an advantage since the university was and still is not tied down by outdated procedures and overwhelming traditions from the past, which also makes its digital transformation as a logical and natural step ahead.

Adapting to the Estonian context has meant, for example, that EBS uses many practitioners and higher-level managers as lecturers in its courses, revising traditional programmes to fit actual needs from the industry, and applying management theories and best business practices in the running of the institution itself as well. EBS also acknowledges and appreciates most of its students working full-time or part-time in addition to studying, encouraging and shaping their entrepreneurial mindset. By using both English and Estonian as languages of instruction, EBS is preparing students for the Estonian market and beyond. Today more than 30% of students come from abroad, from 12 different countries and 20% of faculty members are foreigners.

In year 2011, EBS was the first university to establish its subsidiary in neighbouring country Finland. The goal of EBS Helsinki Branch is to provide Finnish students with the possibility to study international business administration by way of session-based learning in English in the students´ home country. EBS Helsinki is located in the modern and innovative Technopolis Ruoholahti business park, benefitting from various digital solutions and tools. Along with developing high-quality learning environment in Helsinki, EBS has significantly increased the investments into transformation to more innovative and digital solutions also in Tallinn's main campus and now these tools are more widely and rapidly implemented in teaching and training activities and being daily used by all students, staff and academics.

5.3 Study Methodology

For getting more information about the digital transformation at Estonian Business School and for illustrating this discussion with real-life examples, I conducted personal in-depth interviews with EBS owner and chancellor Mart Habakuk (hereafter M.H.), who coming from real estate industry took over the university's management after his father's Madis Habakuk's sudden death in 2016. Prof. Madis Habakuk was the founder and owner and also long-time rector of EBS who was actively involved in management until the day he passed away. He also kept EBS constantly updated and adapted to the changes in the environment and several big changes were made rather often, moreover, several e-solutions were available from the beginning, including WebCT, Moodle, online study system (ois), free use of electronic databases, etc. However, his son Mart Habakuk, coming from business sector and having much more radical views and readiness for innovation and digitalisation, started a new digital transformation process immediately after becoming the chancellor of the university.

For gathering the material for this empirical case study (Yin 2012), I conducted personal unstructured in-depth expert interviews (Saunders et al. 2009) in August 2019.

My purpose of having these interviews was to have open conversation and therefore indicated just the main topics and areas related to a more general view on digitalisation, digitalisation in the university, future of learning and teaching, leading the digital transformation, and values and mindset of the digital leader.

The interviews took place in an open atmosphere, and after I had explained him the purpose of this study, the chancellor was willing and ready to openly share his views and thoughts about these topics. The interviews were conducted in EBS Tallinn campus, in Estonian language. These were recorded, wholly transcribed and translated into English, I also took notes during the interviews to keep an eye on the process, and to be able to ask additional questions for drawing attention to some topics needed to be covered. The recordings lasted for 59 min and the amount of transcribed text was 30 pages.

The chancellor was chosen as the respondent with a clear purpose (see Creswell 2009) to get rich data, to know more about his views and experiences, and especially about his entrepreneurial mindset as being the digital leader, whereas he is the person who initiated the digital transformation and makes most important decisions related to digitalisation at EBS. The information collected from these interviews enables to better understand the importance of entrepreneurial mindset in digitalisation process taking place at EBS and know what were and are the reasons behind decisions related to digitalisation. For analysing I used the case-by-case qualitative content analysis (Frechtling and Sharp 1997), searching for meaningful patterns and creating categories, drawing relations between different topics and focusing on the values and entrepreneurial mindset. The transcribed texts were read several times and different categories marked, during the analysis inductive open in vivo coding was used, in order to create the detailed understanding and decode meanings.

5.4 Digitalisation

The first topic was about conceptualising digitalisation in general. It can be said that here his view goes in line with the ideas of authors discussed previously (Matt et al. 2015; Ilmarinen and Koskela 2015; Westerman et al. 2014). For M.H., digitalisation means using technology in order to do things better and more efficiently, or as he put it in words: '*When looking from more distant, digitalisation might seem to be the use of digital documents or some kind of new program, however with more inside look we realise that it means implementing new products and technology that often is new hard- and software, to make things better and more efficiently*'.

M.H. also made an interesting comparison to the innovation related to steam engine and new technology back then, emphasising that everything starts with the purpose, and why these new applications are needed and he also indicated that today the tools and equipments are just more developed, saying that '*however the purpose has remained the same, to do things better and more efficiently and when this new technology includes software, then it can be also called as digitalisation*'.

5.5 Digitalisation in the University

Next I wanted to know what is the meaning of digitalisation for the university. In his answer, M.H. stated that digitalisation for the university is not as purpose per se, but in order to make its products and services better, it is possible to set up several hypothesis. In his view, learning has to take place over long time, *not like one-two-days sprints*; it is important to learn several things at one time, in order to create connections between different subjects; he also highlighted the importance of learning and teaching from each other, based on own experiences and that has been read from some books or other forms of courses. *Learning about something and then sharing this with the others.*

Similarly with Henderson et al. (2017) he also emphasised the role of experimenting and trying different solutions. The role of technology and digital tools was just seen as helping people, both students and faculty in this process. *Digitalisation of university means a range of different trials and experiments, what might work and what not, and it is also clear, that what works with one might not work with the other, and this depends on the student, on the subject, the instructor and relatively little on the technology.*

M.H. told also more specifically about the EBS's experiences and what has been done in the university during this new digital transformation process. What was really interesting to hear was that there are several trials and experiments taking place at the same time and the success of these is mainly determined by the facts whether these help students and whether corporate customers will buy these for their employees. '*... from the digi- and start-up world (that is also indirectly related to the digital world) it can be seen how new things are done, first there is an idea, then you can look for best practices from the world, put together the brief overviews, find people to test these with, which ones would they buy ... and when the majority would buy the same you have selected, you are on the right track and can use these with students. These should be relevant and specifically meeting the students' needs*'.

5.6 Future of Learning and Teaching

Learning together and sharing the knowledge was emphasised several times during these interviews. The chancellor also argued from the student's perspective, saying that '*in today's high pace environment ... it would be more faster and efficient doing it individually, and thus* via *different forms of online and on-demand courses, where you can learn the basics and which might not be so exiting, but need to be known*'. He also found it possible and even necessary to have group works in the virtual world, where students do not need to be physically present, but also expressed his concerns stating that: '*there's not yet enough evidence that it will replace meetings with others. And there are things which have been and also will stay, these are face-to-face meetings, working in groups and learning from each other'.*

When talking about teaching at the university, he called the lectures with 500 students *edutainment*, which are meant for the superstars, '*who come and do something awesome'*, but added, '*when you look at the learning process as a whole, when you learn some tools or skills, then these big lectures are not so optimal choices'*. Helping to develop certain skills and entrepreneurial mindset, to learn how to use new and innovative tools were topics that seemed to be very important for him as he returned to these several times and considered these as the main purpose and role of the university in the twenty-first century. As the same ideas are also found from Frey and Osborne's (2013) studies, then the importance of digitally minded entrepreneurial people in academic sector cannot be underestimated.

Looking at the whole learning process and helping students there was something that M.H. considered especially relevant for the future: '*... but what I believe that may emerge is the personal learning cloud and big qualitative change in online courses, that are not courses any more, but learning paths*'. The importance of life-long learning and university's role facilitating the process was another topic that was repeated several times: '*... and the new role of the university is being a place where people do these things which are more efficient done as face-to-face, where someone helps when one is stuck. Thus it's possible to ask either from the fellow student or from a faculty member.*' (see also Hill et al. 2015). M.H. views faculty members as facilitators, mentors, who help the students to achieve their purposes, and who need to be present when students need help, in most cases in teams and sometimes also individually. '*... it's is more like a mentor—student relationship and the traditional belief, that a faculty member is the most knowledgeable person is outdated today. A faculty member should help students to achieve their purposes and can suggest what skills are needed and in which order*'.

Turning their head towards customers (as also discussed by Tolboom 2016; Ilmarinen and Koskela 2015; Edelman 2010), creating a supporting infrastructure (Matt et al. 2015) and encouraging atmosphere for recognising opportunities and taking risks (Koe et al. 2012) and developing entrepreneurial mindset have been also considered significant during transformation processes. According to M.H., the digitalisation transformation activities are directly related to the investments made into the infrastructure and providing new spaces where students can work in teams (either in real life or by using new digital tools and solutions) on the assignments faculty members have given them. '*…this (our digitalisation activities (M.K.) ... relates to the experiments we are making with the infrastructure right now, creating more learning spaces outside the auditoriums, there were no such places earlier and now there will be about 10% of the whole area for informal learning spaces. ... It's an experiment now, and it will be interesting to see how students will adopt it and start using it. It also should change the whole image and mindset of people to study together more, also when using online learning…*'. With this statement, M.H. once again gave proof that the whole digitalisation process is carried through with the purpose to increase sheared (online) learning, make things better and more efficient especially for the students, who represent the paying customers for a private university like EBS.

Interesting examples and ideas were expressed by M.H. especially about the future learning opportunities and methods. Some of these solutions are already existing, others being currently developed and constantly improved. *'...Today the big companies such as Amazon and Google have their own academias, where with very reasonable price and constantly improving quality courses are offered and those who want and are able to motivate themselves, can create even groups from people with similar mindsets, and able to get the same education within the same time, at 10 times lower price. But of course universities have several arguments against it, for example the public sector is a thankful customer, who thinks that people should be taught and motivated to learn…'* Here we can argue, that according to M.H. the future learning activities should not take place at the university at all, although this can be considered true and rather probable, however this also endangers the future perspectives of universities as such.

5.7 Leading the Digital Transformation

As Mart Habakuk is really a person with an entrepreneurial mindset, being the initiator and brain behind the digital transformation process at EBS, it was interesting to know more about his experiences when leading this change. Khalid et al. (2018) have emphasised the role of university leaders and hearing how the process is lead at our university enabled to understand certain decisions and choices much better. Although at first M.H. considered this topic more complicated, the answers showed that in case of EBS and for himself personally as well the vision of the leader and encouraging others to work towards that vision (e.g. Kouzes and Posner 2012) are the main leading principles in this digital transformation process. M.H.: '*...basically it is telling your stories, and making sure that you can help to remove the obstacles, that do not allow people to do things they are able to do if they want ... and as the things that can be done are so many, and it's not possible to do them all, even half of these not, then to filter out the single ones where it's feasible to make an effort and put recourses in, looking where the impact is the biggest and always measuring on what ... so we also like to deepen the way of thinking, shape the mindset, that we are not here to become the best university in the Eastern Europe, but for helping our students to achieve their purposes*'.

Here again, his concerns about helping the students to achieve their purposes were heard: *'...and everything we do or leave undone, we need to think whether it helps our students to achieve their purposes or not ... and when not, then what can help them ... and making this way of thinking to become prevailing'*. The same idea was also mentioned when talking about main obstacles in this process as often faculty members are relaying too much on what they are used to do and may be hesitant when implementing new solutions and digital tools (see Fosic et al. 2017): '*... but a big thing is whether we can get our faculty members to integrate the world-class content and solutions into their own courses. So that also the content not produced by themselves is ok, and should be used in order to help students to achieve their purposes. So in principle to offer solutions to overcome the skill caps students might have...*'

5.8 Values and Mindset of the Digital Leader

Final interesting and relevant topics that were discussed were related to the values and mindset of the leader in the digital transformation process. The answers again gave proof to the ideas expressed by several authors who have analysed the digital leaders' activities and principles (e.g. Kaganer et al. 2013; Becerra 2017; Dubey 2019; Khalid et al. 2018). The values were expressed in the best way through M. H.'s views how to measure success and what are the principles behind decisions that are made in the university. Working together on the common purpose, sharing ideas and information was repeated several times, also the ideas how to support our students in the best way and even why is it important to help others in the same field. According to M.H.: *'... values ... mainly how to make people do things that are needed, make sense and get agreements that we are going to achieve these together ...our main success measurement is the number how many persons do not leave the university after graduation, but come back for different courses and events, keeping in touch with us ... this also shows that they are interested and want to learn more ... and so we can offer special modules, at multiple levels ... (it's not yet) not so acknowledgeable, but our main purpose should really be to help students ... and when doing things well, money will follow, it's the result ... (we have also to consider) ... availability is not only the privilege of wealthy ... we can help our students to get the best on the market ... and when doing something and creating something, helping also the others, sharing information and best practices, helping the others to succeed as well (is important) ... as the goldsmiths are all on the same street, when everyone succeeds, then all will be successful ... (and our main purpose is) ...to wake up the 21 century persons, and make them valuing themselves, so that also the others will benefit from it'.* All these ideas were something that I really liked to hear and now hope that these values (e.g. Kooskora 2012, 2013; BBVA 2012) will start playing even bigger role in the university's activities as well.

To conclude this case study, it is just one example how digitalisation transformation is lead in one Estonian private university. It highlights some most important aspects and shows what are the ideas and thoughts behind decisions made during the process and emphasises the role of entrepreneurial mindset. It attempts to look and make sense of the choices that the digital leader has made, not to generalise to other universities in Estonia nor anywhere else, but to advance theory and conceptualisation. Although all cases are different depending on the environment and certain situations as well as concrete persons, their views and values, this case study still presents some certain aspects and patterns that can be also considered characteristic for the twenty-first century organisations. Turning the head towards the customers, hearing their voice, considering the needs and expectations of different stakeholders, involving own organisation's members in the process, leading them by shared vision and telling stories, creating the supportive environment and encouraging entrepreneurial atmosphere, empowering people and valuing their skills are just some of these. Formulating the overall purpose to help their customers, understanding that right and good activities make the money to follow and

helping others to succeed as well can definitely be considered as values that may help to succeed in the changed environment of the twenty-first century. Moreover, while developing relevant online and blended courses there is a need to collaborate closely with different stakeholders. Identifying the skills that are demanded by employers and designing course content to facilitate the development of skills that are aligned with industry demand need considerable input from many stakeholder groups and development of entrepreneurial mindset. Furthermore adapting the curriculum should go beyond the infusion of digital skills to also address the role of digital leadership skills, the skills required of an individual to initiate and achieve digital transformation across companies and industries, and develop digital leadership mindset.

6 Concluding Remarks

The discussion about digitally minded leaders with entrepreneurial mindset and short case study about digitalisation and leading the digital transformation process showed clearly, that although the new solutions and tools gained through digitalisation are helpful they do not have any value without the people. Digitalisation just gives the tools that should make people's lives better and their activities and work more effective, however how successful the process is and will be depends on the people and especially those who are leading it. In order to compete in the much-changed environment, organisations need to succeed in merging their activities and technology. Whereas while facing some of the greatest challenges as well as greatest opportunities from the digital transformation, much depends on people with entrepreneurial mindset and the vision of the leaders.

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The process of digital transformation and the increasing importance of creativity in the new digital age

Edin Smailhodžić and Denis Berberović

Abstract

Creativity has become one of the most important driving factors of today's digital business environments. Businesses are increasingly looking for creative employees who can offer new and out-of-the-box solutions to existing problems. Companies go through the process of digital transformation by increasingly changing the ways in which they employ digital technologies and develop new digital business models that help to create and to capture value. Combined with a creative approach, companies have experienced a surge in creative digital solutions. However, the creative process is not a self-perpetuating mechanism. It must be initiated and supported by organizations. This is done by understanding the creative process itself and by making small but fruitful adjustments to the work environment and the overall management of the workforce. As three chosen real-life examples will illustrate, such approach results in unleashing powerful creative energy that offers new services to the market, new approaches to solving existing problems, or as seen in the case of Uber—bringing in a completely new business model based on creative solutions and innovative approaches to different aspects of business operations.

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1 Introduction

1.1 Digital Transformation and Creativity

In this chapter, we would like to outline the process of digital transformation and the increasing importance of creativity in the new digital age. Our economy is transforming, and the ways in which we create, communicate, work, and collaborate are changing (Rogers 2016). Today's society and business landscape are characterized by trends such as pervasive connectivity, improved performance of information technologies, information abundance, and emergence of big data (Bharadwaj et al. 2013). Accordingly, digital transformation and new business models have also changed consumers' expectations imposing pressure on traditional companies (Verhoef et al. 2016). In this new digital age, creativity and innovation play an important role in creating value for businesses (Sousa and Rocha 2019). Although creativity and innovation have always been important, their nature is changing in the digital business context (Hinings et al. 2018). Competition between companies is now not only based on the quality of products or efficiency in satisfying consumer needs but rather how innovative products are, how well they are designed and how well they solve a consumer problem in a creative manner. This becomes especially important as digital transformation cuts across industry boundaries (Hopp et al. 2018). Competitors are not only traditional companies in an industry, but also digital companies who are using their digital resources to enter the new markets. For example, apps, such as Google Maps, are competing with traditional navigation companies such as Garmin and TomTom, which led Garmin to lose 70% of its market capitalization two years after the navigation apps were introduced (Downes and Nunes 2013).

New digital businesses are one of the examples of the digital transformation era. In line with this, the behavior of customers is also changing. They often become co-producers of the products through, for instance, crowdsourcing campaigns. Furthermore, their expectations have changed. Consumers have the intention to buy and have access to products and services in an easier and more convenient way than ever before. They want to order products online and receive them the next day; this is resulting in an increasing trend for electronic commerce. For example, 69% of Internet users in the European Union shopped online in 2018 (Eurostat 2018). Changes like this are creating the shift in the economy, and companies need to adjust to this or they often go bankrupt. And platforms, like Netflix, are transforming industries, driving big players such as Blockbuster to bankruptcy.

Due to these changes in the economy, the workforce is also affected and must adjust. Employers now require employees to have different skills than before. It seems no longer to be important how much employees know, but rather how well they can apply their knowledge. In the digital era, skills that are essential are higher-order thinking and creative problem solving, as companies increasingly depend on the creation of new products, services, and processes in order to remain competitive. These skills rely on the fact that we must find meaning or patterns in

big data. We have to be creative and find insights that will help to solve problems in a different way than usual (Brinson 2017). For example, big data can be used as a digital asset in order to personalize products and services (Verhoef et al. 2016)

This implies that the digital age is in a way extension and elaboration of the twentieth-century knowledge age. The world is moving toward the right-brained intuitive and creative world instead of a left-brained logical thinking world. The rising automation resulting in increased productivity means that there might be less need for labor in the future. This further leads to more time for other activities, and one of the alternatives is creative work. At the same time, the world experiences a greater need for innovative ideas. The current business environment features a fast strike mentality of companies that aim to disrupt competitive advantage of market leaders, which makes competitive advantage of companies no longer sustainable in the long run (D'Aveni 2010). Thus, this illustrates the increasing importance of creativity and reinvention to remain competitive. Along with this, there is an increasing need for creative people in the workforce, not only for artists and designers (Areete 2018). A creative approach is also needed in business management and strategic planning. Due to the shift of the digital era, jobs for creative people have also changed as they are needed in the more traditional roles within a business in order to help change companies that seek to be competitive in this era of change.

All these changes in the process of digital transformation point to the importance of new skills such as strategic imagination and creative problem solving (Mills 2015). In particular, it is important to have the skill of thinking outside of the typical roles and tasks that one does on a daily basis. Actually, employees should be supported in thinking outside of their tasks and how they can make it more efficient. In an increasingly changing environment enabled by digital transformation, creative problem solving becomes of utmost importance in regard to problem solving and finding new entrepreneurial opportunities. Creativity and critical thinking are not only important today but also projected to be the skills in most demand in the future (World Economic Forum 2018).

2 Theoretical Background on Creativity and Digital Business

2.1 Creativity

Before we can start linking creativity to digital entrepreneurship, we need to define what creativity is and why it is important. Simply defined, creativity is the act of turning new and imaginative ideas into reality (Naiman and Naiman 2017). According to Amabile (1988), it applies to both idea generation and problem solving. However, Amabile et al. (2005) also emphasize that these ideas should not only be novel but also useful. In the context of organizations and workplaces, creativity is seen as the creation of new and useful products, services, and processes by employees (Woodman et al. 1993). Creative people have the ability to perceive

the world in new ways, to find hidden patterns and find connections between unrelated issues. This all makes it possible to generate new solutions.

Creativity should not be seen only as a form of art or an idea. Those are outcomes of a creative process. Creativity itself is a process that takes multiple steps to create the results (Scy 2016). It all starts with a problem that we think of. If this problem does not contain the formula to solve itself, we have to use our creativity to come up with a solution to this problem. We are not able to objectively measure creativity because it is mostly subjective. Outcomes to the problems are usually based on two principles; the idea is most useful or unique. If an idea is useful, it is relevant to the task it needs to be solved. When an idea is unique, it is different from other ideas and not experienced before. To be creative, it is important to not stop at a useful idea. Most people can come up with this. The hard part is to keep thinking and creating an idea that is unique. The creative process takes time and patience, especially to learn the art of being creative. With creativity, there is no guarantee that you come up with new, creative ideas every time that is useful for your project. So, the creative process is guaranteed but the outcomes are not (Scy 2016).

In addition, research has shown that there may be different types of creativity. The types of creativity are based on either emotional or cognitive and spontaneous or deliberate (Al Balooshi 2016).

1. *'Thomas Edison'* type of creativity. It is called Thomas Edison because he ran experiment after experiment before he came up with an invention.

   - Based on deliberate and cognitive.
   - Comes from continuous work.
   - Implies putting together existing information in new ways.

2. *"Aha moments*" type of creativity.

   - Based on elaborate but emotional parts.
   - "Aha moments" have to do with the emotions and feelings and are not continuously focusing on one work.

3. *"Isaac Newton Eureka moments"* type of creativity.

   - Occurs suddenly.
   - Spontaneous and cognitive creativity.
   - It implies working on a problem for a long time and not be able to find solutions. Then when doing something else, flash-insight arises with a solution for the problem.

4. *"Epiphanies"* type of creativity.

   - Spontaneous and emotional type.
   - Mostly used by musicians and artists.

- It is not cognitive, but mostly a skill is needed to perform this kind of creativity such as playing guitar or writing skills.

Another type of categorization of creativity concerns the type of people and the approach to creativity. This is also relevant as people are very different in the level of creativity and in the manner of how they express creativity. In this respect, we can divide people into adaptors and innovators. Adaptors are people who are trying to improve things but within the general system. They are trying to find ways to do things better and more efficiently. Adaptors often work in professions that have stability and order. They link ideas they have to the problem they have and pertain persistent in this. They could be somewhat linked to the process of exploitation, which is described by March (1991). He describes the process of exploitation as focused on refinement, efficiency, selection, and implementation. The second type of creative person is innovators. They like to do things differently than ordinary businesses and people do it. Innovators challenge the status quo. They often come up with radical changes and plans, whereas adaptors like to do things better, innovators like to do things differently. The ideas that innovators come up with are often related to bringing new elements in the problems and changing the formulation of the problem. Same as with adaptors, the role of innovators can be linked to March's (1991) process of exploration, which is focused on concepts such as risk-taking, discovery, and innovation.

Although people can be categorized in these two groups, there are some other factors that both groups should have to be successful in creating creative solutions for problems. Some of the most important ones are motivation, curiosity, and social network. Specifically, motivation represents a crucial part of creativity. Motivation is the measure of emotional investment that makes people break with the old situation and move into a direction with a situation that they actually want (Kim 2018). This desire to move to something new starts the process of creativity. So, to start the creative process, every person needs at least motivation to start it and create something new. After feeling motivated, people get curious about searching for unknown information that can be useful. Curiosity can be frightening due to the fact that something that can be potentially dangerous one has to transform into something manageable and interesting. When fear arises, curiosity is hard to sustain (Kim 2018). An issue often neglected is the social nature of creativity. The power of an unsupported mind is often overrated. A lot of intelligence and creativity results come from interaction and collaboration with other people. Creativity does not develop in people's minds but in the interaction between people's thoughts and a sociocultural context (Kim 2018). For example, supportive supervision and perception that an employee's supervisor is supportive of new ideas have always been an important condition for creativity (Oldham and Cummings 1996). Furthermore, a positive peer group and the participation of others within the company are also important requirements for employees to excel at creativity (Hunter et al. 2007).

2.2 Digital Business

Due to new technological innovations, new ways of conducting business, connecting, and collaborating have been established. The new technologies, such as social media, are building bridges between people, which makes connecting with each other much easier. Digital technologies also have challenged companies forcing them to continuously innovate in order to achieve competitiveness in this new landscape as business models evolve and companies experience immense pressure to stay on track (Fenwick 2016).

Business models have changed, and companies are challenged to keep up. Digital business is about the creation of new value chains and business opportunities that traditional businesses cannot offer. It is the creation of new businesses where the lines between digital and physical worlds are blurred or not even visible. For example, most start-ups these days are digital businesses that solve a problem or have a solution to make day-to-day tasks easier and more convenient. Examples of digital start-ups that have become successful are companies such as Uber, which makes it easier to go to places for a lower price than conventional cabs; or Airbnb, which provides a place for people who want to rent their house and people who are looking to rent a house for the vacation of other purposes. Both of these companies are digital businesses and do not have any physical products.

Wirtz (2018) defines digital business as the initiation, transaction, and maintenance of the service exchange process between economic partners through information technology. Some of the most important elements in the digital business are mobile technologies, social media platforms, analytics, and cloud computing technologies (Fischer and Lopez 2019). Some examples that make these of key importance for digital business are that mCommerce has an increasing part in the total of electronic commerce, social media platforms such as LinkedIn and Facebook have changed the ways in which people meet and collaborate and big data analytics enable businesses to uncover hidden patterns, which lead to reduction of costs and better decision making. Overall, the digital business helps to eliminate barriers that now exist among industry segments while creating new value chains and business opportunities that traditional businesses cannot offer (Fenwick 2016).

However, digital businesses also face challenges such as pervasive connectivity, which challenges companies with their speed of product launches and decision making (Bharadwaj et al. 2013). Fast product launches by digital natives such as Facebook, Google, and Amazon are putting pressure on companies to introduce their products fast. Furthermore, the same platforms and big data pose challenges to react in real time as well as to access, process, and analyze data that become available in a digitally connected world. Such developments enable hyper-connections among customers, companies, processes, and things. Taken together, digital contributes to the hypercompetitive digital economy. With hypercompetition, no competitive advantage is sustainable in the long term (D'Aveni 2010), which emphasizes a need for businesses and individuals to be creative and continuously reinvent and innovate.

2.3 Toward Digital Creativity

2.3.1 How Is Creativity Related to Digital Business Ideas?

For the purpose of this chapter, we define digital creativity broadly as all forms of creativity driven by digital technologies (Lee 2012). Understanding and adopting digital innovation have become more important for existing businesses. For example, banks need to keep up with the latest financial technology to keep being relevant for customers and universities need to change the way they educate students. Keeping up-to-date with the latest digital innovations is not easy, and creativity plays an important role in this adapting phase (Medium 2017). Digital innovations need individuals who are thinking differently and can change the business. Innovators are crucial for developing new digital innovations that will keep businesses up-to-date with the latest trends. The creative process of digital innovations is a structured process that needs guidance and a clear goal. People need to think differently about the possibilities and impossibilities of new technologies. In addition to this, it is important for companies to embrace the creative process and look for new opportunities as well as risks.

In today's world, creativity can facilitate the creation of value, and therefore, it is an important aspect for companies. Due to the fact that the world is changing and is becoming more digital, customers expect this from companies as well. The customer wants to do everything online, and therefore, companies have to adjust. With this adjustment, creativity plays an important role. But how does a manager create value for customers and what makes it different from other companies? Companies should be creative and innovative in the way they adapt to the digital business age because it can create a lot of value for the company. Companies who stay behind will lose customers and eventually will not survive. Thus, companies have to focus on the digital age and provide creative and innovative solutions for existing problems that conventional companies cannot solve (Solomon 2018).

Although creativity has been traditionally regarded as a key in search of innovative ways for generating revenues (Amabile et al. 1996), it is especially important in the age of digital. Digital increases the importance of business agility and speed to market (Luftman and Derksen 2012), and it has been suggested to pay attention between digital and creativity (Yoo 2010). Digital enables individuals to have access to the Internet and other technologies anytime and anywhere allowing them to stimulate their creative thinking (Bal 2013). Given that the employees can achieve creative products through communication and collaboration (Amabile et al. 1996), the link to digital stimulates the creative process in the creation of new digital businesses.

2.3.2 How Can Organizations Develop and Strengthen Digital Creativity?

Digital creativity in businesses can be strengthened mostly due to the culture that lies within a company. Creativity and creative thinking should be encouraged; even if mistakes occur, employees should be motivated to further pursue their creative approach. As already pointed out, inspiration is needed for a creative mindset. The

workplace should encourage inspiration and therefore offer an environment that is boosting the inspiration (Magitti 2018).

Some of the traditional ways on how businesses should boost creativity (Noice 2019) can also be applied to digital context as follows:

- *Search for new experiences and perspectives*. Discussions with people from different departments, work with clients from different industries, or receiving help from non-profit organizations. This helps in critically approaching defined problems and enhances creative solutions.
- *Spending time to think about new ideas on a daily basis*. Even if it is only for 15–20 min, it will help with the creative process because individuals are aware of the time they spend on bringing up new ideas. Detaching from daily routines has a positive effect on finding new ways of solving specific issues.
- *Making weekly goals*. Planning how many ideas one wants to come up with and stick to it. In this way, one will be motivated to keep the creative brainstorming sessions useful.

However, Rogers (2016) suggests a more specific enabler for digital creativity and transformation, specifically rapid experimentation. In particular, he suggests that the firms must change their strategic assumptions from those that apply to the analog era to those that apply in the digital era. These concern being able to make decisions based on testing and validating rather than on intuition, considering that the testing ideas can be done in a cheap, fast, and easy way rather than seeing it as expensive, slow and difficult process, conducting experiments constantly by everyone and not only by experts infrequently, and focusing on minimum viable prototypes and iterations after lunch and only focusing on 'finished' product.

Finally, it is important for an employer to promote creativity by creating a work atmosphere where effort and failure are respected and not punished. It takes brave and open-minded employees to come up with new ideas and pitch them to supervisors; therefore, respect is highly important even when an idea does not appear to be great. Employees should feel motivated to find another idea or improve the existing one. In cases where employees are being punished for erroneous attempts (ideas), a decrease in motivation may result in lower creativity and even worse ideas.

Difference between traditional companies, digital businesses, and start-ups is that traditional companies usually do not apply such encouraging workspace. Start-ups often offer more flexibility and promote the creative process with greater passion. The biggest difference between working in a digital start-up or a traditional company is that working tasks change very quickly in a start-up when the organization is successful and growing. Usually, employees in a start-up have more responsibilities, and therefore, more creativity is required to solve problems that emerge with a growing business. Due to such problems that need to be solved, there are many opportunities to experiment with new ideas. If a failure occurs, another idea from the pool of ideas is selected and implemented. In a traditional company, this is more difficult due to hierarchical layers and due to the fact that employees are accountable to their supervisors.

2.4 Critical Perspective on Digital Creativity

Digital creativity can bring a plethora of positive outcomes regarding business ideas and solutions for current problems. However, there are several challenges in regard to the creative process of companies. The main issue is the fact that the transition to a more creative economy carries significant costs for an existing business (Lehrer et al. 2018). Businesses have to keep up with the newest innovations to keep competing with new start-ups which usually appear with creative solutions for an existing problem.

Creative people are a good asset to the company; however, people are hired to work. If they do not deliver what they are hired for but keep coming up with new ideas, companies will not run smoothly and work will not be done. In addition to this, one cannot always apply new ideas. Sometimes, it seems best to first focus on one new idea and then after it has been implemented or refused, to look for additional innovations (Lehrer et al. 2018).

Another point is that not all ideas or innovations are useful (Soulsby 2019). Therefore, it is important to have a good look at which innovations need to be implemented and which are not worth the time and money. A good working system to decide which innovations are relevant can save a lot of money and time for the company. If companies focus on an innovation that is not relevant and do not add any value to the company, it can lose the competition with other companies who choose another innovation (Sherman 2019).

Sometimes it is better to be cautious with the company's decisions and not taking high risks. When there is economic uncertainty, it might be better to not implement creative ideas with the risk that it will fail and increase costs. In such situations, it might be better to be cautious and not experiment with creativity (too much).

A more in-depth risk of implementing creative and innovative ideas is that a certain idea or project takes too long to implement. This is a very costly occurrence, and businesses can run out of money which results in insolvency risk for the business. This can cause problems with the future existence of the company. The new innovative product can face the fact that it is more difficult to produce and therefore not produced on a large scale which results in higher production costs (Soulsby 2019). The return on investment is not guaranteed which then can anger investors and stakeholders (Sherman 2019). Another downside of innovative products is that quality can be received as poor and then damages the reputation of the whole company. This has consequences not only for that product but also for the company. The company can be facing lower sales levels which then would affect the financial position of the company.

There are multiple examples of innovation that went wrong. But there are two types of innovations that went wrong. One is a new product or service that was not received well by the market. The second is the lack of innovation in which companies stayed behind their competitors which resulted in a loss of market share. When this happened, it is usually too late to catch up.

A good example of a failed innovation is Google Glass. This product was developed by Google in 2014. It was supposed to be a great innovation with a computer that was always on and always provided real-time information. It displayed information in a smartphone-like way, and it was also hands-free. Wearers could communicate via voice commands and so command Google Glass to implement commands (Kariff 2019). When Google started selling the glasses, it got significant criticism, where the main critique was that it violated the privacy laws. After the criticism and the fact that it flopped, Google announced to stop the production of the glasses in 2015. In 2017, they again started with the production with an adjusted version but this time more focused on usage within companies and in the medical sector (Williams 2019).

One of the world's most famous examples of failure to innovate and therefore lose the complete market is Nokia. This mobile phone brand refused to make the innovative leap from phones to smartphones. Nokia was the best-selling phone brand in the world. When Apple became a serious competitor of Nokia, it failed to respond in a proper way. The technological innovations of Nokia were nothing compared to those of Apple. The top managers were arrogant and refused to change their strategy and invest more in innovation (Doz 2019). The failure of Nokia can not only be assigned to not innovating well enough because there were many internal problems within the company. The organizational structures were dysfunctional and managers were competing and thwarting each other. This was the ground for the poor strategic decisions the company made. For example, they used an operating platform for their smartphones called Symbian. At the beginning of smartphones, this operating system gave Nokia an advantage but eventually caused delays because for every different phone new code had to be developed and tested. The management was struggling with finding proper solutions and made crucial strategic mistakes. The software was becoming more important in the smartphone market than hardware. Due to the struggles with the operating system Symbian, Nokia could not keep up with this change and lagged behind. Additionally, the applications became more important but Nokia lacked the skills to develop these applications and struggled again with keeping up with their competitors. By 2010, it became clear that Nokia had fallen behind due to the usage of their operating system and the lack of skills to develop applications. Nokia missed these innovations and stood still in a rapidly changing and developing market.

3 Conceptual Model

3.1 Digital Creativity Process

The creativity process consists of five different stages, with each of them having a distinct length. Depending on the organization, this process can be altered, but it usually does go through all these stages. Some of the phases can even happen simultaneously, such as immersion and incubation. Leaps from one stage to the

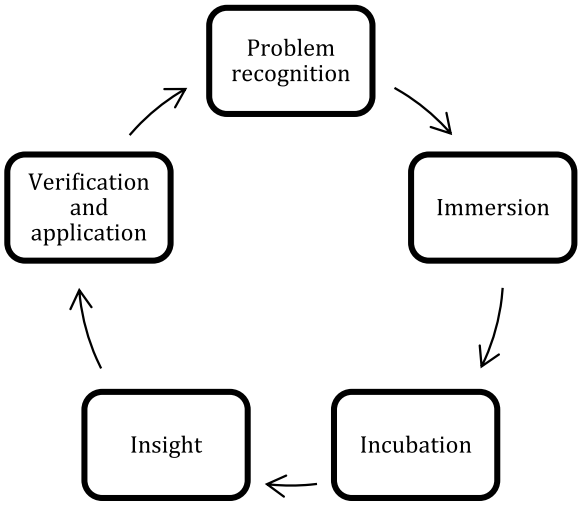

Fig. 1 Conceptual model

next are sometimes difficult to distinguish as lines between different stages are not always clear, such as between incubation and insight (Gannett 2018) (Fig. 1).

Stages in the creativity process are as follows:

1. *Problem recognition*—when facing challenges in the digital business environment, both organizations, as well as employees, initiate a problem resolution process. This phase implies considering the challenge and starting a creative process whose final output is a solution for the emerged issue. In terms of the digital business environment, this is an often occurring process; in fact, the digital business environment is a challenge in its own right, and most of the digital businesses emerged actually as responses to these challenges. It is further important to emphasize that in terms of starting the creative process, it is highly important that the emerged problem is being approached as an opportunity and not as a threat. That leads to creativity being unleashed to its fullest extent. It must also be noted that 'problems' in digital business are not necessary situations that represent an obstacle. It might well be those common situations, activities, operations, etc., in the real world that represent a valuable territory for creative digital solutions. (Weill and Woerner 2018).
2. *Immersion*—after the challenge has been detected and defined, even vaguely, employees will start to gather information in order to be able to approach the issue from different angles. By doing so, they delve deeper into understanding the challenge. This is a crucial phase as it not only helps to understand the challenge from different perspectives, but it also immediately initiates possible solutions. Digital creative solutions are in most cases focused on finding IT solutions; however, there has been a slight shift from finding pure IT solutions to creating solutions that are focused on finding the more comfortable, artistic, fast, or easiest option.

3. *Incubation*—collecting information in order to encompass all aspects of a challenge does not go forever. When the point of saturation has been reached, creative minds usually stop collecting information and even stop thinking about it. Usually, they engage in completely different activities, the ones that are not related to the challenge. Employees would be well advised to stop thinking about the new app they are currently trying to develop, or about the possible solution to the defined IT problem. By 'cooling down' the mind, employees actually move from an active to a passive state of finding a solution. Namely the task of finding a solution with all the gathered data is assigned to the subconsciousness, which keeps working even during the state of mind's rest. This is the reason why most companies nowadays, particularly IT companies, actively support employees in taking time off and resting their minds and bodies. By helping them take the pressure from everyday activities at work, the room is made for creativity.
4. *Insight*—it is exactly in moments of rest and relaxation when suddenly solutions to existing challenges arise from the subconscious to the conscious level. Therefore, creative minds, such as artists, copywriters, and designers, usually have small books by their side, or apps to help them catch sudden ideas and insights. This phase is also called the 'Aha!' or 'Eureka' moment, as it is characterized by a sudden surge of solution. As we live in times of portable devices that offer the opportunity to implement the newly emerged idea instantly, it is no surprise that a sharp rise of experimentation and implementation of newly emerged digital ideas has been noted.
5. *Verification and application*—finally the creative solution needs to be tested—does it work? Does it need an alteration? An immediate upgrade? Due to its nature, digital business is particularly prone to these instant and immediate tests. It is important to note that such tests often lead to emerging of additional challenges or problems. This sparks the creative process again, starting with the first phase—problem recognition. This is the reason why the creative process has been depicted in this chapter as a circle, without a definitive beginning and end.

3.2 Boosting Creativity in Digital Businesses

In order to support creativity in digital businesses, companies have several tactical tools at their disposal.

(a) Diversity—it has been for decades now that companies have realized that diversity opens new ways for creativity. Diversity in organizational culture brings in new approaches, fresh insights, and different, sometimes even unthinkable, perspectives to existing problems. Seen through the lens of creativity, for digital businesses nowadays this implies a set of different solutions to one existing problem.

(b) Breaks—as discussed in the section on the creative process, rest and relaxation play an important part in supporting the creative process. Pushing creativity to the edge can and often is counterproductive. What seems rather lazy, such as having several short breaks, is, in fact, a better way to improve creative productivity. It is often the calm moments that precede important creative breakthroughs.
(c) Reduced time pressure—this builds on the previous point. Breaks help in taking some time off, mostly taking pressure from employees. Time pressure gives people the adrenaline shot to finish operational tasks in the most efficient way. However, it is rather poisonous for creative solutions which for the most part need a strategic approach.
(d) Change the scene—this builds also on one of the previous points. While diversity implies different psychological and cultural perspectives, there is a rather simple way to achieve diversity (although somewhat superficial). By simply rearranging the work environment, or including the lately famous work-from-home approach, employers can boost creativity in their businesses.
(e) Embrace failure—failure is certainly the first step to success. Failing implies learning; failing implies realizing what does not work; failing narrows down options; failing might lead to solutions to other problems; failing leads even to the improvement of the solution which will work.

4 Examples from Practice

Case 1: Tesco in South Korea

South Korea has been a hard market for large retail companies such as Walmart. Tesco Homeplus has been founded by Tesco and Samsung, and it has grown into the second-largest retailer in South Korea. Homeplus has always aspired to become the leader in the market but was hesitant to increase the number of its retail shops. In line with this, they conducted research on the style of life and shopping habits of South Korean customers. Findings of this market research indicated that the people were working long hours and found their time very important. On the one hand, time devoted to shopping for groceries did not have a high priority. On the other hand, South Koreans are heavy users of technology and 95% of the population own smartphones (Taylor and Silver 2018). Combining these two findings, Homeplus decided to think out of the box and be more creative than just setting up physical stores to compete with other retailers. They decided to start the concept of the virtual store. Homeplus created virtual stores in subway stations with the displays that matched exactly the ones in the actual stores. Customers were able to use their smartphone app to scan a product they would like to buy and complete the order. Their order would then be delivered to their home the same day. This creative move

by Homeplus largely increased their sales and made them leading in the online market and second in the offline market for groceries. Online shopping is not a new phenomenon, but Homeplus used its insights into a very creative way to make it extremely convenient and appealing for the customers. The customers found the idea appealing to them because it met their shopping needs, but also turned their waiting time at subway stations into productive shopping and maximized their free time. In 2011, they won the Grand Prix award for mobile creativity emphasizing success in changing the way the people used mobile technologies. Homeplus was able to do this as they looked at its organization and competition in a different way than its competitors. They creatively created a novel and useful solution that mimicked real store shelves with digital displays. In addition, they brought together marketing and sales as the marketing of their company and products directly became sales. Their creativity in this process was expressed through the creative combination of two existing products, namely smartphone app and digital displays.

Case 2: Benchvertising

When Nermin Velagić, the founder of Benchvertising.com, started working in the advertising industry, he did not really plan to introduce innovations that would take advertising to a whole new level. His first business venture within this industry was focused on installing classical benches in parks and main pedestrian zones in the City of Sarajevo, Bosnia, and Herzegovina. When not in use, part of the bench used for sitting would fold, thereby exposing a highly visible surface to anyone walking nearby. Being installed in places with high frequency, these benches became a very attractive communication medium. Several hundreds of such benches were installed and advertisements of major Bosnian–Herzegovinian advertisers were highly exposed. It was a win-win-win situation for municipalities, advertising agencies, and the public, i.e., (potential) consumers.

However, as consumers embraced digitalization in every aspect of their everyday lives, Mr. Velagić was aware that he had to follow. Instead of starting a completely new (digitalized) business idea, he decided to do something extraordinary with the current business. He decided to digitalize the bench! A very traditional, simple artifact has been around for centuries in more or less the same shape and with a very basic function.

Meanwhile, very much as the whole of Europe, Bosnia and Herzegovina faces the demographic trend of an aging population. For local communities, among other things, this implies an increasing need for benches—in parks, pedestrian zones, around medical, and administrative facilities. In terms of costs related to benches, local authorities face rising costs of purchasing, installing, and maintaining them. In times of increasing pressure to achieve high-cost efficiency, financing benches represent a growing challenge for local authorities with anyhow tight budgets.

Having in mind the need to ‘go digital’ and finding out the problem of long-term financing the rising need for benches, Mr. Velagić, again, came to the idea to create a win-win-win business concept. He created digital benches labeled as ‘Benchvertising’ which provides a web, cloud-based, communication tool that allows owner/user to upload content, create, and schedule campaigns, to manage

execution as well as to control screens on benches. It is an advertising display on a city bench, used to present an advertiser's product or service. It is a new and innovative way of digital-out-of-home (DOOH) advertising venture. Mr. Velagić claims that Benchvertising's social influence is immense, as it not only revolutionizes the traditional bench by bringing people together, but it also brings dynamics to usually calm areas in local communities where benches are installed. And finally, not least important, it tackles the issue of financing benches as it represents a profit source for bench owners/vendors.

In order to enhance the spread of these benches around the world, Mr. Velagić and his partners have decided to approach this business initiative by applying a well-known business model—franchising. Benchvertising.com is franchising their expertise to allow franchisees an opportunity to share their vision of the future of advertising, which helps local community growth and brings a substantial income to the franchisee. Only Benchvertising.com franchisees are entitled to strategically position and manage benches in their local community and to sell advertising slots to other businesses. To conclude in Mr. Velagić's words: 'We think this is the best way to combine a global-born digital initiative with local knowledge and expertise.'

Case 3: Uber

Another case in point when thinking about digital business and creativity is Uber. Uber was founded 10 years ago and was one of the fastest-growing companies in the world. In those years, Uber created over 160.000 jobs in the USA (Siu 2016).

The idea of Uber arose from the cab problem in San Francisco. Inhabitants thought of a simple way to solve the problem and avoid waiting on the streets of San Francisco and avoid getting stranded. They came up with the Uber app that helped connecting local drivers and passengers. It was initially launched in San Francisco but already a year later it expanded to New York which proved that it was a good and convenient alternative to the public transport and often more expensive cabs (Hyder 2017).

Uber quickly became very popular due to its simplicity and convenience. It matched the problem of the cabs in San Francisco with the upcoming mobile technology, thus offering solutions with new approach to digital creativity. Namely Uber makes use of GPS systems to locate the drivers and passengers making it easy for both parties to see where the other is. It uses also digital payment opportunities via mobile phones, creating thereby not only a unique service experience for the user but also a highly safe service offer for drivers because no cash is involved (Hyder 2017). Uber relies on digital solutions for service quality feedback, as its application also offers driver feedback which improves the experiences for the customers. This transport service is available by charging a 20% fee over each ride. However, the app can be used for free. Even though customers' overall feedback appears to be highly positive, the company and its application are continuously changing as new features are added. For example, the latest feature makes it possible to choose the type of vehicle that you want (Siu 2016).

This creative digital solution to solving an intense cab problem leads to a large company emerging based on a rather simple digital solution. Furthermore, it disrupted not only the cab service industry but also the whole car industry as Uber has changed the concept of owning a car (Siu 2016). Uber fares are comparatively cheaper to rivals and sometimes lower than cab fares, and passengers can always order an Uber. Therefore, it disrupts the car industry in the sense that people do not find it necessary anymore to own a car on their own (Hyder 2017).

5 Practical Implications

The new technologies are building bridges between people and make connecting with each other easier. It is important to emphasize that creativity is being encouraged in businesses to support employees to come up with new ideas and solutions for problems that have arisen. Due to an increasing interest in the creative process by people and companies, and the fact the economy is shifting toward a new digital era, new digital businesses and start-ups are booming. New ideas to make our lives simpler are being thought of every day, and this will continue for years to come. This era is mainly focused on making people's lives easier and more convenient since people are increasingly busy and do not have time to do other things. Of course, shifting to this digital era also has its drawbacks and carries new threats, such as hackers. Data can be stolen and manipulated, thereby affecting people's privacy. On the other hand, this problem creates not only new jobs but whole new industries, such as IT security, offering opportunities for new digital businesses to emerge.

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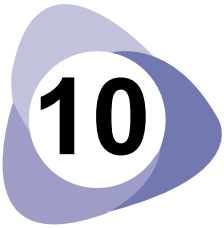

Importance of emerging digital technologies for digital entrepreneurship

Swapan Ghosh, Mathew Hughes, Paul Hughes, and Ian Hodgkinson

Abstract

Industrial firms are under severe pressure to innovate by leveraging the industrial Internet of things (IIoT) and emerging digital technologies. Digital entrepreneurship for existing organizations (corporate digital entrepreneurship) is a key differentiating factor in a highly competitive and disruptive environment. However, there is limited guidance for corporate digital entrepreneurship and industrial managers do not have a conceptual framework to navigate their organizations for new product and process innovation. This paper discusses the importance of emerging digital technologies for digital entrepreneurship and presents a conceptual framework of corporate digital entrepreneurship highlighting three elements—business model transformation, operating model transformation, and cultural transformation—which is necessary for fostering digital entrepreneurship in organizations. The chapter presents three case studies and discusses practical implications for the future.

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1 The Relevance of the Topic

Innovation and entrepreneurship are intertwined and most often entrepreneurship starts with innovation by an individual or group of people (Gustavsson et al. 2018). The great economist Schumpeter suggested that entrepreneurship by individuals or by a large firm could drive the innovation and growth of a firm (Schumpeter 1934). In corporate entrepreneurship terms, acts of entrepreneurship (or intrapreneurship within the boundaries of the firm) and innovation are needed to perpetuate and sustain an organization over time (Kraus et al. 2018; Hughes and Mustafa 2017). Despite considerable scholarly discussion about entrepreneurship, we must increasingly pay attention to digital technologies and its profound impact on entrepreneurship (a phenomenon termed "digital entrepreneurship") (Nambisan et al. 2017) as we traverse the new industrial revolution. The practitioners have started multiple digital transformation initiatives; however, they have limited guidelines for fostering entrepreneurship in a large organization.

The Fourth Industrial Revolution (Industry 4.0) and the industrial Internet of things (IIoT) are fundamentally changing the industrial landscape, and digitization of businesses is driving innovation and change in organizations (Kagermann et al. 2014). We are also moving from the Fourth Industrial Revolution to the Fifth Industrial Revolution (Industry 5.0), where man and machine will be integrated seamlessly to deliver business outcomes and artificial intelligence (AI) will bring the Fifth Industrial Revolution.[1] Digital (corporate) entrepreneurship in large organizations using digital technology is more important now than a decade ago. For example, businesses must anticipate and address digitization in business and corporate strategies (Mithas et al. 2013; Kohli and Grover 2008), revise organizational design (Sund et al. 2016), and must implement new digital technologies (Setia et al. 2013) and generate new capabilities (Tripsas and Gavetti 2000) to innovate new value propositions (Krotov 2017), or else be left behind. As appropriately surmised by Bill Ruh, former CEO of GE Digital,[2] "if you cannot master the idea of digital inside your business, you are opening the door for commoditization." By leveraging industrial IoT and other digital technologies such as artificial intelligence (AI), machine learning (ML), blockchain, big data/analytics, managers, and corporate entrepreneurs can accelerate business transformation, which in turn will optimize the organizational productivity and increase customer satisfaction. Industrial IoT requires new business models and the concepts of digital entrepreneurship and traditional entrepreneurship are merging together for industrial businesses.

This chapter discusses how large and established companies are accelerating corporate digital entrepreneurship by leveraging industrial IoT and emerging technologies.

[1] https://www.robotics.org/blog-article.cfm/What-is-Industry-5-0-and-How-Will-Industrial-Robots-Play-a-Role/99.

[2] https://www.forbes.com/sites/maribellopez/2018/01/24/ge-digital-ceo-shares-insights-on-digital-transformation-in-industrial-markets/#23e4b1fe3385.

2 Background

There is a plethora of academic studies positioning the meaning and intent behind entrepreneurship Schumpeter (1934) viewed the entrepreneur as a leader and contributor to the process of creative destruction. Kirzner (1985) suggested that entrepreneurs mostly fulfill unsatisfied needs in the market or improve operational efficiency by detecting and closing gaps in the marketplace. In recent times, views have emerged that highlight the uncertainty under which entrepreneurs must make judgments about assembling resources and mobilizing partners and markets (Foss, Klein and Bjørnskov 2018). Digitization and Industry 4.0 are symptomatic of a context characterized by fundamental uncertainty and asymmetric information. Perhaps the most significant challenge to large organizations in this context is the inability to foresee which business models will be the most profitable, what capabilities are needed into the long-term, and what the customer and competitive landscapes will consist of. This is all the more apparent which are industry boundaries blur, and non-traditional entities become modern-day competitors (e.g., consider Apple, Dyson, and Google) all making investments in autonomous vehicles versus the classic top car manufacturers (VW, Toyota, Renault Nissan, GM, Hyundai Kia, Ford, Honda, Fiat Chrysler, Suzuki, PSA Peugeot Citroen, BMW, and Mercedes-Benz).

Digital entrepreneurship can be thought of as an extension of the traditional entrepreneurship model; however, there are some distinct differences. The process of marketing products and services, workplaces and coordination between stakeholders are different in the digital entrepreneurship model (Hafezieh et al. 2011). E-commerce business models exist for a couple of decades (Turban et al. 2006; Mahadevan 2000) where business models support business-to-business (B2B) and business-to-consumer (B2C) models and most of the companies developed their own e-commerce platforms (e.g., ebay.com, Alibaba.com, etc.). However, with technological advancements and cloud computing, platform-based business models have emerged and platform owners have more power than the factory owners in the early industrial revolution. For example, Amazon Web Services (AWS), Salesforce.com, and other platform vendors provide software platforms to build different e-commerce solutions quickly for a larger customer base. The platform economy has helped a new set of entrepreneurial companies like Airbnb, Uber, Lyft to connect consumers with service providers.

According to Hull et al. (2007), value creation is the core purpose of entrepreneurship, where digital entrepreneurship is a subcategory of entrepreneurship where most or all of the products and services are digitized. Hair et al. (2012) suggested that market orientation is important for digital entrepreneurship and electronic community and communication play an important role for successful digital ventures. Giones and Brem (2017) further divided entrepreneurship into three categories: *Technology Entrepreneurship* characterized by new products based on innovative and breakthrough research and development, *Digital Technology Entrepreneurship* where new products are based on information and

communication technology (ICT), and *Digital Entrepreneurship* where new products and services are developed by leveraging the Internet, Cloud, Big Data/Analytics and other emerging technologies. Sussan and Acs (2017) believe that digital entrepreneurship is any venture (social, government, or corporate) where digital technologies are used for developing products and services for customers.

2.1 Corporate Digital Entrepreneurship/Intrapreneurship

Corporate entrepreneurship is implemented in the firm either through corporate venturing (internal, cooperative, or external corporate venturing) or through strategic entrepreneurship, where a company invests in innovation activities for competitive advantage; however, these innovations may or may not result in new business (Morris et al. 2010). Other researchers suggest that corporate entrepreneurship includes a firm's innovation activities, venturing, and renewal activities (Ling et al. 2008). Corporate entrepreneurship is also a higher-order capability/construct based on a firm's ability in innovation, venturing, and renewal activities (Ling et al. 2008).

Corporate entrepreneurship is typically used synonymously with Intrapreneurship and is defined as entrepreneurship within an existing organization (Antoncic and Hisrich 2001), commensurate with innovation practices within an organization by which employees undertake and pursue different business opportunities (Ward and Baruah 2014). Ping et al. (2010) suggest that intrapreneurship fosters every aspect of business innovation and create new business benefits for organizations. Intrapreneurship initiatives can help a company to develop new businesses by innovating new products and services (Knight 1997; Stopford and Baden-Fuller 1994; Zahra 1993) or by entering new markets and customer segments (Zahra 1991) or both. These efforts can alter the course of the business and revitalize its business performance.

For the remainder of this chapter, corporate digital entrepreneurship is used in lieu of corporate entrepreneurship and intrapreneurship from a digitization viewpoint. Corporate digital entrepreneurs play important roles in bringing industrial Internet of things (IIoT) and emerging technology-based business applications to the market and create new business models using their technical knowledge, business expertise, and relationships with ecosystem partners. These entrepreneurs connect the dots between technological, business, ethical and legal issues and create a business environment where they can develop new products and services (Krotov 2017). As with any other innovation, technology-based innovations can be classified into three categories: incremental, revolutionary (integrative), and disruptive (Christensen et al. 2005). For example, GE Healthcare developed GE Centricity™ imaging collaboration suite in the cloud.[3] This is an example of incremental

[3]https://www.gehealthcare.com/products/healthcare-it/enterprise-imaging/centricity-imaging-collaboration-suite.

innovation over GE's in-hospital Centricity imaging solution. Now, the hospital can store healthcare-related images in the cloud and clinicians (general physicians, radiologists, specialists) and patients can share and collaborate effectively in a cloud-based environment. The scope of the incremental innovation is mostly restricted to existing customers and markets. On the other hand, GE Healthcare also developed a GE health cloud,[4] where hospitals, patients, and related services can store comprehensive health information (imaging, monitoring, electronic medical record, etc.) for patients. This is an example of a revolutionary (integrative) innovation. This type of integrative innovation is enterprise-wide and mostly creates new customers and markets. GE Healthcare also developed a handheld pocket-sized ultrasound machine[5] using a smartphone and intelligent probes. This machine can collect ultrasound images for a patient and securely transfer the image to a health cloud or in-house hospital imaging system. This is a moderately low cost, high utility machine for developing countries and represents an example of disruptive innovation, which creates new markets and expands the business rapidly. Corporate digital entrepreneurs in large organizations develop products and services by leveraging these three categories of innovations. These innovative solutions use IoT-based applications and digital technologies for data management and analysis.

2.2 Impact of Industrial IoT and Emerging Technologies

Application of industrial IoT and digital technologies is disrupting industrial businesses, and this external pressure can stimulate entrepreneurship within incumbent organizations. "Industrial Internet" is a term coined by General Electric (GE) (Leber 2012) and comprises of connecting together industrial machines to share information on a real-time or near real-time basis and to make proactive and predictive business decisions based on machine analytics. Leber (2012) further suggests that the industrial Internet can change the entirety, or at least substantially, the business paradigms of industrial businesses, which in turn will help a company to develop new products and processes faster, improve productivity, and increase customer satisfaction. There is a convergence of industrial systems with the power of advanced processing and analysis capabilities, the emergence of low-cost cloud-based data sharing environments, and low-cost sensing and machine data sharing. These business solutions are transforming the industrial world and in turn will change our daily lives, including the ways we do our jobs and business. For example, GE aviation and Pivotal have created a data analytics solution where they can track 3 million flights, gather 300 terabytes of data and analyze the data 2000 times faster than the previous methods and reduce cost tenfold (Schneider 2014).

[4]https://www.gehealthcare.com/products/health-cloud-platform.
[5]https://www.gehealthcare.com/products/ultrasound/vscan-family/vscan.

Siemens healthcare has developed a digital ecosystem store in the cloud where Siemens and its partners are sharing healthcare applications and the customers can subscribe to those applications on a pay-per-use basis.[6]

This holds the promise of greater productivity, a higher standard of living and a safe and secure industrial environment. The savings from interconnected and intelligent machines will be substantial for the global market. For example, in fifteen years globally, improving fuel savings by just one percent in the aviation industry could save $30 billion, one percent of fuel savings in power generation equipment could save $66 billion, one percent of operation costs of hospitals could save $63 billion, one percent increase in transportation efficiency could save $27 billion, and one percent improvement in capital utilization in upstream and downstream oil exploration and development could save $90 billion (Evans and Annunziata 2012). So, the power of just one percent improvement is substantial for industrial companies and these five industries alone could save $276 billion globally in fifteen years. The corporate entrepreneurs can utilize the digital ecosystems and develop new products and services and bring those to the market much faster than their competitors.

The problems facing firms are twofold, though. First, which companies will gain as technologies shift, new technologies emerge and are implemented, and new business models emerge is uncertain. Established, incumbent businesses are struggling with historical investments in capabilities and ways of doing business that has developed a dependency and reinforced by years if not decades of investments. Second, established, incumbent businesses must embrace entrepreneurial and digital mindsets to set a willingness to innovate into new, non-traditional technologies, the ability to both do so and execute on which requires hitherto undefined capabilities. As firms cannot make infinite investments, strategic decisions on markets and capabilities are judgments couched in uncertainty, which calls on incumbent firms to embrace corporate digital entrepreneurship. For example, Pitney Bowes Inc. (www.pitneybowes.com) is a nearly century-old office postage meter company in Stamford, CT, USA. The company's annual revenue is around $3.5 billion. In 2014, Pitney Bowes realized that office postage meter and printing businesses were changing and customers were more interested in digital transactions. The corporate digital entrepreneurship initiative was started by Roger Pilc, then chief innovation officer,[7] who realized that Pitney Bowes should reposition itself as a technology company and should leverage emerging technologies such as IoT, big data, mobile, and cloud technologies. They developed a commerce cloud (software-as-a-service, SaaS) solution and diversified their business in cross-border e-commerce. In 2018, half of the revenue came from commerce services.[8]

[6]https://www.siemens-healthineers.com/press-room/press-releases/pr-20180306009hc.html.
[7]https://www.forbes.com/sites/peterhigh/2016/08/09/roger-pilc-awakens-pitney-bowes-innovation-engine/#1a32078f603d.
[8]https://www.investorrelations.pitneybowes.com/static-files/faba498e-408f-4085-87ae-fc815edbc061.

2.3 Elements of Digital Entrepreneurship

From the above discussion, we can infer that digital technologies and interconnected ecosystems have a profound impact on digital entrepreneurship as companies are developing new ways to do business, manage their internal operations differently, and have developed new ways to interact with their partners. For example, disruptive technologies such as 3D printing technologies could help in business model innovation as it allows rapid prototyping and mass customized products based on unique fulfillment requirements for the customers (Rayna and Striukova 2016). These mass customized products could initiate new enterprise ventures. In the dotcom era, business model innovations were started by the start-up companies by developing advertisement-based business models as digital technologies changed the value creation models (Abd Aziz et al. 2008), however in the current situation, established companies must transform their business models and initiate new ventures by developing new products and services so that they can compete in the connected ecosystem (Burmeister et al. 2016).

As companies are changing their business models, they need to change their operating models as well as needing the next-generation operating models for the digital world (Bollard et al. 2017). As business models are changing, companies are developing new operating models to support their business models (Berman and Hagan 2006). Researchers (Reijnen et al. 2018) have suggested an operating model canvas (OMC) approach such as based on business model innovation. A company can develop an OMC model that visualizes value proposition, primary and supporting business activities, channels and actors responsible for such activities. Thus, digital technologies are impacting existing operating models and by realigning operating models with business models, companies can be engaged in the new ventures.

Other than business models and operating models, the mindsets of the managers, which transform organizations culturally, are equally important to be successful as digital entrepreneurs. The mindsets of the executives and top managers influence strategic changes (Adner and Helfat 2003). As industrial businesses are expanding their digitization efforts, companies are redrawing their industry boundaries and developing new and innovative ways to deliver services to their customers (Kaganer et al. 2014). According to these authors, digital leadership is not a job title or a role, but a mindset of managers responsible for digital entrepreneurship. The cognition capability is an important attribute of top managers (Finkelstein et al. 2009). Smith and Tushman (2005) suggest that top managers need to build "paradoxical cognition" that enables them to pursue exploration and exploitation simultaneously.

Digital disruptions and emerging technologies are influencing a firm's ability to change its business models, operating models, and culture which is in turn fostering digital entrepreneurships, and these transformations lead to new ventures.

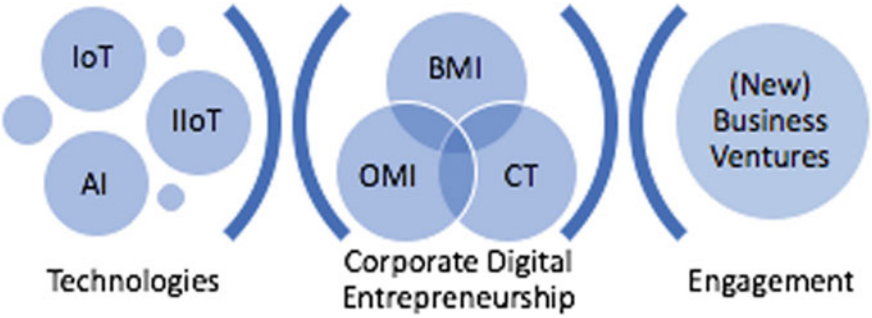

Fig. 1 Conceptual framework for corporate digital entrepreneurship

3 Conceptual Model/Empirical Findings

Emerging digital technologies (Industrial IoT, AI/ML, Blockchain, etc.) foster digital entrepreneurship by providing a disruptive solution development paradigm so that new and existing companies develop new products and services across multiple industries by leveraging these technologies (Lee and Lee 2015). IoT provides new opportunities for innovation (Krotov 2017), whereas artificial intelligence (AI) has a significant impact on the economy as it is being considered a "method for invention" which positively changes the innovation processes within an organization and the roles of R&D within that organization (Cockburn et al. 2018). AI/ML-based technologies are helping digital entrepreneurship in medical technologies including expert system guided medical diagnosis (Cockburn et al. 2018), home health care (Augusto et al. 2007), intensive care unit applications (Hanson and Marshall 2001). Outside healthcare, AI/ML-based applications are accelerating digital entrepreneurship in manufacturing, retail, and other industrial businesses. By utilizing IoT, AI/ML, and other Internet technologies, manufacturers have developed proactive preventive maintenance solutions for their machines and they are offering product-as-service business models to their customers.[9] IoT and AI/ML serve as a boon for retail companies as they collect huge amounts of customer data from different customer interactions, analyze the data using machine learning techniques, and provide new and enhanced customer-centric solutions including highly structured web shops, intelligent in-store bots, and online chatbots (Fig. 1).[10]

[9]https://www.forbes.com/sites/insights-intelai/2018/07/17/how-ai-builds-a-better-manufacturing-process/#38a799f01e84.
[10]https://medium.com/datadriveninvestor/how-ai-will-change-the-retail-industry-in-2019-c817091c6306.

As mentioned in the previous sections, industrial organizations are changing their business models and developing outcome-centric business models, which are possible due to technological advancements. Since organizations are venturing into new markets and customers, they are transforming their operating models by integrating business systems and processes with internal systems and with ecosystem partners. Finally, organizations are transforming their cultures and developing digital cultures for entrepreneurship. However, external factors such as competitive turbulence, market turbulence, technology turbulence, and internal factors such as path dependency and digital commitment influence these factors. The following sections describe these three factors and influencers.

3.1 Business Model Transformation

Corporate digital entrepreneurs are developing new products and services by transforming existing business models and introducing new ones. Value creation and value capture are two fundamental functions of a business model. Teece (2010) suggests that the purpose of a business model is to define how the company delivers value to its customers, entices its customers to pay for those perceived values, and converts those payments to profit for the company. Teece further suggests that business model innovation can be a path to competitive advantage if it is sufficiently differentiated from its competitors and cannot be replicated easily. Hui (2014) highlights the importance of digital business model innovation for IoT businesses. The author emphasizes that in the connected world, companies need to rethink how values are created and captured for their customers. Hui (2014), in the *Harvard Business Review* article entitled "How the Internet of Things Changes Business Models", describes the value creation and capture model and identifies the capabilities needed to create and capture values for IoT business. Value creation is related to the offerings provided by companies to their customers so that they are encouraged to use the service and to pay for those services. Earlier competition was based on features and, since new features add incremental value for customers, most of the business models were based on price. However, in the connected world, products are never sold once as the companies collect the usage of the products on a continuous basis and tweak the products based on customer requirements. This is a continuous improvement process and one that embraces services aligned to products. As with value creation, Hui suggests that the value capture model is changing. Companies are not relying on the one-time value of their products and services, but on recurring values captured from their customers. This is becoming possible due to real-time connectivity with customers. Table 1 (adapted from Hui 2014) describes the model and how emerging technologies are helping to transform the business models.

A business model developed by one company in one market segment can be implemented in another company in a different segment (Teece 2009). For example, a subscription-based software services model pioneered by Salesforce.com's platform is being adopted by GE Digital in its Predix, Industrial Internet platform.

Table 1 Value creation/capture analysis

Value models	Factors for value creation/capture	Traditional business model	IoT and technology-based business model
Value creation	Customer needs	To solve existing problems (reactive)	To address the current and future needs proactively
	Offerings	To market products with service contracts	To market products as-a-service
	Role of data	To maintain customers by collecting data periodically for future product enhancements	To enhance customer satisfaction by continuous monitoring of customers
Value capture	Path to profit	To develop and maintain sales capabilities for one-time sale of the product and service	To enhance sales capabilities for recurring pay-per-use revenue
	Control points	To protect using IP protection, brand values, and customer support	To protect using personalization and network effects
	Capability development	To leverage core competencies and existing resources and capabilities	To work with alliance partners to develop products and fill the gaps with customers

Source Hui (2014)

Though business model studies have gained importance, some scholars (Zott et al. 2011) observe that: (i) the definition of a business model is not clear, (ii) the researchers are interested in business models for e-business/digital business and how business models are creating competitive advantages, and (iii) researchers are considering a business model as a new unit of analysis and partners play an important role. For industrial businesses, firms must develop value creation capabilities (such as offering service-based business models, freemium-based subscription models) and business models must include contributions from partners. Though industrial businesses are going through technological innovation, they do not guarantee business success; the new product development efforts should be coupled with a new business model to capture value for its customers (Teece 2010).

Digital technologies have led to the disruption of existing business models (Weill and Woerner 2015). Corporate digital entrepreneurs in innovative companies take advantage of new business opportunities and enhance or disrupt the existing business models (e.g., Instagram, a Facebook company, disrupted Kodak's business model of capturing, sharing, and storing photography, Lucas and Goh 2009). Similarly, a big retailer, Ikea is implementing digital technologies (augmented reality AR, virtual reality VR, big data analysis, etc.) and developing new customer-centric business models (Milne 2018). Ibarra et al. (2017) suggested four different ways in which digital entrepreneurs in existing companies are transforming their business models by leveraging digital technologies: internal and external process optimization by applying digital technologies in existing businesses; improving customer interfaces with digital technologies and offering new business models; developing new ecosystems and value networks by integrating

companies' business processes with ecosystem partners and offering new products and services; developing disruptive new smart products and services and creating new business models.

Based on these discussions, we propose that digital technologies lead to business model transformations, which in turn influence corporate digital entrepreneurs to develop new products and services for their organizations.

3.2 Operating Model Transformation

Business model transformation may not be enough for corporate digital entrepreneurship and companies need to transform their existing operating models or develop new operating models for innovation and operational efficiencies. The digital operating model is a new way of running business functions, processes, and structures that combines digital technologies and operational capabilities of an organization so that it can achieve its mission (WEF 2018). Companies can achieve operational efficiencies and competitive advantages by understanding current and emerging business processes, models and current and emerging digital technologies (Andriole 2017). Organizations should develop the following capabilities to transform their operations digitally (WEF 2018) to initiate new ventures.

- **To sense disruption and extend industry boundaries**: Since physical and digital worlds are converging, companies should develop an operating model that will expand beyond their current industry. Corporate digital entrepreneurs should explore business opportunities outside their current business boundaries. As firms now have temporary competitive advantages (McGrath 2013) as more competitors are entering the business from multiple industries, to remain competitive, a firm needs to transform its operating model and expand its industry boundaries.
- **To experiment with ideas and launch them faster**: Corporate digital entrepreneurs should launch their ideas faster and should try to get early mover's advantage with their products and services. Digital entrepreneurs should take advantage of platform-based innovations and open systems (Hsieh et al. 2019).
- **To understand and leverage data**: Corporate digital entrepreneurs should understand their data and should come up with operating models to monetize data in new ways and which may lead to new business. The data monetization capability is gaining importance. Data monetization is the conversion of the intangible value of data into real value by selling the data, and it can also be monetized in other forms, like data-driven advertising or discounts and reduction in IT costs (Najjar and Kettinger 2013). For example, GE and Pivotal created a

data lake for the airline industry by storing flight data from the aircraft and providing analytics to airlines.[11] Thus, a data-driven operating model may foster corporate digital entrepreneurship.

- **To build a competent digital team**: Companies should assess their digital capabilities and acquire new or retrain existing workforce in digital technologies. The managerial cognitive capability (Helfat and Peteraf 2014) is essential for managers who are faced with strategic changes for corporate digital entrepreneurship. The role of Chief Digital Officer (CDO) is critical for corporate digital entrepreneurship, and this person is responsible for digital initiatives in large organizations (Singh and Hess 2017).
- **To develop ecosystem partnerships**: Corporate entrepreneurs should develop ecosystem partnerships to provide comprehensive solutions to their customers. Also, companies should partner for non-core activities. The firm with stronger technological capabilities likes to enter an emerging technological field through internal development, whereas the firm with weaker technological capabilities will enter through strategic alliances (Anand et al. 2010). In order to successfully launch new products and services, a firm often cannot fulfill all the requirements from customers on its own, so the strategic partnership is key for success and corporate digital entrepreneurs should take advantage of that.
- **To organize for speed**: Companies should have digitally savvy executives who can lead corporate digital entrepreneurship. The role of CDO reporting to the CEO could be ideal for companies. In a hyper-competitive environment (digital disruption), the mere presence of adequate resources is not enough and the firm's ability to mobilize its resources and organizational capabilities and align them dynamically with the changing opportunities in the environment is vital to maintain competitive advantage (Liao et al. 2009). The role of the CDO to bring changes using digital technologies is a key for corporate digital entrepreneurship (Rickards et al. 2015).
- **To design a user-friendly experience for its customers**: Corporate digital entrepreneurs should design multi-channel user experiences for their customers, which should include web, mobile, and other digital assistants. Omni-channel marketing capabilities are gaining importance to connect with the customers and becoming a key success factor for developing new products and services for a firm (Mirsch et al. 2016).

Industry 4.0 or the Fourth Industrial Revolution refers to the next phase of the digitization of manufacturing where emerging technologies, such as IoT, play a significant role which has the potential to develop low volume highly personalized products and services cost-effectively (Bahrin et al. 2016). According to Fonseca (2018), Industry 4.0 fosters newer production systems and business models impacting the overall manufacturing value chain, society, and environment. The Fourth Industrial Revolution will empower consumers and will foster new business models, and digitally enabled consumer-obsessed companies must change their

[11]https://www.ge.com/reports/post/94170227900/angling-in-the-data-lake-ge-and-pivotal-pioneer-4/.

operating models to satisfy the consumers' needs.[12] One of the significant changes in the operating model is driven by digitization across vertical and horizontal functions of an organization. Industrial businesses are digitizing and integrating their vertical value chains, from design, manufacturing, sales and service functions. All operational process information is available on a real-time basis, and it is supported by emerging technologies such as augmented reality (AR), virtual reality (VR), artificial intelligence, and machine learning (AI/ML). The horizontal integration spans across partners, suppliers, and customers in the digital ecosystem. The corporate digital entrepreneurs are developing new operating models to support pay-per-use business models. For example, Baker Hughes (a GE Company) has developed digital twins in their Minden plant to optimize supply chain and factory operations.[13] Digital Twins are virtual models of physical assets or business processes that learn continuously from the data; they provide proactive business decisions and use emerging digital technologies such as IoT, Big Data, AI/ML, 3D simulation, and other technologies. The corporate digital entrepreneurs are also forging strategic alliances and bringing new products and services to the market. For example, GE Aviation and Microsoft are developing a new outcome-centric business model, "TrueEngine", where GE Aviation will use Microsoft's Blockchain technology and offers a cloud-based service so that airline companies can get better visibility of their entire supply chains, which in turn will improve their operational efficiencies (Allison 2019). Thus, strategic ecosystem-centric operating models are helping digital entrepreneurs to develop new products and services.

Based on these discussions, the framework proposes that digital technologies influence operating model transformation and foster corporate digital entrepreneurship.

3.3 Cultural Transformation

Business model transformation and operating model transformation are two key factors for corporate digital entrepreneurship. However, another key factor is cultural transformation. To implement Industry 4.0, the companies will face organizational challenges related to digital culture and training as all employees need to think and act like digital natives, should have the willingness to experiment with new technologies and new ways to do their work (Lee et al. 2017). In the new digital age, business leaders must have the ability to reimagine their businesses with clear digital strategies and to foster digital cultures in their organizations (Kane et al. 2015).

Most companies are facing digital talent and skill challenges, and they need to develop digital workforces by improving their company culture and offering

[12]https://www.accenture.com/_acnmedia/pdf-72/accenture-strategy-wef-operating-models-future-consumption-full-report.pdf.
[13]https://gereportsbrasil.com.br/how-digital-twin-is-making-machines-and-processes-more-productive-a4d1b6ef4ddc.

suitable incentives and growth opportunities for their digital workforce. Corporate digital entrepreneurs should pay special attention to the following challenges for developing new products and services:

- **Attracting and retaining talent**: Corporate digital entrepreneurs should develop proper recruitment and retention strategies for their employees. Companies also need to have transparent hiring policies because digitally savvy applicants receive information from different online channels, such as Glassdoor and Linkedin.com, and any negative comments might impact on selecting and retaining talent. Employee satisfaction is also associated with long-term returns, profitability, and valuation of the companies in countries with high labor market flexibility (Edmans et al. 2014). Creating and sensing opportunities are not uniformly distributed among employees or throughout the organization, and employees need to have the capability and knowledge to recognize and execute these opportunities (Teece 2007; Nonaka and Toyama 2007). Thus, a digitally savvy and knowledgeable workforce possesses the necessary capabilities for sensing and seizing opportunities and works with internal and external partners to execute those opportunities.
- **Creating a digital workforce**: Due to the shortages of the digitally skilled and digitally equipped workforce, companies should develop strategies and capabilities to acquire digitally trained employees from within and outside their companies. Digital success is not all about technology. However, organizations with digital maturity are four times more likely to provide the necessary digital skills to their employees for DT (Kane et al. 2015). Organizations should assess their digital needs and develop proper training and development programs for their employees, including digital boot camps, in-house training and should encourage employees to participate in the educational courses outside the company. Companies should also prepare an inventory of existing employee skills and encourage hidden talent within the company to pursue corporate digital entrepreneurships (WEF 2018).
- **Bringing in a digital leadership team**: Companies may not have digitally skilled and equipped managers and need to hire digital managers from within or outside the organization so that they can initiate changes in the organization; these individuals should be placed in different functions in the organization to enable changes on a broader scale, not restricted to one business function. The top managers in a company must work as catalysts for digital corporate entrepreneurship. Top managers' entrepreneurial and leadership skills can help an organization in its transformation journey (Teece 2010).
- **Moving away from a risk-averse culture to more entrepreneurial approaches**: Due to digital disruption, companies should experiment with newer and bolder ideas to bring changes. According to Teece (2009), risk-averse managers tend to discount outcomes that are improbable and go after certain outcomes. For corporate digital entrepreneurship, entrepreneurial capability, such as risk-taking, is becoming a necessity as more digital companies are taking risks to venture into new areas of business (Kane et al. 2015). The role of middle

managers is also important for driving innovation in an organization. Middle managers must allocate resources for innovative projects in organizations, and they play innovative roles in these organizations (Engle et al. 2017).

Digital technologies are forcing existing organizations to change their organizational cultures and develop a nimbler entrepreneurship-focused organization (Porter and Heppelmann 2015). Bilgeri et al. (2017) have identified three organizational and cultural issues for corporate digital entrepreneurship in large organizations: the role of new corporate entities, the role of traditional information technology (IT) functions, and business unit (BU) collaborations. More and more large organizations are creating a Chief Digital Officer (CDO) role as a key executive leadership role to drive corporate digital entrepreneurship. The role of IT is changing and the role of Chief Information Officer (CIO) is to help the CDO in new innovative projects. The business units incorporate customer success management mandates in their corporate objectives as companies and customers are collaborating for new business ventures. Most of the major organizations have CDOs as executive management roles. For example, Samsung, Nike, GE, Hitachi, etc., have CDO roles in their executive organizations. A CDO in a large organization works as a digital entrepreneur and is supported by a proper organization structure and digital culture to accelerate new digital business opportunities.

Based on these discussions, the framework proposes that digital technologies are influencing cultural transformation in the organizations and facilitating corporate digital entrepreneurship.

3.4 Factors Affecting Corporate Digital Entrepreneurship

The framework suggests that environmental turbulence (technology turbulence and market turbulence) influences the relationship between digital technologies and corporate digital entrepreneurship because environmental turbulence creates new digital business opportunities. Some scholars (Wilden and Gudergan 2015) suggest that technological capabilities such as implementing digital technologies enhance performance in stable competitive environments and marketing capabilities such as developing new business plans, go-to-market strategies, and enhance performance in highly competitive environments. Huang et al. (2012) find that technology turbulence positively affects the relationship between external technology acquisition and firm performance and not external technology exploitation and firm performance. So, digital disruptions and rapid technological changes affect corporate digital entrepreneurship as it helps organizations to develop new products and services. Environmental turbulence also influences cultural transformation. A top management team can be considered as the information processing center of an organization (Thompson 1967). Haleblian and Finkelstein (1993) suggest that the degree of environmental turbulence or stability greatly influences the information processing requirements of a top team (managers). So, environmental turbulence influences the use of managerial capabilities of top managers in a turbulent

technology and market environment and their capability for corporate digital entrepreneurship. Another important characteristic of a digital manager is the manager's perception of the need for change as in a stable environment a manager perceives the environment as predictable and that there is less need for change, whereas, in a turbulent environment, the manager perceives it as fast-paced, unpredictable and that the need for change is very high (Ambrosini et al. 2009). In his book, *The Innovator's Dilemma*, Christensen (1997) argues that the organization needs to align differently when faced with technology disruption and changing market conditions. Christensen further suggests that corporate digital entrepreneurs need to have exploration and exploitation strategies in these disruptive situations. However, the firm needs to consider its existing capabilities and systematically develop new strategies and capabilities for exploration and exploitation for developing new products and services. Competitive turbulence refers to the degree of competition in an industry (Porter 1985). When the market is highly competitive, the companies must watch out for their competitors and their relative positioning in the market (Han et al. 1998). The digital business is highly competitive, and companies are coming from different industries to get a share in digital businesses. Based on these discussions, it could be suggested that the external environment influences the relationship between digital technologies and corporate digital entrepreneurship.

Internal factors, such as path dependency and digital commitment, affect corporate digital entrepreneurship. Path dependency is a property of a system where the outcomes over a period are determined by the initial set of conditions (Goldstone 1998). Path dependency can speed up, slow down or halt construction of capabilities which could better position the firm for corporate digital entrepreneurship (Sydow et al. 2009). Path dependency is developed when contingent events trigger self-reinforcing paths (i.e., the set of positive and negative mechanisms which increase the attractiveness of a path related to other paths) (Vergne and Durand 2011). These scholars also suggest that path dependency creates a lock-in within a firm. A firm may not be able to sense the opportunity and may remain on its historic path during this disruption. For example, though Blackberry realized that the mobile application market was changing drastically from a mobile phone for the conversation to a multi-purpose mobile device for conversation, audio and video, due to path dependency it did not change its original path/business and lost business. So, path dependency for Blackberry created a negative effect on corporate digital entrepreneurship. Strategic focus and intent create digital commitment for a firm, and it accelerates the development of corporate digital entrepreneurship. For example, the Board of Directors of GE, including the previous chairman Jeff Immelt,[14] were committed to the digital transformation of GE's businesses by leveraging digital technologies and they established GE Digital as among the top ten software companies in the world. Adner and Helfat (2003) propose that within a single industry, where managers face

[14]http://www.cnbc.com/2017/02/15/ge-ceo-jeff-immelt-tells-cramer-hes-betting-on-the-industrial-internet.html.

the same external environment, time-varying corporate effects for managerial decisions are statistically significant. By extending this concept to digital commitment, it can be said that faced with digital disruptions, the commitment of managers and allocating resources will have a significant impact on corporate digital entrepreneurship. Digital commitment from the top, especially the CEO and CDO, should enable commitment to transformation initiatives by digital technologies, and they should allocate the necessary resources to achieve that; otherwise, the transformation will be sporadic (Bendor-Samuel 2017). Thus, it is proposed that digital commitment positively influences the relationship between digital technologies and corporate digital entrepreneurship.

4 Examples from Practice/Case Studies from Practice

4.1 Rolls Royce—Power by the Hour

Rolls Royce's civil aerospace business is the leading manufacturer of aircraft engines for commercial aircraft, regional jets and the business aviation market. The company's aircraft business has a 35% market share and revenue of 7.3B Euro in 2018. The company transformed its business model by changing a product-centric business model to an outcome-centric model, where customers pay by the operating hours of the engine.[15] Previously, a customer used to pay a one-off large amount for the engine and bought a service contract for ongoing maintenance. In the engine value-based pricing model, the payment is based on flight performance hours achieved with the engine and customers do not have to buy the engines and pay the maintenance costs, thus allowing low-cost airlines to sign contracts with Rolls Royce. This innovative business model has increased its customer base and provides better benefits for customers as they only pay for engine performance.

Rolls Royce started their "Total Care" business model in the mid-1990s when the company introduced a new venture, "Total Care Term", where customers signed up for coverage over a fixed fee per engine flight hours. The fees were charged based on the expected number of shop visits and related costs divided by the expected number of flight hours. Though there were uncertainties about the engine conditions at the end of the contract, customers chose this term for the lowest cost. In 2007, Rolls Royce enhanced the existing maintenance service venture and introduced "Total Life". As the company gained more and more experience in servicing aircraft, it introduced a new service business model to increase its market share in the aircraft maintenance business. In the "Total Life" model, Rolls Royce provides aircraft maintenance for life (as long as the aircraft is in operation) and the flying hours are considered for per-hour cost; the service can be transferred to other aircraft operators in case of any changes in ownership. In 2015, Rolls Royce introduced the "Total Care Flex" business model, where a customer can pay a

[15]https://www.rolls-royce.com/media/our-stories/discover/2017/totalcare.aspx.

higher per -hour cost for flexibility. The business model "Total Care" helps the company to reduce waste and optimize resource efficiency while it enables customers to maximize the flying hours of their aircraft. Rolls Royce monitors the performance of the aircraft engines by implementing an IoT-based real-time data collection and analysis system and utilizing AI/ML and big data analytics technologies for proactive maintenance of the engines. Rolls Royce in turn has constant revenue streams by charging by the flying hours of the engines. Business model transformation such as "Total Care" drives new business ventures as Rolls Royce can provide other value-based services to the airlines and the airports.

Thus, Rolls Royce's new business models align with customers' business requirements and it can create powerful circular business models. With the usage of emerging technologies, a company can gain meaningful insights about the businesses of its customers which can lead to new business models and business ventures. This example illustrates how a company such as Roll Royce utilizes transformation technologies available at a particular time and has developed new business models, which in turn facilitated new business ventures.

4.2 Siemens Healthineers Digital Ecosystem

Siemens Healthineers is a healthcare company based in Munich, Germany, and is a division of Siemens AG. The company provides a wide range of imaging and diagnostic medical devices including X-ray systems, radiation oncology systems, laboratory diagnostics, and other diagnostic medical devices. In 2018, the revenue of Siemens Healthineers was 13.4B Euro with a profit of 2.3B Euro. Though the healthcare diagnostic and imaging systems collect a lot of data and most data is stored in the individual machines, it is difficult for a healthcare provider to analyze all these data together to provide a comprehensive 360-degree view of a patient. There is a lack of interoperability between different healthcare systems and machines from different vendors may not share information. Siemens initially developed a new service venture by participating in Integrating the Healthcare Enterprise (IHE) and providing healthcare data integration services to its customers. However, the service business realized that instead of providing individual integration services, Siemens could change its operating model and provide a healthcare data platform for interoperability with multiple partners and customers. Thus, Siemens Healthineers started a new venture, Healthcare Digital Ecosystem. Siemens Healthineers imaging equipment, in-vitro solutions and associated software and services cover more than 200,000 patients per hour globally; the data from the patients could be collected in a cloud-based digital ecosystem and analyzed using emerging technologies such as AI/ML, big data and IIoT for better patient diagnosis. The digital platform-based economy is not new and companies such as Amazon, eBay, Facebook, Google, Salesforce, and others have developed new businesses leveraging digital platforms. The platforms are frameworks that allow multiple parties to collaborate, most often creating a de-facto standard and form an ecosystem for value creation and culture (Kenney and Zysman 2015). The digital

service providers can scale internationally by leveraging digital platforms and can develop new business ventures in different geographies (Täuscher and Laudien 2018). The healthcare digital platform links healthcare experts together, and they can communicate with their peers worldwide and exchange views and expertise for medical diagnostics, which in turn help patients and healthcare providers since population health could improve by such collaboration. A platform is successful once it has a critical mass of partners who use the platform to develop new business ventures by leveraging data from the platform. The healthcare digital ecosystem platform allows healthcare device manufacturers, healthcare payers, providers, and service providers to integrate their services seamlessly into the platform. Siemens has signed up a large number of partners to collaborate effectively in the digital platform. Currently, the platform supports data transparency across imaging systems, maintenance and performance of assets, laboratory process automation, actionable analytics from diagnosis, and imaging software platforms for multimodality reading.

Siemens has transformed its service operating model by leveraging emerging technologies such as cloud, IoT, AI/ML, big data and developed new platform-based service operations, and it helped to create new business ventures not only for Siemens but also for its ecosystem partners. The influence of emerging technologies initiates operating model transformation of an existing business and fosters entrepreneurship within the organization.

4.3 GE Digital

Cultural transformation is another key component for corporate digital entrepreneurship, and it is highly influenced by digital disruptions and digital technologies. Business model transformation and operating model transformation influenced by emerging technologies may not be sufficient for digital entrepreneurship without transforming the culture of the organization. The GE Digital example illustrates that.

Digital transformation is not about the digitization of existing business but rather to transform products and services to software-defined assets and to utilize these digital assets to redefine the business (Govindarajan and Immelt 2019). GE is a big industrial conglomerate, and in 2010, it operated major businesses such as aviation, healthcare, energy, oil and gas, transportation, home and business solutions and GE Capital, with a revenue of $149.59B. GE businesses sold industrial equipment and service contracts (to maintain that equipment) to their customers. The contribution of service revenue from those contracts was 58.5% in 2010 (GE Annual Report 2011). GE's executives realized that GE could increase their earnings from service contracts by making their machines "Smart Machines". However, the software service business was dominated by software service providers such as IBM, Toshiba, HP, and industrial businesses such as GE, Siemens, and others were not aggressively engaged in digital initiatives. Most of the industrial companies were relying on software service providers, and they outsourced their digital operations

to many software vendors. Also, the average gross profit margin from the manufacturing industry is around 10–15%,[16] whereas for the software industry, the median gross profit margin is around 30–40%.[17] By analyzing the trend, GE management decided that investing in digital initiatives would be a game-changer for them as it could take the company to the next level of higher profitability and revenue. GE management also realized that GE was an industrial company, and though it had significant software revenues from different businesses, the culture of the company was not suitable for a pure-play software company. To transform the business culturally and to transform the company into a digital industrial company by leveraging IIoT, GE decided to create a new business venture, GE Digital in Silicon Valley, California, far away from its headquarters in upstate New York. GE also launched an advertising campaign, where a recent college graduate (Owen) was breaking the news to his parents and friends that he had joined GE. In one advertisement, Owen's friends were very excited and in another advertisement, Owen's father told Owen that he was not macho enough to work for an industrial manufacturing company (Winig 2015). GE wanted to reposition itself to recruit Millennials. As industrial Internet footprints were expanding in GE, the management decided to create a new role, Chief Digital Officer (CDO), in all GE businesses. The CDOs of the respective business groups reported to the group CDO of GE, and he was also the CEO of GE Digital. This matrix structure allowed the CDO of GE to influence each business in its digital ventures. Since there was a strong strategic focus and intent to transform GE businesses digitally, all business CDOs started implementing GE's digital platform "Predix" as their base digital platform for new businesses. Thus, GE implemented a strong digital culture and developed new business ventures for its different business groups.

5 Conclusion and Implications

Emerging digital technologies are disrupting businesses, and companies are increasingly accelerating their corporate digital entrepreneurship initiatives. This is not only true for start-up or small companies but equally important for large organizations as they need to transform their businesses and remain competitive in the market. Managers can develop new business, and operating models by leveraging digital technologies and coming up with new products are services that were not possible earlier. Cultural changes are critical to orchestrating structural changes in the organization. A proper sensing strategy is a prerequisite to understanding the internal and external environments for corporate digital entrepreneurship opportunities which are influenced by digital technologies. Once opportunities are identified, digital commitment is necessary to support these initiatives by allocating proper resources and implementing suitable operating models to seize those

[16]https://smallbusiness.chron.com/average-manufacturers-gross-profit-percent-15827.html.
[17]https://www.inc.com/graham-winfrey/the-5-most-profitable-industries-in-the-us.html.

opportunities. Companies should also provide learning and development opportunities for their employees to become digital employees. Ecosystem partnership is very important and a company cannot provide the entire business solution, so strategic alliances and customer management are critical for corporate digital entrepreneurship.

As larger organizations are implementing digital technologies to foster corporate digital entrepreneurship, they can identify potential business ventures to strengthen their competitive positioning in the market. For industrial businesses, product-as-service business models could be piloted for newer products and services. The organizations can develop joint go-to-market (GTM) strategies with alliance partners to address customer requirements. Corporate digital entrepreneurship must be a corporate mandate and a proper organization structure, headed by a CDO or Chief Information Officer (CIO), could foster corporate digital entrepreneurship.

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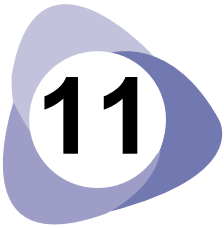

Entrepreneurial finance

Theo Lynn and Pierangelo Rosati

Abstract

Digital technologies are transforming entrepreneurial finance. Near-ubiquitous access to the Internet, platformisation, and advances in cloud computing, machine learning and artificial intelligence, and blockchain are changing the sources, basis, and quantum of funding in ways that were unimaginable at the turn of the century. This chapter outlines the changes to the market for entrepreneurial finance from the perspective of structure and participants. The key sources and characteristics of alternative sources of finance available to entrepreneurs, including start-ups, are presented. Two online alternative finance sources, crowdfunding and token offerings, are discussed in greater detail. These are illustrated with case studies. This chapter concludes with recommendations and a discussion of practical implications.

1 Introduction

Entrepreneurs are typically defined by their risk taking, innovation, and opportunity-seeking behaviour (Wennekers and Thurik 1999). Their contribution to economic growth is widely accepted. Entrepreneurship provides employment and income to a wide range of citizens and contributes to increased innovation, productivity, and competitiveness (OECD 2017; Wennekers and Thurik 1999). Despite this, the nascency of entrepreneurial ventures presents challenges for entrepreneurs in attracting the resources needed to survive and achieve and sustain economic success. This is particularly the case in sourcing finance. Limited credit histories,

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cash flow, under-collateralisation, lack of sophisticated financial statements, and higher default risks are just some of the factors that impede access to credit (Bhide 2003; Hall and Lerner 2010; OECD 2013). While entrepreneurs and SME owners report that credit conditions have improved in recent years, they also report that access to finance is a major concern (OECD 2019).

Entrepreneurs are exploiting new technologies to develop, market, and sell traditional and new products and services in new ways to global markets 24/7/365. At the same time, these technologies are changing how entrepreneurs access funding and from whom. As a result, a large number of new channels to investors have been introduced to the market mobilising new sources of capital. Entrepreneurs have never had so much choice with respect to sources of funding. The remainder of this chapter outlines the changing landscape of entrepreneurial finance and discusses two Internet-enabled sources of entrepreneurial finance in greater detail—crowdfunding and token offerings. These are illustrated with two case studies on Jolla Software and AspenCoin. The former raised over US$1.8 million from over 13,000 contributors in 21 days using the IndieGoGo crowdfunding platform (Jolla 2014c), while the latter raised over US$18 million through a security token offering (Carroll 2018b). The chapter concludes with a summary of the key takeaways for entrepreneurs.

2 The New Alternatives for Entrepreneurial Finance

Up until the turn of the century, the traditional sources of entrepreneurial finance were the so-called three "Fs"—friends, family, and fools—and then as a venture evolved, additional finance was sourced from business angels, venture capital firms, and capital markets (Bellavitis et al. 2017). Over the last twenty years, the market for entrepreneurial finance began to change in terms of both its structure and, relatedly, its participants (Harrison and Mason 2019). Table 1 summarises the structural changes and the implications of these changes for entrepreneurial finance.

Alongside the structural changes highlighted in Table 1, Harrison and Mason (2019) note that a large number of new actors have entered the market mobilising new sources of capital. To some extent, these new actors (presented in Table 2) mitigate the negative effects of structural changes by providing funding at formative stages (e.g. university or government venture capital), reactivating the three Fs, and providing a wider geographic reach for fundraising (e.g. crowdfunding), and democratising venture capital (e.g. token offerings—initial coin offerings (ICOs) and security token offerings (STOs)).

These new actors are re-conceptualising the funding cycle by introducing new peculiarities and dynamics (Brown et al. 2019; Martino et al. 2019). Rather than a relatively linear funding cycle, new sources of entrepreneurial finance can be used interchangeably and revisited many times (Bellavitis et al. 2017). Furthermore, they may not have financial goals or require equity at all. The peculiarities of these new

Table 1 Major structural changes in the market for entrepreneurial finance in the last twenty years

Structural change	Description	Implication
Demise of "classic venture capital"	Withdrawal of institutional venture capital from the start-up and early-stage capital market due to the economics of managing and investing increasingly larger funds	Smaller number of larger transactions thus affecting business development and economic growth
Closure of the IPO market	The IPO market is only available to all intents and purposes to larger companies	Has resulted in "second equity gap" and growing importance in long-term angel investors
Emergence of formally organised angel groups	The development, often with government support, of business angel networks (BANs) which act as matchmaking services for entrepreneurs and investors	Emergence of formal managed angel syndicates, syndicate managers/gatekeepers, formal and informal alliances of angel investors Demise of traditional funding escalator and replacement with a bundling model involving angel groups co-investing with other funds
Identification of a "scale-up" problem	The displacement of individual business angels by BANs and the requirement for larger long-term investment commitments may result in a "first equity gap"	Downward management of entrepreneurs' growth aspirations to match the availability of capital
Changing geography of venture capital	Venture capital investment tends to be concentrated in a relatively small number of the world's major cities	Venture capital has an uneven impact on urban and regional economic development

Adapted from Harrison and Mason (2019)

sources of alternative funding reflect the heterogeneity of the stakeholders behind them. Their goals may be financial, non-financial, or a blend of both financial and non-financial in the case of government, university, and social venture capital funds. In other cases, funding may be provided by stakeholders who just like the idea or consider themselves fans (Block et al. 2018). Similarly, the benefits to firms include not only access to finance but infrastructure, customers, or legitimacy (Bellavitis et al. 2017).

3 The Digital Alternatives: Online Alternative Finance

Not all of the new sources of alternative finance are Internet-enabled. Online alternative finance involves soliciting funds from the public for a project or venture through an Internet-based intermediate platform. Like traditional financing, these may be debt or equity-based. The two most prominent categories of online alternative finance are crowdfunding (including peer-to-peer lending) and token offerings (including ICOs and STOs). The Global Crowdfunding Market was valued at

Table 2 New sources of entrepreneurial finance

Sources of finance	Description	Debit/equity	Investment approach	Investment goal	Examples
Accelerators	A fixed-term, cohort-based program for start-ups, including mentorship and/or educational components, that culminates in a graduation event (Cohen et al. 2019)	Varies	Active	Varies	Y Combinator, Techstars
Business Angel networks	A structured network which offers business angels the possibility to access projects in need of financing (Lange et al. 2003)	Equity	Active	Financial	Tech Coast Angels (US), HALO (Ireland)
Contests	Contests between start-ups and founders where business plans are presented to a panel of judges where the prize may be funding, investment, mentoring, or other supports	Varies	Passive	Varies	Start-up World Cup, Disrupt SF
Crowdfunding	An open call, mostly through the Internet, for the provision of financial resources from a group of individuals or organisations either in the form of donation or in exchange for the future product or some form of reward to support initiatives for specific purposes (Belleflamme et al. 2014; Lynn et al. 2017)				
– Debt-based (Peer-to-peer lending)	A type of crowdfunding where funds are provided as a loan, with the expectation of a rate of return on capital invested (Mollick 2014)	Debt	Passive	Financial	Prosper.com, Funding Circle

(continued)

Table 2 (continued)

Sources of finance	Description	Debit/equity	Investment approach	Investment goal	Examples
– Donation-based	A type of crowdfunding that is used to collect funding in support of charitable or social causes and projects (Lukkarinen et al. 2016)	NA	Passive	Social	Crowdrise, GoFundMe
– Reward-based	A type of crowdfunding where funders receive non-monetary rewards in exchange for their support (Lukkarinen et al. 2016)	NA	Varies	Product-related	IndieGoGo, Kickstarter
– Equity-based	A type of crowdfunding where funders receive a share of future profits or equity securities in exchange for their support (Belleflamme et al. 2014)	Equity	Passive	Financial	IndieGoGo, Kickstarter
Corporate venture capital	The investment of corporate funds directly in external start-up companies for financial or strategic reasons (Chesbrough 2002)	Equity	Active	Financial, technological, strategic	Google Ventures, Intel Capital, Comcast Ventures
Family offices	A private company that manages investments and trusts for a single family (Single Family Office) or a form of financial services to management investments for multiple families (Multi-family Office)	Equity	Mostly passive	Financial	Omidyar Network, Kapor Capital

(continued)

Table 2 (continued)

Sources of finance	Description	Debit/equity	Investment approach	Investment goal	Examples
Governmental venture capital	The investment of government funds directly or indirectly in external start-up companies for financial or policy reasons	Debt or equity	Mostly passive	Financial, governmental	Yozma (Israel), Innovation Network Corporation (Japan)
Incubators	A program that provides a physical office space, networking opportunities, and basic business services to start-up companies. Incubators may offer accelerator programs	Varies	Mostly passive	Financial	Academ park Incubator, ActivSpaces (See Accelerators)
Initial coin offerings	Open calls for funding promoted by organisations, companies, and entrepreneurs to raise money through cryptocurrencies, in exchange for a "token" that can be sold on the Internet or used in the future to obtain products or services and, at times, profits (Adhami et al. 2018)	Equity	Passive	Financial	Telegram, Filecoin
IP-based investment funds	Patent-based investment funds acquire intellectual properties such as patents or patentable inventions at an early stage of development (Gredel et al. 2012)	NA	Passive	Financial	Altitude Capital, Rembrandt IP Management

(continued)

Table 2 (continued)

Sources of finance	Description	Debit/equity	Investment approach	Investment goal	Examples
IP-backed debt funding	Provision of finance for IP owners, either directly or as intermediaries, usually in the form of loans (debt financing), where the security for the loan is either wholly or partially IP assets (i.e. IP collateralisation) (Millien and Laurie 2007)	Debt	Passive	Financial	Bowie Bonds, Singapore IP Financing Scheme (IPFS)
Micro-loans	Provision of debt financing to entrepreneurial projects on a small scale (Heller and Badding 2012)	Debt	Passive	Financial, social	Grameen Bank, BRAC
Mini-bonds	Fixed income debt securities (bonds) that can take advantage of a simplified issuing mechanism (Altman et al. 2018)	Debt	Passive	Financial	Crowdcube
Security token offering	Open calls for funding promoted by organisations, companies, and entrepreneurs to raise money in exchange for a "token" that is fully regulated and approved within at least one jurisdiction	Equity	Passive	Financial	AspenCoin, BoltonCoin
Social venture funds/social venture capital	These funds invest in companies that manufacture or sell socially beneficial products, utilise a management approach that benefits employees and customers, or in companies created to support non-profit organisations or to pursue primarily social objectives (Rubin 2009)	Debt and equity	Active	Financial, social	Better Ventures, Acumen Fund

(continued)

Table 2 (continued)

Sources of finance	Description	Debit/equity	Investment approach	Investment goal	Examples
University-managed/university-based funds	The investment of university funds directly or indirectly in external and internal start-up companies for financial or strategic reasons	Primarily equity	Active	Financial, university-related	The House Fund (Berkeley), NYU Innovation Venture Fund
Venture debt lenders or funds	Loan origination to start-ups who may lack positive cash flow or securities	Debt	Passive	Financial	Clearbanc, Columbia Lake Partners

Adapted and extended from Block et al. (2018)

10.2 Billion US$ in 2018 and is expected to reach 28.8 Billion US$ with a CAGR of 16% by 2025 (Valuates Reports 2019). More recently, token offerings have gained traction providing more than $26 billion in funding through more than 1700 thousand successful offerings (ICObench 2019a).

3.1 Crowdfunding

3.1.1 Equity, Reward, and Donation Crowdfunding

Crowdfunding enables entrepreneurs to attract external finance and develop their business idea by sourcing small amounts of money from a large number of individuals, typically non-professional, i.e. the "crowd" instead of relatively small group of professional investors (Ordanini et al. 2011; Belleflamme et al. 2014; Brown et al. 2019). Crowdfunding platforms exploit the power of the Internet and platformisation to create a two-sided market that links capital-seekers (crowdfunders) and capital givers (investors) generating revenues for themselves through a commission on funds (Haas et al. 2014; Zvilichovsky et al. 2013; Zaggl and Block 2019).

Figure 1 provides an overview of the typical process for a crowdfunding campaign. Promoters submit their project idea to a crowdfunding platform describing the idea, the amount of capital sought, the team, the reward promised, and the length of the campaign. Platforms typically allow promoters to upload interactive material. This may include images or video. A properly designed narrative is quite important for the success of crowdfunding campaigns and is considered an effective way of building legitimacy around new ventures and mobilising diverse and dispersed actors like crowdfunders (Frydrych et al. 2014; Manning and Bejarano 2017). Properly designed communication strategies, both pre and post-launch of a campaign are key elements for its success as they help creating awareness for the project (Gierczak et al. 2016). Furthermore, crowdfunding campaigns typically heavily rely on social media and online communication in order to reach a wide and dispersed audience and in particular potential investors unknown to the promoters (Agrawal et al. 2011; Lynn et al. 2017). Most of the funds tend to be collected during the first and the last weeks of campaigns, therefore, it is important to sustain communication and engagement efforts until the end of a campaign to maximise the amount of capital collected (Kuppuswamy and Bayus 2018).

Crowdfunding platforms do not borrow, pool, or lend money on their own account but enable investors to pledge funds, often on an or all-or-nothing or keep-it-all basis (Cumming et al. 2015; Haas et al. 2014) (see Table 3). The economic model for these platforms is typically a commission based on funds raised or donations received. As such, when a campaign ends, promoters receive the amount of capital raised net of the platform fee. A key differentiation of these platforms is that they cater for a wide range of projects including products, experience goods, social initiatives, and more recently, research projects. Since its emergence in 2010, crowdfunding has expanded in terms of the volume, variety, and value of

Fig. 1 Crowdfunding process

Table 3 All-or-nothing versus keep-it-all (Cumming et al. 2020)

All-or-nothing	Entrepreneurial firms set a capital raising goal below which the entrepreneurial firm does not keep any of the pledged funds and the crowd does not receive any reward
Keep-it-all	Entrepreneurial firms can keep the entire pledged amount regardless as to whether or not the stated capital raising goal is reached

transactions to which it is applied (Agrawal et al. 2015). Massolution (2015) reported that crowdfunding investments worldwide grew to US$34.4 billion in 2015 from over 1250 crowdfunding platforms.

Crowdfunding differs from traditional VC investments by the characteristics of investors, the investment model, and indeed the type of relationship the investors have with the investee. First, as mentioned earlier, unlike traditional investment, the overwhelming majority of crowdfunders are not professional but rather comprise friends, family, and those motivated by preferential access to products or feelings of connectedness to a community or a social cause (Gerber et al. 2012; Brown et al. 2019). Second, crowdfunding investment models are more varied than traditional investment and include crowdinvesting (lending and equity-based crowdfunding) and crowdsponsoring (donation, reward, and pre-purchase) (Griffin 2012). Third, the relationship between investors and investees in crowdfunding models differs from traditional investment (Ley and Weaven 2011). Due to the nature of crowdfunding, the ability to mitigate risk through deal screening, deal referrals, information sensitivity and due diligence before investment are limited. Similarly, ex-post risk mitigation through contractual rights, board representation, value adding capability, economic life, and exit options are also limited (Ley and Weaven 2011). In the case of donation and reward, and pre-purchase crowdfunding models, these may not even be relevant.

Conducting a crowdfunding campaign can be particularly beneficial for entrepreneurs as it provides them with access to capital but also generates a community effect around the project. Research suggests that many crowdfunders are motivated by early or preferential access to innovative products/services and feelings of connectedness to a community (Gerber and Hui 2013). As discussed earlier, crowdfunding also has the potential to eliminate geographical boundaries between entrepreneurs and investors therefore providing them access to a larger pool of resources and projects, respectively. This may result in more investment opportunities for capital givers and in more business and innovation, business and growth

opportunities for entrepreneurs. However, cross-border opportunities have not been fully exploited by investors yet (Wardrop et al. 2015), and therefore, entrepreneurs should still focus on developing and leveraging their own local personal network. Critically, local investors tend to invest early, and this may represent an important signal to the other funders in the initial phase of campaign (Agrawal et al. 2011).

3.1.2 Peer-to-Peer Lending

Lending-based crowdfunding, typically referred to as peer-to-peer (P2P) lending, has attracted most of the crowdfunding investment so far. P2P lending platforms are typically quite targeted as they mostly focus on either personal or business lending with very few exceptions (e.g. LendingClub[1]). Table 4 provides an overview of the funding provided through P2P lending platforms by region and segment.

Zopa was the first P2P lending platform to be launched back in 2005 (Cummins et al. 2019). Two other large US-based platforms, Prosper.com and LendingClub, followed in 2006 and 2007, respectively (Greiner and Wang 2009). However, the amount of capital channelled through P2P lending started growing significantly only post-2009, in the aftermath of the financial crisis. In fact, the combined effect of the crisis and the introduction of stricter banking regulations (e.g. Basel II) made access to capital extremely difficult for small enterprises and entrepreneurs. On the other hand, low interest rates made bonds and other traditional financial instruments unattractive for investors. In this context, P2P lending platforms started to prosper as they represented suitable alternatives to traditional channels for both businesses and investors.

P2P lending is anything but new. Entrepreneurs have traditionally leveraged their personal network to raise capital (Berger and Udell 1998; Kotha and George 2012; Robb and Robinson 2014; Cummins et al. 2019). Small loans are often provided by family members or friends on the basis of personal relationships rather than formal due diligence. These informal transactions carry undeniable risks for both borrowers and lenders. Online P2P lending platforms have improved this process by providing online marketplaces that enable borrowers and lenders to transact directly with defined rules of engagement and by providing due diligence services that reduces the risk of default (Cummins et al. 2019). In exchange for this, platforms charge a fee, typically a small percentage of the funded amount, paid by borrowers.

A brief outline of the funding process for business loans on LendingClub is as follows.[2] A potential borrower registers to the platform, provides verifiable contact and bank details together with the desired loan amount and duration. Then, the borrower provides additional background information about the business and its current financial status (e.g. last year's revenues and profits, ownership, and other existing financial commitments such as loans or leases). The approval process takes on average seven days, and the platform sets the interest rate based on its own risk

[1]https://www.lendingclub.com/.
[2]https://help.lendingclub.com/hc/en-us/articles/360001352047-Business-loan-application-walk through.

Table 4 Size of P2P lending funding by region and segment

Region	P2P consumer lending	P2P business lending
2015		
The Americas	18.00	2.60
Asia Pacific and China	52.78	39.99
Europe	0.40	0.23
Middle East and Africa	0.01	0.02
2016		
The Americas	21.10	1.30
Asia Pacific and China	137.02	58.51
Europe	0.73	0.37
Middle East and Africa	0.03	0.03
2017		
The Americas	14.90	1.50
Asia Pacific and China	225.26	98.05
Europe	1.39	0.47
Middle East and Africa	N/A	N/A

Notes All figures are reported in USD/billions
Sources Cambridge Centre for Alternative Finance (2017a, b, 2018a, b, c, d), Cummins et al. (2019)

assessment. If the borrower accepts the offered the proposed conditions, the funds are transferred to the provided bank account, and the borrower repays the loan to the platform on a monthly basis. The platform collects the monthly payments and transfers them to each backer on the basis of the amount funded. A key differentiator of online P2P loans when compared to traditional banking loans is that borrowers have the flexibility to make lump sum payments or repay their loans early at no extra cost. This flexibility, together with short approval times, is particularly valuable for businesses that face temporary liquidity needs.

The interest rates charged by P2P lending platforms are on average higher than the ones offered by traditional financial institutions. This reflects the fact that P2P loans are typically riskier than the ones funded by banks (de Roure et al. 2016). P2P loans are mostly unsecured, and the access requirements for businesses are not as strict as the ones imposed by banks. For LendingClub, for example, a company would need to have been in business for a minimum of 12 months with at least $50,000 in revenues.[3] As such, P2P lending platforms are complementary to traditional financial institutions as it allows riskier borrowers, which could not be served by banks, to obtain access to capital (de Roure et al. 2016). However, P2P lending platforms are also competing with traditional financial institutions for low risk borrowers (Tang 2019). In fact, investors (i.e. lenders) bear all the risk in P2P lending, and a key metric for them to evaluate platforms is default rate. As a result,

[3]https://www.lendingclub.com/business/?utm_source=LC&utm_medium=link&utm_campaign=pl_top_nav&u=1.

the rejection rate at the application stage is quite high for risky borrowers, and capital is more likely to flow towards borrowers who are already "bankable" (Tang 2019).

3.1.3 Case Study: Jolla—The Power of the Crowd

In February 2010, Intel and Nokia merged their efforts to develop a Linux-based mobile operating system (OS), MeeGo, and agreed to work together to drive a broad ecosystem of partners (Grabham 2010). For a short time, this partnership seemed to make progress, attracting companies like Novell, AMD and Aminocom to the MeeGo development effort. This all came to a shuddering stop exactly one year later when Nokia abandoned the partnership to switch to Windows Phone 7 (Reuters 2011). Intel soon followed and by October 2011 (Ricknas 2011), the MeeGo development effort had migrated to a new community effort named Mer (Mer Project 2011).

The switch to Windows Phone 7 was a major blow to Nokia. This strategy change contributed significant to nearly 24,000 job losses (Blandford 2012). To support those made unemployed, Nokia launched the Bridge programme. Under this programme, an ex-employee can potentially receive up to €25,000 in seed funding for a start-up company and up to four employees can come together for one start-up (Blandford 2012). One such group of former Nokia employees came together to form a new company, Jolla, to evolve the MeeGo/Mer OS. Jolla's plan was to license the new OS, Sailfish OS, to smartphone manufacturers, but this was not without challenges. Sami Pienimaki, cofounder of Jolla, told Engadget:

> 'We realised that we had to develop our own phone in order to bring life to the Sailfish operating system' (Summers 2018).

After suffering a number of setbacks, the Jolla phone launched in November 2013 to lukewarm reviews. Undeterred by the lacklustre reception, Jolla continued to market and sell its Sailfish-based smartphones. It also refocussed its efforts to demonstrate the capabilities of Sailfish OS in the emerging tablet market. A big question remained unanswered. How would it market and fund this new tablet effort?

On 19 November 2014, a year after launching its smartphone, the Jolla Tablet Indiegogo crowdfunding campaign was announced. Marc Dillon, the then CEO launched the campaign:

> 'Crowdsourcing has been the foundation of so many amazing, inspiring and independent products, and what it stands for taps directly into Jolla's ethos. We have a strong worldwide community supporting us, and we want to give people the opportunity to contribute early and take part in the Jolla Tablet campaign. By contributing you also have the opportunity to have your say in the actual development of the product' (Jolla 2014a).

As part of the Jolla Tablet campaign, the first thousand contributors were given the opportunity to get a Jolla Tablet for US$189 and assuming the campaign hit its target of US$380,000, product shipments would start in the second quarter of 2015.

The campaign was made available in all EU countries, Norway, Switzerland, the USA, India, China, Hong Kong, and Russia. Jolla supported the campaign with PR, online advertising, and social media but also by seeking feedback on product features from the community.

By 27 November, Jolla had pledges of nearly US$1.3 million, exceeding its original target by nearly 3X (Jolla 2014b). Riding the momentum, Dillon decided to use the feedback on product features to incentivise more investment. Jolla announced an extended phase of their crowdfunding campaign with the promise of new hardware and software features (3.5G HSDPA, extended memory card support, and split screen UI), if a new target of US$2.5 million was reached, nearly 6.5X the original campaign target (Jolla 2014b). Dillon announced:

> 'We are really excited to announce these new stretch goals, which we've carefully identified and discussed together with our community. We asked what our backers want, and we hope we get to fulfil these promises. The highest stretch goal, adding the 3.5G HSDPA connectivity, has been in our hopes for a while already, and now we're looking forward to build further partnerships with cellular operators across the markets' (Jolla 2014b).

Would they succeed? By the time, the Jolla IndieGoGo campaign ended on 10 December, Jolla raised over US$1.8 million from over 13,000 contributors in 21 days (Jolla 2014c). Including post-campaign contributions, Jolla raised over US $2.5 million from 21,633 contributors (IndieGoGo 2019). The campaign's original target was reached in two hours, and US$1 million in funding was raised in the first 24 hours. The campaign not only raised valuable funding but helped build a brand and international customer base in less than a month. Antti Saarnio, Chairman of the Board of Jolla commented:

> 'Involving fans and followers early through a crowdfunding campaign is a perfect way to launch a new product, and also to test the demand in advance. We are really pleased with the outcome, and are happy and thankful to see so many early contributors participating. Jolla has a strong worldwide community who believe in us and this campaign is one proof of that' (Jolla 2014c).

3.2 Token Offerings

3.2.1 Initial Coin Offerings

Initial token offerings, often referred to as initial coin offerings (ICOs), are, at first glance, similar to crowdfunding campaigns as they represent open calls for funding. However, they have critical differences in that they are completely disintermediated, typically are of orders of magnitude larger in terms of participants and value, and are established on blockchain-based smart contracts. Although token offerings represent a recent phenomenon, more than US$27 billion has been raised through ICOs since 2013, with exponential growth over the last two years (PwC 2019). Figure 2 provides an overview of how ICOs work.

The unencumbered nature of ICOs has attracted the attention of policy makers worldwide; in some countries (e.g. China), ICOs have even been deemed illegal

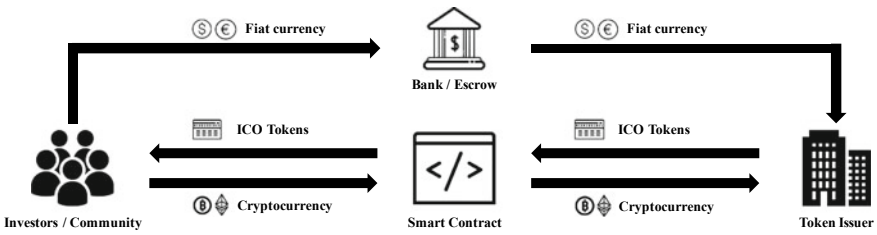

Fig. 2 ICO process (adapted from PwC 2019)

(Barsan 2017). As such, entrepreneurs aiming to launch an ICO should first verify the legal implications of conducting an ICO in the jurisdiction that they, and potential investors, are based in.

The token issuer, typically a start-up, defines the main characteristics of the tokens (e.g. the rights it will provide to token holders, number of tokens, protocol, etc.) and of the selling process (e.g. initial value, issuing platform, time period of token sale, type of investors, accepted methods of payment, etc.). There are three main types of tokens (Tasca 2019):

- Payment tokens which are essentially cryptocurrencies that are used as means of payment or value transfer;
- Utility tokens that allow token holders to access a specific digital application/service;
- Asset/debt tokens which represent for the investor assets such as a debt or equity.

From a project promoter's perspective, one of main benefits of token offerings is the opportunity to attract both capital and users, particularly with the issuance of utility tokens. This is particularly beneficial for platform promoters as reaching a critical mass of users is paramount for the success of the project. Unsurprisingly, platform-based businesses represent the majority of completed token offerings so far, followed by projects related to cryptocurrencies (ICObench 2019b). As this type of fundraising matures, the number of token offerings across other industries is expected to grow, particularly in the IT sector.

Once the token and the sale process have been designed, the entire project is then described in a "white paper". A white paper typically contains the technical details related to the token offering but also a detailed description of the project and the team. The white paper is a key element for the success of a token offering (Adhami et al. 2018), and its production typically involves considerable cost (Fisch 2019). The white paper then needs to be promoted to potential investors. In this phase, a properly built website, and a clear marketing and communication strategy can make the difference in terms of reaching potential target investors in the most effective way. This phase typically requires time and effort as awareness needs to be built around the proposed project.

Once launched, the duration of the sale depends on how attractive the project is to investors and how effective the pre-sale communication is. Gnosis' ICO, for example, concluded in 10 minutes[4]; others may last for weeks or months. Many do not reach the minimum threshold at all. If the token offering is successful, the next step is for the promoters to deliver on their promises. This includes delivering tokens to the buyers and getting the tokens listed on one or more exchanges. One of the advantages of token offerings compared to traditional VC investments or crowdfunding campaigns is that tokens can be traded in the secondary market (Benedetti and Kostovetsky 2018). Tokens' price fluctuates based on progress in product development and project's future prospects (Benedetti and Kostovetsky 2018). Despite all the hype around token offerings and the announcements of multi-million sales frequently reported in the media, the failure rate of token offerings is quite high. According to a recent report published by Satis Group LLC, only 15 percent of the ICOs launched so far managed to get to the listing stage, and approximately, 50 percent of them are deemed to be successful (Satis Group 2018).

3.2.2 Security Token Offerings

Although very attractive from a financial standpoint, token offerings face two main challenges. Firstly, ICOs suffer from legitimacy issues arising from 78% of past ICO initiatives being perceived or designated as scams (Satis Group 2018).[5] Unsurprisingly, many investors still look at token offerings with suspicion. This also relates to the second challenge—ambiguous regulation. As mentioned previously, ICOs were, and still are, completely unregulated in many countries. As such, investor protection is very limited at best or non-existent at worst. Some regulators have recently provided clearer frameworks by making asset/debt tokens comparable to more standard securities like debt or equities. This has enabled the development of more legitimate, transparent, and regulated token offerings (also known as security token offerings—STOs). What distinguishes STOs from ICOs is that STO tokens pass what is called "The Howey Test"—there is (i) an investment of money, (ii) profits are expected, (iii) money investment is a common enterprise, and (iv) any profits come from the efforts of a third party (Henning 2018). As such, unlike ICOs, STOs are defined as securities and therefore face the same regulation as equity shares while retaining the advantages of cryptocurrencies over traditional private markets in terms of liquidity, price discovery, and market makers. STOs are particularly attractive for profit-driven established investors who are looking to acquire a stake in these innovative ventures. From a promoter perspective, the process of launching and conducting an STO is similar to the one for ICOs presented previously with two key differences mostly related to compliance (Lee et al. 2019). Firstly, token issuers need to pay more attention to compliance with local security law requirements and to fully understand the legal implications of the STO for both the issuing company and investors. Secondly, token issuers must provide potential

[4]https://cointelegraph.com/news/fastest-ever-ico-ethereum-based-gnosis-creates-300-mln-in-minutes-raising-12-mln.

[5]https://medium.com/@sherwin.dowlat/ico-quality-development-trading-e4fef28df04f.

investors with a prospectus, a legal document which contains detailed information about the offering and the financial elements of your offering. The prospectus has to be approved by a financial regulator and is designed to protect investors from fraud.

3.2.3 Case Study: Aspen Coin—The First Real Estate STO

Aspen, Colorado is one of the most expensive towns in the USA. Founded as a mining town in the nineteenth century, the development of the Aspen area into a ski resort heralded unprecedented real estate investment into the area and a skyrocketing of property prices that has continued today. Reliable snow, a variety of ski terrains, historic neighbourhoods, year-round events, and celebrity cachet have resulted in a proliferation of second homes adding to the already superheated property market. In 2017, Aspen had the highest entry threshold for high-end properties across the USA (Block 2017).

The St. Regis Aspen Resort is a five-star luxury destination nestled at the base of Aspen Mountain managed by a subsidiary of Marriott International. It is owned by Aspen REIT, Inc. In November 2017, Aspen REIT announced its intention to be the first single-asset REIT to list on a national exchange by offering 1,675,000 shares at US$20 per share on the NYSE American stock exchange (Aspen REIT 2017). At the time, Aspen REIT CEO Stephane De Baets said:

> 'We plan to bring to the market a first-of-its-kind real estate offering that provides individual investors with the opportunity to own shares in a highly attractive, trophy asset in the St. Regis Aspen Resort. Historically, the chance to own a portion of an individual property of this calibre and stature was only available to institutions. With our offering, we are changing this model while at the same time providing individual investors with liquidity optionality for a single-asset investment. Our value proposition is innovative and, we believe, highly compelling' (Aspen REIT 2017).

However, in March 2018, Aspen REIT withdrew its common stock from listing on the New York Stock Exchange. It had other plans. De Baets told the Aspen Times:

> '…we believe many people secretly want to own a piece of the St. Regis Aspen hotel. Owning a digital token is the equivalent of owning a share, and is a digital security. We saw that doing an IPO was not scalable through the traditional route. Seeing where the blockchain market was heading, we saw the opportunity to be first-movers with our token offering for the St. Regis Aspen' (Carroll 2018a).

In August 2018, Templum Markets launched Aspen Digital, a tokenised asset offering (TAO), on Templum's trading platform. Aspen Digital is a digital Reg D 506c security offering open to accredited investors (Templum Markets 2018). Each token, called an Aspen Coin, represents, through indirect ownership, one share of common stock in the St. Regis Aspen Resort. Aspen Coins can be bought with US dollars, BitCoin or Ethereum. More important, all Aspen Coins are backed by the St. Regis Aspen Resort asset. De Baets clearly felt he had found a more efficient, cost-effective, and liquid means to raise funds:

> 'Asset backed coins like the Aspen Coin not only offer a transformative way to invest in real estate, but also establish a new way to store wealth by utilizing collateralized and income generating digital assets…we believe that the real estate tokenization model has tremendous potential in that it brings liquidity and disintermediation to the world's largest asset class' (Templum Markets 2018).

Reg D 506c offerings differ from public offerings, such as the Aspen REIT IPO on the NYSE. For example, investors do not obtain voting rights, something that favours the promoter. While Reg D 506c are open to the public to some extent, they are technically private placements that are only open to non-US persons or "accredited investors" in the US for the first year. Accredited investors must meet income, network, or asset thresholds as well as know your customer (KYC) and anti-money laundering (AML) requirements. However, this only applies to US investors; overseas investors do not need to meet these requirements. Standard ICOs do not have the same thresholds or requirements. Notwithstanding this, the offering can be advertised widely with no dollar limit on offering size and much lower disclosure thresholds. These lower compliance requirements reduce a perceived burdensome overhead while addressing legitimation issues associated with ICOs. Furthermore, participation is not limited to "those in the know". Indeed, the Aspen Coin offering was relatively self-service. Interested parties registered on the Templum Markets platform and provided documentation to verify accredited investor status and meet the KYC/AML requirements. Once verified, investors could participate in the offering; the minimum investment was US$10,000.

In addition to Templum's existing network of investors, the Aspen Coin offering was marketed to the nine million users of IndieGoGo, a first for the global crowdfunding platform. IndieGoGo co-founder Slava Rubin explained their motivation:

> 'We have always strived to foster innovation and provide our users access to some of the most novel and interesting products and ideas from around the world. With the blockchain revolution fully underway, we at Indiegogo are excited about the world-changing impact and potential of security tokens. Our goal is to [perform diligence for] each company and provide an access point to our growing network of millions of customers. And it's a privilege to work with the St. Regis Aspen Resort' (Wolfson 2018).

So was the Aspen Coin offering successful? On 9 October 2018, Aspen Digital announced 18.9% of the St. Regis Aspen Resort ownership through US$18 million in tokens (Carroll 2018b).

4 Conclusion

Entrepreneurs and SMEs have an unprecedented range of funding sources to draw from. Digital technologies are providing new opportunities for value creation, value capture, and value delivery for not only entrepreneurs but also investors. Online alternative finance is both disintermediating and democratising entrepreneurial finance transforming the access, relationship, and dynamics between supply and

demand and providing valuable alternatives for entrepreneurial ventures at different stages of development. While P2P lending is better suited for both traditional and established businesses with existing revenue streams but need of small, short-term loans to meet monthly loan repayments or for small investments (Fenwick et al. 2018), other forms of crowdfunding are better suited for early-stage riskier ventures in need for capital to fund their prototype or initial growth (Harrison 2013). Similar to crowdfunding, token offerings are particularly attractive for early-stage ventures although mostly suited to platform-based businesses and have been adopted by start-ups aiming to avoid the complicated and costly auditing, and regulatory burden of traditional funding models (Tasca 2019), they are also typically larger in scale than traditional crowdfunding.

While new Internet-enabled funding mechanisms, such as crowdfunding and token offerings, have the potential to transform entrepreneurial finance and play a significant role in creating a level global playing field for access to funding, it remains concentrated in a small number of markets and raises a number of public policy issues, not least investor protection. The trajectory of these financing innovations is only going one way. Whether they will replace or complement the existing funding cycle remains to be seen.

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Methods to foster digital intrapreneurship

Gifford Pinchot III and Mariusz Soltanifar

Abstract

For decades, intrapreneurship has been, and is still, promoted to employees as a way to capture the creativity and excitement of entrepreneurship, albeit with more resources and less risk. Intrapreneurship creates opportunities for individuals to be innovative and entrepreneurial within and for the organisation that employs them. The ways in which intrapreneurs act have not changed, unlike the business context surrounding them. Digitalisation has opened the path for new intrapreneurial opportunities; however, the amount of attention paid to the role of digital intrapreneurs within existing organisations is limited. We present our own definition of digital intrapreneurship and position our definition in the digital landscape where modern companies operate. This chapter outlines numerous ways to foster digital intrapreneurship, including a set of practical methods for managers to identify, and empower digital intrapreneurs. The chapter presents three case studies and discusses their practical implications for entrepreneurs and their teams.

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1 Introduction

PlayStation, iPod, Post-it® Notes, and Gmail are all products of intrapreneurship. Introduced by Pinchot in 1978, intrapreneurship has long been promoted to employees as a way to capture the creativity, sense of purpose, and excitement of entrepreneurship, albeit with more available resources and less risk (Corbett 2018; Pinchot and Pellman 1999). Intrapreneurs are not merely talented speakers and polished PowerPoint presenters. They are individuals capable of making quick prototypes, testing ideas with potential customers, learning what works and what does not work, redesigning their products, testing them again, and pushing through or around whatever barriers are in their way. They are self-motivated, proactive, and action-oriented employees who take responsibility for turning an idea into a profitable business reality for their employer.

Digitalisation and digital transformation have opened new intrapreneurial possibilities. Digital tools and technologies are transforming business strategies and processes, firm capabilities, and key interfirm and customer relationships. These changes are not exclusively relevant to organisations focussing on digital products and services; they also affect how firms in traditional industries do business. Digital technologies are creating or changing most jobs and future growth opportunities. Digitalisation even transforms creative industries like music and film. Fundamentally, digitalisation puts enormous pressure on companies and individuals to reflect on their current strategies and explore new business and career opportunities (Rachinger et al. 2018). This is the 'new normal'.

Intrapreneurs are as essential to corporate innovation as entrepreneurs are to start-ups, so most companies need many more intrapreneurs than they used to in the more stable times of the past. A firm's capacity to foster intrapreneurial talent significantly affects its ability to address the many opportunities and disruptions caused by the digital transformation. For that reason, nowadays, an understanding of how a firm can create a corporate environment within which digital intrapreneurs can thrive is an essential leadership capacity.

According to recent studies, although digital transformation offers organisations numerous opportunities to involve intrapreneurs in seizing the opportunities made possible by digital technology, many of the platforms, designs, and tools that corporations use to encourage intrapreneurship are limited and ineffective (Reibenspiess et al. 2020). However, if managers can suitably locate digital intrapreneurs and accommodate their needs, organisations can function more effectively in a digitally transforming environment. This requires decision-makers to adopt entirely new ways of thinking, leading, and managing rather than simply approaching new processes with the same old mindset.

This chapter discusses the importance of digital intrapreneurs and explores the ways of identifying, surfacing, and empowering them within established organisations.

2 The Relevance of Intrapreneurship to Digital Business

This section defines intrapreneurship and digital intrapreneurship, describes intrapreneurial roles and behaviour, elaborates on the growth of digital transformation, and provides an overview of the subject.

2.1 Defining Intrapreneurship

Definitions of intrapreneurship abound, each emphasising a different aspect of the term (e.g. Zahra et al. 2016). For example, intrapreneurship has been used to describe the following:

1. The entrepreneurial *initiatives* of a firm, viewing the firm as a whole as an individual actor
2. The *processes and structures* for managing intrapreneurs within an organisation
3. The *activities and behaviours* of intrapreneurs, their teams, and their sponsors.

In this chapter, to distinguish between these three aspects of intrapreneurship, we shall use the term *intrapreneurship* to refer to (a) the intrapreneurial activities of a firm as a whole and (b) the methods it uses to support and guide intrapreneurs. We use *intrapreneuring* to discuss the activities and behaviour of an intrapreneur and an intrapreneurial team as they work on developing and implementing innovative solutions. We will also use intrapreneurship as a general term to refer to all three abovementioned aspects.

Academic literature on intrapreneurship embraces innovative initiatives coming from employees when the initiatives come as responses to requests and challenges from a firm's leadership and when innovations align with its strategy. Studies also recognise initiatives that began as bottom-up ideas and eventually received management approval. According to Pinchot (1985):

> '[Intrapreneurs are] any of the 'dreamers that do'. Those who take hands-on responsibility for creating an innovation of any kind within an organization. The intrapreneur may or may not be the creator or inventor but is always the dreamer who figures out how to turn an idea into a profitable reality' (p. ix).

Pinchot later defines one particular kind of intrapreneurs (1987): the 'in-house entrepreneurs, those dreamers who can increase the speed and cost-effectiveness of technology transfer from R&D to the marketplace' (p. 14).

Our definition of intrapreneurship is somewhat broader than general usage. Writing about intrapreneurs often focusses on the people within an existing organisation who develop innovative products or services provided to external customers. However, people can use their intrapreneurial spirit for many things other than new externally focussed products and services, instead concentrating on developing better ways to make, improve, and sell products and services. Although Pinchot's perspective includes both the intrapreneurial actors (i.e. intrapreneurial

leaders and teams and their sponsors) and the ways corporations could encourage intrapreneuring, most studies on intrapreneurship and the often interchangeably used term 'corporate entrepreneurship' have focussed on organisations and not individuals (Soltanifar 2016). Moreover, throughout the past decade, studies on intrapreneurship or corporate entrepreneurship have been dominated by analyses of firm-level contributions, that is, the instances where firms acted as entrepreneurs (e.g. Lumpkin et al. 2009; Rauch et al. 2009), with only a few exploring the individual-level or team-level perspectives.[1] Until now, no studies had expressly modelled the individuals' intrapreneurial behaviour within the context of digital intrapreneurship.

2.2 Intrapreneurial Roles and Behaviour in Organisations

Pinchot and Pellman (1999) recognise five distinct roles that are essential for managing innovation: (1) an idea generator, or an inventor, (2) an intrapreneur, (3) an intrapreneurial team member, (4) a sponsor, and (5) an innovation climate maker. Although all five roles need to coexist to result in successful innovation, the permitted space, unfortunately, does not allow us to discuss all of them; thus, in this chapter, we focus solely on the roles of the intrapreneur and the sponsor and their contributions to digital intrapreneurship.

Intrapreneurial activities range from large interventions, such as creating new business ventures and changing the strategic direction of a company, to smaller changes, such as developing new products, services, and technologies and improving existing products and processes. Intrapreneurs, like entrepreneurs, prefer to act without having to prove that their attempts will necessarily be a success (Pinchot and Pellman 1999). Instead, they want to find out what will work through a series of experiments, learning scenarios, and redesigns. They are prepared to encounter obstacles and setbacks, learn from them, and adjust their initial assumptions according to any new information. Intrapreneurs operate across the boundaries of organisational units, which is often necessary, since many new ideas require changes in more than one aspect (Pinchot 1985).

Intrapreneurs' anticipatory behaviour aimed at creating, and later implementing, new ideas for their organisation increases its capacity to respond to new opportunities and external developments (e.g. Gawke et al. 2017). According to Deloitte (2015), this action-oriented intrapreneurial behaviour is often combined with a strong business focus and a relationship-building skill set, enabling intrapreneurs to actively sell their ideas within their corporations and thus drive their implementation. Without such skills, intrapreneurs might lack internal sponsorship and, regardless of their creative spirit and vision, fail to convince management to let them proceed. Intrapreneurs operate within their respective companies and are thus acutely aware that they will never act as independently as entrepreneurs (Deloitte 2015).

[1]For exceptions, see Covin et al. (2020), Hughes et al. (2018), Kraus et al. (2019), Marvel et al. (2007), Monsen et al. (2010), Mustafa et al. (2018).

Like the role of intrapreneur, the role of the sponsor has been extensively discussed in the literature on innovation and corporate entrepreneurship. Sponsors serve to ensure that the intrapreneurial projects they finance are legitimate and supported (e.g. Hayton and Kelley 2006). They help intrapreneurs to gain access to any resources they need for their ventures (e.g. Day 1994). Good sponsors are able to distinguish the real intrapreneurs from the 'promoters' who look and sound good but fail to get the job done. Once they select an intrapreneur to support and trust, sponsors protect and coach them on future strategies (Garud and Van de Ven 1992).

This demands a lot of the sponsors' time for each intrapreneur, so if many innovations are needed, as they are in today's disruptive environment, many sponsors are needed to coach and protect the many intrapreneurs that drive those innovations. For this reason, it is important that executives delegate discretionary time and budget to lower-level managers so they can support the many needed intrapreneurs (Hayton and Kelley 2006).

2.3 The Growth of Digital Transformation and Its Implications for Intrapreneurship

Many emerging digital technologies are called exponential because every few years their capabilities are doubled. Because they are rapidly becoming impactful, exponential technologies like the Internet of things (IoT), artificial intelligence (AI), machine learning (ML), 3D printing, robotics, and blockchain are creating many new opportunities in most industries almost every year.

IoT, for instance, opens up new possibilities for product development, logistics, and improved business processes (Phaneuf 2020). IoT also provides powerful tools for tracking the quality, the ownership history, and the social and environmental attributes of the supply chain. This might greatly increase the capacity of organisations to manage their supply chains and address the sustainable development goals set by the United Nations.

AI enables users to process huge amounts of consumer data accumulated from various customer interactions to provide new and enhanced customer-centric insights, which are useful for idea generation, advertising, surveillance, and the invention process (Newman 2019). Machine Learning, a type of AI, lowers the costs of prediction and problem diagnosis, which are inherent to all business decisions (Forbes Technology Council 2019). Blockchain provides access to various markets, smart contracts, finance innovation opportunities, and enhanced security and competitiveness strategies (OECD n.d.). However, these powerful exponential technologies, despite their numerous benefits, may cause undesirable results. First, such exponential technologies might radically reduce consumer privacy and potentially induce totalitarian control through enhanced surveillance mechanisms. Second, they may also increase the criminals' ability to conceal illegal activity and transfer the right to create money away from governments to private entities, which might significantly impact the distribution of wealth. Both of these possibilities come with ethical and political issues that businesses will have to manage.

Although digital transformation is currently impacting a large variety of businesses, we have noticed a limited display of attention towards the role of digital

intrapreneurship within traditional industries. Nevertheless, digital intrapreneurship plays a significant role in such industries by increasing production speeds, streamlining logistics, managing processes, lowering costs, handling supply chains, supporting low-cost customisation, managing risks, and allowing companies to build more responsive relationships with customers.

To seize these opportunities, even the most traditional manufacturing businesses must initiate systems and foster corporate cultures conducive to digital innovation. This is not just about coding or system design skills; rather, this transition requires an understanding of how digital natives live. Most digital natives are millennials or younger people, who are born after 1982. This is not to say that older people cannot drive digital innovation—many can; however, the volume of talent required to deal with the speed of contemporary digital transformation means that even mid-sized companies must recruit, motivate, and retain many young digital intrapreneurs. Digital natives understand the ways in which emerging technology can be, and is, used (Rossi 2019).

What are digital natives looking for? Deloitte (2019) has recently conducted another round of their 'Millennials Survey' and suggested that millennials have the following expectations:

1. Work that is aligned with their sense of purpose
2. A chance to make a significant contribution before they are 50
3. Freedom to choose what projects to work on
4. Freedom to act and make decisions about their work without frustrating delays caused by waiting for permission
5. Work that aligns with a desire to make the world better, as well as producing profit.

These demands do not fit well with command-and-control management approaches or shareholder-value-only objectives. However, these demands do not come from an unreasonable sense of entitlement by the young. They are what employees need to get the digital innovations and the other increasingly creative, intrinsically motivated and self-guided work of the twenty-first century done.

Older managers, not realising that the nature of work is changing, might think that the demands of the young are absurd; however, most talented digital natives will stay in an unsupportive company for only as long as it takes to establish a good résumé entry and then leave to work for another employer who will be more willing to accommodate their needs. Many older managers find it frustrating to manage these young people, who do not seem to behave 'the way the employees ought to'. And yet, these young people and many of their behaviours are essential for the development of a robust strategy of digital transformation.

2.4 Putting It All Together: Digital Intrapreneurship

The broadened definition of intrapreneurship presented under 2.1 is particularly pertinent to a discussion of digital intrapreneurship. Digital intrapreneurship is any intrapreneurship that uses digital means as a critical component of its innovation

initiative. The innovation itself can be a new digital product like Google's email client or Amazon's cloud storage; however, it can also be exemplified by the use of digital technology to do what the company already does, but better, cheaper, and faster.

The latter kind of innovation is the most important form of digital innovation for companies in traditional industries. For such companies, digital innovation is not about new digital products or services but rather about the better ways to market, relate to customers, create operational efficiencies, and use exponential technologies such as 3D printing or genomics to perform the current processes much better, faster, and cheaper. For example, digital intrapreneurship includes using AI to optimise scheduling in a trucking firm or image interpretation in health care. It can also be used to market non-digital products, such as Amazon's online sales of physical products, or design a new physical product, such as a new medication or an airplane. Much of the innovation of Boeing 777 was done using digital tools, which allowed to rapidly design a better integrated airplane, thereby streamlining production.

Continual improvement of operational processes is still best done using the total quality method and its descendants like Six Sigma; however, breakthrough process improvements are mostly done by digital intrapreneurs. If one looks closely at continual improvement processes, one will often find that they create an environment where employees express a higher degree of initiative that resembles an intrapreneurial spirit.

Google's use of ML to improve their language translation services is good example of a radical product improvement made possible by digital intrapreneurship. Google was already delivering machine translation to customers; however, a small team of intrapreneurs overrode the traditional methods of its translation engines with a statistical ML approach. The outcome of this decision was an exponential improvement in the quality of translation, which was so striking that it caused Google to promptly stop working on improvements reliant on older methods (Lewis-Kraus 2016).

Quite often, digital intrapreneurship offers innovation opportunities that can create major transformations in terms of efficiency or customer relationship with a very modest investment. This creates a large number of high return-on-investment (ROI) intrapreneurial opportunities by developing personalised customer relationships, collaborating with suppliers, taking more data-driven decisions, automating diagnostics, managing natural resources like energy or water, and optimising logistics and process control.

Digital intrapreneurs are employees who use their entrepreneurial spirit for the benefit of their employer and simultaneously to give meaning to their work by implementing their ideas to produce impactful digital innovations.

Digital intrapreneurs must possess the skills to identify new digital-technology-enabled business opportunities and bring them to fruition, either as a new concept

altogether or as an existing, but transformed, business system (World Bank Group 2016). Even though many companies seemingly focus on using innovation to drive commercial growth, what many of them miss is a corporate culture of innovation and a safe and supportive environment for their digital intrapreneurs. Creating that environment requires supportive managers to protect and coach one or several intrapreneurs that they personally trust and want to empower. Many such managers produce many empowered intrapreneurs. The collaboration between intrapreneurs and sponsors can be facilitated by a culture that permits them to act. Together these factors can lead to great levels of digital innovation.

3 Digital Intrapreneurship Model

Based on our review of the relevant literature, as well as our practical experience, we offer the following conceptual model that enables established organisations to surface, identify, and empower digital intrapreneurs to drive digital innovation. Finding, retaining, and supporting digital intrapreneurs, including millennials and GenX digital natives, is a core competency in our times.

Every organisation has control systems that create barriers that slow down intrapreneurs or stop them entirely. How, then, does innovation take place? In every organisation we studied, the key to innovation has taken the form of courageous managers who guide, protect, and clear the way and get resources for one or several intrapreneurs with whom they have close and trusting relationships. In effect, to those who put up barriers that block intrapreneurs, they say, 'I have checked this team out, and they are on the right track. They are acting responsibly. Let them pass'. We call these courageous managers 'sponsors'.

Nowadays, organisations cannot flourish without an organisational knowledge of digital technologies. Some of this knowledge is provided by digitally competent employees. The large issue of how an organisation can learn to act using the knowledge of digital technologies is unpacked below (Fig. 1).

Next, we shall elaborate on each component of the model.

3.1 Sponsors: The Key Factor for Supporting Digital Intrapreneurs

The first factor positively affecting digital innovation is a sufficient number of good sponsors. Often, when business leaders call for more digital innovation, it does not happen. When it works, how does the intent of the leaders to support digital intrapreneurship go through the 'clay layer' of middle managers who are usually driven so hard to achieve short-term goals in established systems that they have no time for new ideas?

In practice, we have found that the answer lies in a special class of managers who, because of their own intrinsic motivation and their relationship with intrapreneurs

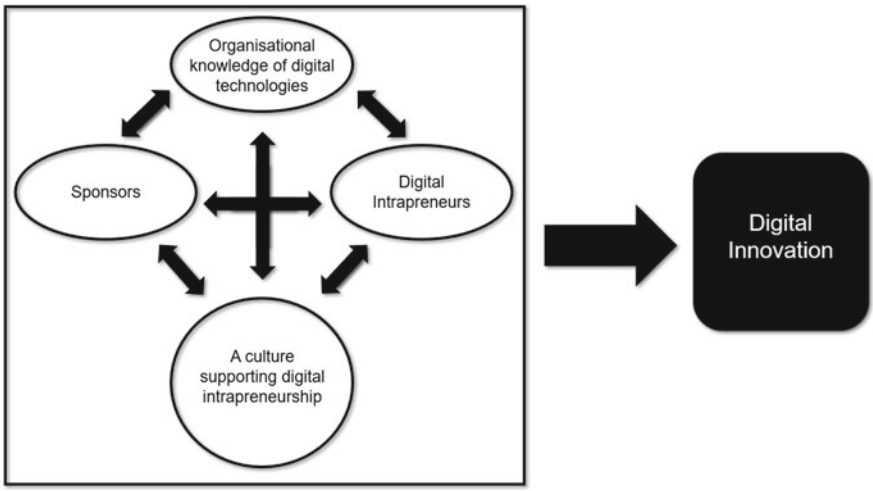

Fig. 1 Digital intrapreneurship model—the corporate solution to a rapid digitalisation

and their teams, choose to go out of their way to help the intrapreneurs. They spend their political capital to support the intrapreneurs even though it is not their 'day job'. As mentioned above, these altruistic managers are called 'sponsors'. Sometimes, they are called champions, but that term is a bit ambiguous because it is often applied not only to the sponsors, who champion the intrapreneurs, but also to the intrapreneurs themselves, who champion their ideas. Thus, the term 'sponsor' is clearer.

Sponsors spend time with intrapreneurs and coach them on both the commercial and the political issues and strategies. They stand up for the intrapreneurs when they are not present and help them access any necessary resources. If an innovative solution works in a given company, it is almost always due to a close and trusting relationship between a self-motivated team of intrapreneurs and their management sponsors. That combination is what moves innovation forward through the inevitable resistance of any corporate system.

Organisations can facilitate sponsorship in several ways. First, companies can train managers to be effective sponsors. This training includes both a description of what a sponsor must look for in an intrapreneur and some dos and don'ts for managing them.

Second, organisations can promote sponsorship by authorising lower-level managers to serve as effective mentors. Companies can provide managers with discretionary budgets to fund the early stages of innovation. These budgets do not have to be large to have a positive effect. Often a rapid prototype and a little travel money can be enough for testing an idea and gathering enough data to make a strong case for pursuing it further.

Third, companies can hold managers accountable for sponsoring innovation. They can feature sponsoring intrapreneurs as a responsibility on the list of the

managers' key performance indicators (KPIs). Human resources can assess the sponsors' performance are by asking successful intrapreneurs: 'In your darkest hour, among your management, who supported you and helped you deal with whatever barriers were in your way?' The individuals mentioned in the answer to that question are the true sponsors. Then, counter-intuitively, when the good sponsors are identified, they should not be celebrated.

Great sponsors give credit to everyone around them, so celebrating them publicly will annoy all the others who ended up getting credit for what the sponsor did. This will create jealousy and limit the sponsor's future effectiveness. It is important to value what good sponsors do, but this can be done by congratulating them privately and, like succession planning, by keeping a secret list of good sponsors and promoting them whenever possible. As they rise, the true sponsors can be even more effective in supporting intrapreneurs and the culture that makes them effective.

Fourth, companies can measure their innovation outputs. At 3M, division leaders were held accountable for the number and quality of the innovations coming out of their division. The innovations were graded by the company's innovation rating team from minor improvements to those innovations that could create disruptive products for years to come. The leaders were not prompted to be innovative themselves. To get a good innovation score, a division needed to foster a corporate culture where intrapreneurs could thrive; this was measured using the innovation output of each division. This made having high-quality intrapreneurs and sponsors in their divisions valuable to general managers, who therefore created conditions conducive to intrapreneuring.

The best sponsors are motivated intrinsically, rather than extrinsically. They support intrapreneurs because they buy into the intrapreneurs' ideas and passions. Helping the intrapreneurs gives them meaning and provides them with valued professional relationships. The most effective sponsors are not driven by their ego. In extreme cases, they might have already reached the highest level they could expect to achieve in their career, so now they are giving back to younger innovators who remind them of their previous selves.

Many processes aimed at innovation fail. Idea contests bring out lots of ideas but rarely lead to successful implementation. The result is that they give hope to numerous employees only to crush them eventually. Rather than increasing employee engagement, they cause a short-lived increase in it followed by a long-term decline.

Formal processes like Stage-Gate, which at least intends to provide a pathway to commercialisation, should work better. However, much too often, due to delays between review cycles and an excessive focus on secondary information rather than on the testing of quick prototypes and intrapreneur assessment, they tend to slow down and halt innovation instead of accelerating it. They often become a process that creates more ways to say no and kill an idea rather than building a system for supporting intrapreneurs.

Significant decisions are made by committees, but no one has the ability to dig deep enough to understand the most difficult ideas. Committees may eliminate bad ideas,

but they also tend to reject highly innovative and disruptive suggestions because they are hard to understand. What tends to survive are mediocre copycat ideas.

What works for selecting and supporting innovations is not a process, but rather a large set of close relationships between intrapreneurs and their sponsors who have some clout and influence and who trust, spend time with, and give extraordinary support to specific intrapreneurs. These sponsors get to know their intrapreneurs, their team, and their ideas very well. They are in a good position to evaluate the intrapreneurs and their proposed innovations. Their judgement on what the company should invest in is better than that of the committee; additionally, they can help the intrapreneurs to improve their ideas using well-informed questions and coaching.

Successful intrapreneurs, digital or not, often have several committed sponsors occupying different positions at different levels of the organisation. Creating and managing a coalition of sponsors is thus a core intrapreneuring skill.

Consider these facts together:

1. Each intrapreneur usually requires several collaborating sponsors to support and protect their interests and ideas.
2. Many intrapreneurs are needed to deal with the threats and opportunities rapidly generated by exponential digital technologies.
3. Sponsoring is an intimate relationship, which makes it time-consuming; that means that each sponsor can only protect one or few intrapreneurs.

These facts imply that each company needs a great number of sponsors to support the many intrapreneurs necessary to face the era of rapid digital innovation.

Senior leaders cannot possibly provide the volume of sponsorship sufficient to address the opportunities and threats created by exponential technology. Their role is to create the systems and a culture that empower middle managers and even first-line supervisors to serve as effective sponsors. Any intrapreneurship programmes that necessitate the blessing of senior leadership for individual innovations will fail for simple numerical reasons. In the age of digital innovation, authority to give the green light to innovation must be delegated.

3.2 Organisational Knowledge of Digital Technologies

The second factor driving digital innovation is the organisational knowledge of digital technologies. What does this mean? It means that an organisation, as an entity, makes decisions and takes actions as if it understands and is gracefully creative with its use of digital technology. It is not just about how many people with digital skills are employed by a given company; rather, what matters is how an organisation responds to digital opportunities and threats. That is what matters. There are two main elements of the organisational knowledge of digital technology:

1. The presence of a sufficient number of members of an organisation who understand digital technology and can create and implement all the innovations necessary to drive the digital transformations needed by that organisation
2. The way an organisation makes decisions and takes necessary actions to exhibit a fluid knowledge of digital technology.

Some organisations succeed in both aspects. Smart digital thinking pervades every aspect of their corporate functioning. As for the rest of modern organisations, it is unlikely that their largest barrier to digital innovation is a lack of people with the knowledge of digital technologies.

Companies today hire many digital natives. However, if digital innovation does not take place, the issue is more likely that a company is blocking the intrapreneurial spirit of its digitally competent employees, while those with significant digital talent are leaving the organisation or are disengaged and demotivated. See Case 2 below for more on this situation.

The major problem preventing most organisations from acting from a place of understanding of digital technology lies in their management. If management has neither the sufficient understanding of nor the familiarity with digital technology, how can it rapidly foster the organisational knowledge of digital technology?

1. Certainly, widespread education about digital technology is one part of the answer; however, it will probably take time to help the senior management reach the required level of understanding of and familiarity with digital technology where it would be able to properly assess any proposed digital innovations. There are faster approaches to the issue in question.
2. If more senior-level managers put their trust in selecting mid-level managers as sponsors, the growth of digital organisational competence within a company would significantly increase without the need for substituting any senior managers. A cultural transformation aimed towards increasing professional trust is necessary to empower intrapreneurs, and it can also increase the company's organisational intelligence in digital matters much faster than if the company tried to foster a profound digital competence among its senior executives. However, the senior members are still needed to provide wise advice about the core of the business that takes years to develop.
3. If a company learns to give more weight to the character, competence, and track record of its intrapreneurs, with slightly less focus on the initial quality of their ideas, then their sponsors will be able to make better decisions even without a detailed knowledge of digital technologies. In this scenario, the sponsors may augment their understanding of technology by knowing how to recognise and relate to true intrapreneurs.
4. Senior executives and middle managers can build a small set of digitally competent advisors to help them understand and assess proposals related to digital transformation. These advisors may not be highly ranked and may

function best in a formal role as coaches on digital technology, with any advice they offer on more strategic matters being done informally so as not to disrupt the sensibilities of the chain of command.

5. As demonstrated in Case 2 below, a company can acquire digital talent through acquisition; however, if it does not learn how to create an appropriate working environment for its intrapreneurs and the emerging creative work of the twenty-first century, they will soon be gone. A company must not impose its culture on any acquired entities; instead, it must learn from the acquired businesses about how they can better manage their own operations in this new digitally transforming world.
6. If a company has already developed a good organisational capacity to understand what digital transformations it should take on, then it can hire or partner with external organisations to complete the most technical aspects of its digital innovation plans. This requires a culture that knows how to deal with external entrepreneurs and intrapreneurs in vendor organisations.

Big companies in this era often need to partner with smaller digital innovators. To utilise the potential arising from the know-how of external digital entrepreneurs, big firms need to operate and make decisions at or close to the speed of their entrepreneurial partners. Otherwise, the entrepreneurs—or even the digital intrapreneurs within the larger partners—might become frustrated with partnering with a slow-moving firm or, worse even, take advantage of it.

The only way to achieve the necessary operating speed is to delegate the responsibility for managing relationships with external partners to a team of intrapreneurs, who are driving the part of the innovation being done by the larger firm, and let them make decisions with their external partners without constantly waiting to get their permission to make the next move.

3.3 Managing Digital Intrapreneurs: A Core Competency for Digital Innovation

The third method for supporting digital innovation lies in high-quality management of digital intrapreneurs. Motivating intrapreneurs is not necessary; instead, it is sufficient to merely not demotivate them by preventing them from taking their ideas further. A business leader can and should ask complex open-ended questions with the goal of helping them avoid trouble, but, whenever possible, trust them to come up with the right answer by themselves. A leader should also let them make non-fatal mistakes if these questions do not help them see the faultiness of their plan. After all, their plan might be smarter than expected.

A business leader should also be a good friend, who is concerned about the well-being of their innovations. By asking questions about the possible weaknesses in their plans while still letting them come up with the answers, a leader can support their intrinsic motivation. If he or she tells them what to do, their motivation will

shift towards getting the permission of the manager (an external motivation), and the spirit of intrapreneurship will be lost. One must let them be the driving force, support them, and clear the path in front of them.

Intrapreneurs require an unusual level of freedom to be effective. This means managers have to trust them to rapidly make decisions about the development of their innovations without having to wait for permission or review. But one cannot trust everyone equally; thus, determining which digital intrapreneurs are worthy of trust and thus which ones to fund is critical to cost-effective digital intrapreneurship.

According to Pinchot (1987), 'Venture Capitalists say, "I'd rather have a class A entrepreneur with a class B idea than a class A idea with a class B entrepreneur"' (Pinchot 1985, pp. 15–16). The same logic applies to choosing the right intrapreneurs and innovations to invest in.

Pinchot (1987) continues:

> 'Picking the people with a passion, attitudes and talent for making the idea work is more important than picking the right plan. … Corporations can greatly increase their return on innovation efforts by moving the emphasis in their innovation management efforts from selecting the right plan to selecting the right team to trust' (Pinchot 1987, p. 14).

The reason why people are more important than ideas is because almost no innovative idea will work in its original state. No one is that smart and foresighted. Investors need to have an appropriate team that can learn from its setbacks, experiments, and surprises and use that information to develop a functioning plan. For this reason, when deciding which digital innovation to invest in, the intrapreneur and their team serve as two most important factors.

A core part of that task involves seeing the difference between the real intrapreneurs and the individuals that venture capitalists call 'promoters'. Promoters are posers who talk a lot but lack the grit, persistence, courage, and intrinsic motivation to push through all the barriers, setbacks, and changes that will inevitably arise when they will try implementing an innovative idea. Promoters are driven by their ego and a desire for status rather than a genuine commitment to a transformational idea. When things go wrong, they will try to gloss over the problems instead of digging deeper to nip them in the bud. They will try to embellish their ideas instead of acknowledging the need for change. They will redirect supervisory attention to how great it will all be at the end of the journey instead of trying to dig the problem out.

Real intrapreneurs, conversely, are very interested in the pathway leading to the implementation of their ideas. If a supervisor suggests anything that might get in the way of implementing their ideas, they will take it seriously. They will, if necessary, ask questions to understand any related concerns. Alternatively, since they have probably already thought about the potential problems, they will be happy to tell about the ways of mitigating or circumventing the obstacle in question. Moreover, they will be interested in their supervisor's thoughts about the issue.

Following are some things to look for when deciding whether to back a proposal for a digital innovation (Table 1).

Table 1 Ten criteria for approving an intrapreneur's proposal for digital innovation

Criteria	Characteristics
Collaboration	Digital innovations usually span many functions and business units. Thus, collaboration with other business functions, even if they initially occupy hostile silos, is a core intrapreneurial requirement *Does the intrapreneur collaborate effectively?*
Deep involvement with the steps leading implementation	Real intrapreneurs are capable of envisioning the pathway to success as well as the final outcome of the innovation *Is the intrapreneur thinking clearly and in detail about how to implement their idea?*
Honesty	Honesty is a core character trait of successful intrapreneurs. Intrapreneurs may bend the rules or even break them to get something done, but they will always be open and honest with their potential sponsor. Moreover, they will not lie to others, even though at times they may hold their cards close to their chest. If they are not honest and open with their sponsors, they are probably not honest with themselves, which means that they will ignore data that does not support their desired expectations. The result of such an approach will almost certainly be a failure *Are they honest with you?*
Long- and short-term goal setting	Intrapreneurs set goals and assess their progress against them. If they are missing their targets, they want to know why. This helps them stay focussed, experimental, and realistic *Are they interested in assessing their own performance?*
Moderate risk-taking	Successful intrapreneurs take on challenging initiatives but do everything in their power (e.g. early tests of rapid prototypes) to reduce the accompanying risks. They are not gamblers; however, security is not their prime motivator either. The intrapreneurs' sense of security comes believing that they and their team have the ability to handle whatever problems that might arise *Are they good at managing risks?*
Motivation	Real intrapreneurs are intrinsically motivated—motivated from the inside by their values, vision, and purpose. Even though, like anyone else, they like to be paid well, money is not the reason for their new ideas. They innovate because they think their innovation matters above and beyond money. Money is a way of keeping score on how well they are doing in pursuing their vision, but it is not the reason for pursuing the innovation in the first place. This does not mean that they do not need to be paid well. They (particularly the talented intrapreneurs born after 1980) will leave if they find themselves paid substantially less than their peers who are just climbing up the conventional managerial ladder at a leisurely pace *Is their motivation deeper than money or promotions?*

(continued)

Table 1 (continued)

Criteria	Characteristics
Optimistic, inspirational leadership	Intrapreneurs do not have the resources to materialise their vision. Hence, they must inspire others to volunteer and help them construct their dream. Eventually, when they face a big setback (which is almost inevitable in every innovation), they may not claim that they know the solution but rather express their genuine belief that their team will find a way around the issue. If they cannot maintain that optimism, they will lose their followers *Do they attract proactive and inspired followers?*
Persistence	A predominant characteristic of both intrapreneurs and entrepreneurs is a deep persistence. If a senior executive puts a stop to their idea, a promoter will simply switch to another idea to get back in the executives' good graces. Real intrapreneurs are not interested in pleasing executives, so they do not give up. Instead, they find support elsewhere or build a plan to change the executives' mind *Treat persistence as a positive indicator*
Team building	Intrapreneurship, particularly digital intrapreneurship, is not a solo sport. Most innovations require a team. For instance, most digital innovations require a team that contains at least a system architect and a coding manager. Most teams also need a sales and marketing person, and that is just the beginning *Can the intrapreneur attract a team and run it effectively?*
Technical capabilities	A digital intrapreneur does not have to be a star technical talent. In fact, many intrapreneurs will have balanced skills and will usually be comfortable with new technologies and capable of understanding and working with those who excel in detailed tasks *Does the team have the necessary technical skill set?*

Of course, the idea that the intrapreneur wants to pursue is also part of the evaluation process; however, a good idea without a good intrapreneurial team to implement it is of very little value. Too often, in corporate decision-making, the quality of an intrapreneurial team and their commitment to an idea take a back seat to the analysis of the idea. Even worse, sometimes, passionate intrapreneurs are replaced with bureaucrats who lack both the passion for the idea and the intrapreneurial mindset necessary for innovative success.

3.4 A Culture Supporting Digital Intrapreneurship

The fourth factor contributing to effective digital innovation, in addition to intrapreneurs, sponsors, and organisational competence in digital technologies, is a supportive culture. Creating and nurturing a culture where digital intrapreneurs can

thrive in the organisation is a core capability for facing the world of exponential digital innovation. Building such culture is not about creating intrapreneurs, since they already exist, often concealed, within established organisations. It is, however, about discovering them, showing them that manifesting intrapreneurial behaviour is safe, and supporting and empowering them. Instead of engaging in an academic discussion of corporate culture, let us display a number of practical activities that can be undertaken to facilitate a digital intrapreneurial culture within an established organisation and give hints on how one can succeed using those activities: applies to the entire chart (see Table 2).

Table 2 Activities within established organisations supporting digital intrapreneurs

Activity	Implementation suggestions
A vision of the organisation's overall destination and goals	Create and communicate a vision that inspires digital intrapreneurs, let them know about any challenges faced by the company, and invite them to come up with digital solutions to those challenges. (Also, keep the door opened for divergent ideas with small budgets, as these may find their application in future.)
Active involvement of management and senior leaders	Keep talking about digital intrapreneurship. Watch for and celebrate successes. Reward managers when their people innovate, so that they do not steal their subordinates' ideas. The H in Help looks like II in the pdf. Help intrapreneurs develop the leadership skills they need. Build a culture that supports intrapreneurship
Support of digital intrapreneurs	Intrapreneurs are as essential to corporate innovation as entrepreneurs are to start-ups. Cherish your intrapreneurs. Build a culture that supports them. Build an intrapreneurial career path. Support implementation by digital intrapreneurs, not just idea inventors and early development specialists. Allow employees time to think and test their ideas
Support of cross-functional teams	Digital innovations often involve changes in the way things are done in the non-digital parts of the organisation. Support cross-functional teams by assigning team members from non-digital sectors of the firm. Give the teams time and the ability to make decisions together. Support the team's decisions instead of letting the decisions propel into turf battles between the functional seniors
Creating a sponsorship culture	Management sponsors who select, coach, protect, and allocate resources to intrapreneurs are the primary support for intrapreneurship. Innovation is more about this relationship than any other process Train and expect managers to sponsor one or more intrapreneurs whose character and innovations they trust

(continued)

Table 2 (continued)

Activity	Implementation suggestions
	Make sponsoring innovations a central part of the corporate culture and every manager's job. Include sponsoring success into management KPIs
Widespread intrapreneurial training	Deliver a short course for everyone to know what intrapreneurs are, what they do, how they act, and the ways they can be effective. Let managers know about the support that intrapreneurs require and how the managers can provide it. Managers, executives, and individual contributors can all attend the same two-hour online training lesson, so they all get to see how the intrapreneurial system works
Idea exposition	Organise both the online and the in-person idea expositions that help intrapreneurs to share their ideas and attract others to join their intrapreneurial teams. Management can also tour the expositions and look for intrapreneurs to support. Expositions can result in the creation of teams that attend innovation accelerators
Use of digital innovation accelerators	Accelerators are action-learning workshops that help teams of intrapreneurs develop their ideas, increase the quality of their teamwork, and bring out their intrapreneurial spirit. They can be full time or part time; however, part time is more common in the corporate world. The workshops usually range from six weeks to six months or longer
Delegation of discretionary time and resources to the lower levels	Today, computers can monitor every minute of an employee's time and document their use of resources. This hinders the casual experimentation, daydreaming, and 'fooling around' that often serve as the source of innovative breakthroughs Allocate discretionary budget and time to the lower levels: to individual contributors, their supervisors, and lower-middle management. Offer employees the option of spending some of their time and modest supplies on side projects of their own choice. Let supervisors and lower-level managers sponsor the early stages of innovation from their own discretionary budgets
'Sandbox' or 'seed' fund allocation	Seed funds are pools of discretionary finances reserved for early-stage innovations. Create small local seed funds distributed throughout the company. Seed funds create a route circumventing the bosses who block employees' early-stage ideas. It is not just a monetary grant; it is an implied permission to work on an idea Let any employee apply and, if they succeed, give them some time off to pursue the idea. Seed funds generally only award small grants for a rapid prototype test or similar purposes

(continued)

Table 2 (continued)

Activity	Implementation suggestions
Boundary crossing	Since digital innovation tends to cross boundaries, digital intrapreneurs need permission to cross these boundaries and be encouraged when they ask for help. This cultural attribute of generosity can serve as a powerful booster of digital intrapreneurship. Reward cross-boundary generousity. Ask intrapreneurs, 'Who helped you in the early days?'
Anticipation and failure acceptance	Do not punish intrapreneurs for any original mistakes committed in pursuit of an innovation. The best pathway to success involves making your mistakes faster and cheaper and then quickly learning and adapting. Have meaningful 'good try' recognitions and rewards. Make sure these rewards are viewed to be positive by the recipients. Venture capitalists like to invest in entrepreneurs who have experienced both failure and success
Articulation of a digital culture	Establish your company's digital vision. Talk about the kinds of things you hope that digital innovation can do for the company. Say that you need help to make those things happen
Small beginnings	Corporate strategists often discount the value of small innovations, sometimes saying that they are of no significance. However, small beginnings often pave the way for the arrival of major opportunities and serve as places from which to explore and learn about a new possibility. The lean start-up model prescribes a rapid testing of 'minimal viable products'. Value small beginnings and intrapreneurial investigations of new possibilities using small budgets. Then, if particular ideas start to work, spend more on scaling up what already shows signs of success
Assessing the innovation output	Assess the innovation output of each business unit. Create a scale of how impactful an innovation is with many points allocated for disruptive innovations. Give units overall innovation scores, and hold them accountable accordingly Let multiple units get credit for the same innovation if they all made substantial contributions. This promotes cross-organisational cooperation
Developing new ways of organising work	Keep a backbone of hierarchical control, but release innovative structures from it. Create a convenient platform for a network of self-organising and self-directing intrapreneurial teams that function in the chain of command. Let empowered intrapreneurs select their team members from those who wish to join. Let the teams stay together and take on projects cooperatively. When possible, let intrapreneurs be responsible for the execution of their own initiatives

(continued)

Table 2 (continued)

Activity	Implementation suggestions
Giving rewards	Build an intrapreneurial career path that provides successful intrapreneurs with good salaries, sufficient time, and budget to innovate again. Freedom to work on their next ideas is the most effective reward for intrapreneurial success. Reward the whole team, not just the leader. Do not rank people within innovation teams; an 'all boats rise and fall together' reward system promotes teamwork

4 Examples from Practice/Case Studies

The case studies below describe the practical ways of increasing digital intrapreneurship.

Case study 1: Finding, surfacing, and empowering digital intrapreneurs at Deutsche Bahn

The Deutsche Bahn (DB) Group is one of the world's leading mobility and logistics companies. DB employs some 331,600 people around the globe, including roughly 205,000 in Germany (Deutsche Bahn 2019). The company trusts in the innovative potential of its employees and believes in unleashing their potential to develop corporate start-ups. Its programme motivates the employees to work on solutions for problems that they have identified. The programme enables teams of employees and external team members to test and develop their ideas, potentially creating an internal business unit or even and external company. Within the structured programme, desirability, feasibility, and viability are considered to be the focal points.

The corporate entrepreneurship department with its intrapreneurship programme, 'DB Intrapreneurs', is part of the Chief Digital Officer unit of the DB Group. Launched in March 2017, DB Intrapreneurs is a fundamental part of DB's digital and cultural transformation strategy across all its divisions. As internal incubator, the purpose of the programme is to offer all employees the possibility to develop their own digital business models and products in an empowering environment. Moreover, participants gain entrepreneurial mindset and skills.

DB designs and operates the transportation networks of the future. Through the integrated operation of the traffic and railway infrastructures as well as the economically and ecologically beneficial connection of all modes of transport, the company focusses on the transportation of both people and goods. In 2017, it held a market share of 67%. DB's target is to increase punctuality, quality, and reliability of its transport. Its efforts are primarily focussed on improving the travelling experience of its customers, significantly enhancing punctuality, and providing

more reliable information to the customers throughout their travels. DB aims to bring more traffic to its environmentally friendly rail network, particularly its freight transport.

Digital transformation and new technologies are changing DB's core business. The company uses digital technologies and methods to offer attractive new products and strengthen those that it already has. Whether on the train, at a station, or on the railway, digital functioning enables it to enhance or simplify its services. In doing so, it increases its capacity and remains environmentally friendly. A 20% increase in the capacity of its rail networks has been achieved through the use of a standardised digital system. DB's aim here is to achieve improved performance, better service quality, greater efficiency, and more growth on the rail network. A part of DB's corporate strategy, the 'digital railway' also promotes the reputation of Germany as an industrially developed country.

DB Intrapreneurs is open to all employees (intrapreneurship track) and business units (called 'co-creation') from all parts of the organisation, from maintenance and engineering to sales. This means that employees can either apply to participate in teams and independently of their own business unit to solve validation problems and create new or improved products and services. Work in teams is always required. Operating independently of their own business unit means that teams pursue their intrapreneurial endeavours in addition to their regular jobs—with the exception of 4 workshop days which they attend within their working hours.

In both cases, DB Intrapreneurs has developed, tested, and iterated a clearly structured innovation process across four stages that see employees first become intrapreneurs and then entrepreneurs:

1. Engagement Phase: Prior to joining a batch, participants can attend several workshop and community events to generate ideas and prepare themselves before joining a batch of teams. A batch includes several teams entering the design phase together to test their problems and solutions. Every employee (and, in some cases, everyone) can participate in these events or get feedback about their ideas. The goal of this pre-batch phase is to encourage potential intrapreneurs and generate new ideas as well as lower the entrance barriers and enable a soft entry into the programme.
2. Design Phase: Across three workshops, intrapreneurs identify and validate a problem as well as develop an initial concept of a solution. During this phase, the participants must pass several gates and, if necessary, restructure and change their team to proceed. The highlight of the design phase is the Pitch Day at the end, where teams pitch before entering the build phase, which is the section where they receive funding and intensive coaching. During this phase, each team is supported by a dedicated method coach.
3. Build Phase: Over the course of three or four months, intrapreneurship teams assess how their products will behave on the market. This includes user research, service design, requirement engineering, development of first low-fidelity prototypes, business case modelling, and the drafting of a go-to-market strategy.

4. Grow Phase: If teams are able to achieve a proof of concept at the end of the build phase, they can develop their own corporate start-up. This encompasses everything, from ramping up of the organisational structures to developing and selling goods, although the process is highly unique and features the evolution of the team outside of the programme.

Workshops during the engage and design phases mostly take place in Frankfurt (Main), with some located in Berlin. Both the build and the grow phases take place in Berlin, in the Digital Base of DB. Within intrapreneurial projects, where teams of employees are allowed to work on their own ideas, such groups are supported by a venture architect. The intrapreneurial team members act as facilitators, project managers, and challengers, giving the group an overall direction. They encourage employees to set up their own corporate start-ups. Coaching includes design thinking, lean start-up, scrum, value proposition design, business modelling, and product management models.

In co-creation projects, where participants co-create together with a business unit, their role transforms. Instead of coaching employees, the members themselves serve as the co-project leads of the ventures and therefore accept partial responsibility for the success or failure of their ideas. Responsibilities are shared with the project lead of the business unit(s). The major asset of the intrapreneurial programme lies in its ability to cultivate specific capabilities of the employees and grant access to both intra- and extra-organisational networks.

There are four different exit options for intrapreneurial ventures:

1. Scaling-up of the corporate start-up inside a newly established business unit
2. Founding of a new subsidiary company wholly owned by DB where the intrapreneurs get chief experience officer positions (e.g. Chief Executive Officer or Chief Operations Officer)
3. Incorporating their business within a given business unit
4. Founding of a new start-up by the intrapreneurs (upon which they leave DB).

There is also another exit—the positive failure. The value of failing is promoted early in the innovation process. For example, if teams find out that there is no problem–solution fit, it is still a valuable and positive experience and a valuable learning tool for both the employees and DB itself. Intrapreneurs learn a large amount in a very short time, which is unprecedented among corporate training opportunities.

A number of teams have been coached and worked on a large variety of ideas. When it comes to idea generation, DB Intrapreneurs encourages participants to think globally. DB believes that ideas should be globally scalable. Thus, successful teams continue to work hand-in-hand with all business units across several silos, since DB considers that interdisciplinarity and co-creation are keys to successful innovation taking place within a corporation.

Like so many other units and companies, DB's business units are facing digital transformation. DB Intrapreneurs believes in using and empowering the innovation potential of its employees to create the digital future of DB. Therefore, DB Intrapreneurs strives to achieve three important goals:

1. Inspire employees and business units to drive innovation by understanding digital transformation.
2. Equip employees with entrepreneurial competencies and skills to foster an innovative and entrepreneurial mindset among them.
3. Support employees as a business unit to validate and build corporate start-ups.

The following case has been prepared in cooperation with DB. We would like to thank Florian Messner-Schmitt, Head of DB Intrapreneurs, and his team for their useful insights.

Case study 2: Obtaining digital talent through acquisition

Many companies, knowing that their current culture can make hiring or developing digital talent that they need difficult, have switched their talent acquisition strategy to buying digitally competent companies, not so much for their operations but rather for their talent.

When one of us was an angel capitalist, we made a disappointing investment wherein the entrepreneur we had invested in had a great engineering team and a good idea that was just too big for the funds and the time that were allocated for it. This entrepreneur was destined to fail. When we invested, we imagined that we could get him to begin earning revenue with a lesser product that moved in the direction of the grand dream before his funds ran out.

Unfortunately, the CEO was unwilling to work on anything other than the full version of his original dream with all its features. Once we learned that he would never change his plan, we wrote the investment off as a failure. However, we then received an offer to sell this company; this gave us a twofold return on our total investment in the firm. The buyer had no interest in the CEO's vision or the CEO himself: the purchasing company was just buying his engineering team. Acquisition is one way to get the talent you need, and considering the team and the company that bought out the firm, I suspect it worked out well for them.

Nevertheless, simply acquiring the digital talent you need is not sufficient since you also have to keep it. In another example, one of us was running a small internet security company with a strong intrapreneurial culture and superstar engineers. To give an example of what it took to keep such talent, consider the following scenario. One of my engineers insisted on this arrangement: even though I was his boss, I could only talk to him when he arrived in the morning or left at night; under no circumstances was I allowed to interrupt his thinking between those two times. Anything I had to say to him could wait until the end of the day. He did not need or want to be managed. Once he agreed to take on a project—which was a matter of persuasion rather than command—he would take it from there.

Subsequently, we were acquired by a publicly traded company at a price of several million dollars per employee. One of the reasons we received such a high price per engineer (and a ridiculous multiplication of revenue) was that, within a week, my non-communicative engineer solved a problem the acquiring company had been working on for six months without any results. Our superstar engineer delivered a working code that got the firm's algorithm to operate to a critical In ternet security standard. Getting engineers with that level of talent can be very valuable, and we were lucky to have had several of them.

As mentioned above, acquiring talent is not enough; you must then keep it. The acquiring company had a very different management style from ours. Their command-and-control style assumed that top management knew what was best. Two years later, none of our former employees were still working for the company that acquired us.

I heard about some of what happened when they tried their hierarchical management style on our self-motivated talent. It was difficult to get my former employees to stay long enough to cash in their stock options.

Not knowing how to nurture and support talented digital intrapreneurs makes the strategy of acquiring them useless. The same principle applies to home-grown talent. Jobs of routine processing are gradually disappearing, either becoming taken over by smart machines or getting shipped to low-wage countries. Increasingly, the jobs that remain require creativity and care—things at which people are still better than machines.

Creativity and care must come from the inside. You cannot force someone to care for their customers, since the motivation to care about them must come from the inside. As Daniel Pink points out, the same applies to creativity (TED 2009). Even rewards reduce creativity by shifting the mind from what psychologists call intrinsic forms of motivation to the extrinsic ones. The emerging kinds of work in the twenty-first century is similar to intrapreneuring and is thus in need of managers who behave more like sponsors than conventional supervisors.

This is particularly true of digital employees. Coders, for example, must make instantaneous decisions on how to structure their code and what path to take to achieve the desired result. To do that well, they must focus entirely on their intrinsic motivation and enter a state of flow. They need to be motivated by their own values instead of worrying about what their boss might think. That is why my superstar engineer asked me not to talk to him during the day. He wanted to be motivated by caring about what he was doing, by his own sense of what was right and elegant, and not by the opinion of his boss who did not really understand his code. That is a lesson for anyone who must manage digital talent. If you have hired the right people, they know more about what they are doing than you do. If you respect that, they might stay.

Case study 3: The School for Intrapreneurs™

This case is about an online action-learning programme at a global company, which, in one year, produced a ten-to-one return and provided a proof of concept that digital intrapreneurship could yield rapid profitable results. Quick wins and the

proof of a digital intrapreneurship concept is an important early step in building a culture suitable for digital intrapreneurs. Our client's goals for the programme were as follows:

1. To increase profitable innovation in the IT sector
2. To bring out and implement bottom-up ideas
3. To develop business acumen in IT
4. To build teamwork skills in IT.

The digital intrapreneurship programme was entirely online. The design brief stipulated that no person in the programme could be required to meet with any other participant in person, which was good, since the intrapreneurial teams formed in the programme were often intercontinental, with, for example, one member based in Brazil, another one in the USA, another one in Germany, and another one in Singapore. The School for Intrapreneurs™ included four major parts:

1. *The Doorway to Intrapreneuring,* a three-hour online course covering the basics of intrapreneurship. All of the 1100 IT professionals of the company, including the head of IT, were required to complete it.

   a. For managers, the course showed how to recognise and manage intrapreneurs, with case studies illustrating the role of managers as sponsors.
   b. For intrapreneurs, the course inspired participants to bring out their intrapreneurial spirit and declare their desire to implement their ideas. It taught them more effective ways to move their ideas forward within a bureaucratic organisation.
   c. For the company, the course located potential intrapreneurs, so that management could support the development of their ideas.

   The Doorway was run entirely by software. The company placed the software on a server and gave the participants a login. From that point on, the workshop ran without any faculty involvement. Still, the course had a 95% approval rating from graduates, which is unusually high for a required course. This illustrates the power of software and digital innovation to reduce the marginal cost of training an additional participant to almost nothing. It also illustrates more generally how digital innovation can greatly reduce operating costs.
2. *The Idea Expo* was an online forum where participants could post their ideas and get feedback from the other participants and managers. It served as an online meeting ground for forming teams around some of the ideas.
   The next step for intrapreneurs after the Expo was to move their ideas forward and attend an accelerator that would help them build a business plan for their ideas, teach them about being an intrapreneur, and build high-performance teams. At the end, it gave them an opportunity to present their ideas to senior management.

To get into the accelerator, the participants had to form teams of three or more members, who would all be committed to the same idea. This was done to encourage team leaders to assemble their groups and form ideas that were good enough to attract at least two more members. Twelve teams progressed to the accelerator.

3. *The Pathway to Intrapreneuring* was a quick six-week online accelerator for the innovation projects coming out of the Idea Expo. Each week, there were brief lectures and readings on an aspect of intrapreneuring and building a business plan. The teams received weekly assignments and were required to write reports about how their group would address certain strategic issues.
   The assignment types included elevator pitches, building and testing rapid prototypes, managing the organisational immune system, designing and testing a business model, checking up on teamwork, developing marketing and sales plans, fostering the intrapreneurial spirit, making financial projections, and so on. At the end of each week, the teams presented their work online to two other teams, who then gave them feedback using structured forms. At the end of the accelerator, teams presented their results to a panel of executives. Six teams were funded to continue working on their innovations.
4. *The Journey to Intrapreneuring* was a twelve-week implementation workshop for the teams that were funded to develop their ideas.

As mentioned above, within the first year after the participants graduated from the *Journey to Intrapreneuring*, the programme had already produced a ten-to-one return on all the resources invested in it. Because of word of mouth, thirty more teams applied for the next round of the accelerator.

What was learned from this experiment?

1. There is a vast reservoir of creative talent and intrapreneurial spirit buried in IT departments.
2. If you demonstrate that there is a safe pathway to bring one's ideas to management and get support for them, many digital intrapreneurs will appear. There are far potential digital intrapreneurs buried in most organisations than their management suspects.
3. The means for releasing digital innovations can itself be a digital innovation. The first two courses were delivered almost entirely as pieces of software running on a server.
4. Training intrapreneurial employees who had already been developing their innovative ideas in their own time, rather than starting with generating ideas, produced much faster and better results. This was achieved by selecting teams that had already chosen their ideas. There are generally more than enough good ideas distributed among the employee population at all times.
5. Implementation, and not idea generation, is the rate-limiting step in the innovation process. Many successful ideas had been around for quite some time but had previously lacked a pathway to implementation.

6. A process with several short cycles of rapid prototyping and business model testing and a weekly cycle of presentations caused the plans to evolve rapidly and produced better results than could have been achieved through a series of functional tests that only put it all together at the very end.
7. Implementation support after management had funded the projects was seen as quite helpful.
8. Future versions of this programme should involve more training for the management sponsors of intrapreneurial projects, perhaps as a feature of an existing high-potential leadership development programme.

5 Conclusion and Implications

Intrapreneurship remains an important way to capture the creativity, excitement, and energy of entrepreneurship within a larger firm. It can let employees pursue their ideas with more resources and less personal risk than they would have if they had gone out on their own. For companies, resilient responses to a rapidly changing world require the input of a large number of intrapreneurs. The digital transformation of our society is creating challenges for existing firms and many opportunities for both entrepreneurs and intrapreneurs.

As the COVID-19 pandemic has shown, the world does not always progress smoothly. Occasionally, we face startling discontinuities. These sudden changes favour resilient firms. A firm's capacity for responding to big changes resiliently resides in the intrapreneurs who are empowered to make all the innovations necessary for the company to adapt and create a culture to support them. However, this capacity cannot be developed overnight. It requires changing managerial attitudes and building employee trust in the fact that passionately standing up for an idea is not career-threatening (Hughes et al. 2018; Mustafa et al. 2018). Fortunately, even though building that intrapreneurial muscle is very helpful in the times of sudden change, it is also profitable in the more regular periods of the twenty-first century where rapid changes and disruption, per Moore's law, are normal. Preparation for what Nassim Taleb calls 'black swans', like the coronavirus outbreak, requires many of the same steps and cultural attributes that are necessary for giving a financially informed and beneficial response to these disruptive times.

The contemporary digital world requires the development of habits of intrapreneurial innovation. It requires complete managerial acceptance of the fact that digital transformation is inevitable and that one has the choice of either being the disruptor or being disrupted.

This is not a time to cut back on innovative capacity, but rather, it is a time to expand it so that organisations can thrive in a rapidly changing world. This can be done to generate extra profits in the short term and develop the appropriate organisational systems and culture changes to face the unknown shocks that the future will surely bring.

The benefits of digital intrapreneurship are not just in the new products, but also in the better ways for delivering existing goods and services, often with fast results. Digital intrapreneurship creates opportunities for more intrapreneurs than the traditional applications of intrapreneurship. There are many more high-ROI opportunities to improve the way things are done with digital technology today than there were opportunities to develop new products and services in the industrial era.

This chapter has identified several ways in which companies can surface, choose, and empower digital intrapreneurs. It has shown how the exploitation of new business opportunities can be speeded up. It has also identified more effective ways of operating digitally in the non-digital business areas. Moreover, it has displayed that digital intrapreneurship is needed to reduce the risk of being disrupted by entrepreneurial competition.

We have shown several ways in which companies can bring out and support potential digital intrapreneurs. We have provided the means for distinguishing true digital intrapreneurs who can be trusted from the 'promoters' who are talented speakers that lack the character to persistently work hard and persevere through the difficult times until the eventual implementation of their ideas.

Creating systems and a corporate culture for supporting digital intrapreneurs is a core competency for the times of rapid digital transformation. Some ways of doing that include a clear organisational vision for digitalisation, valuing, training, and supporting intrapreneurs, more managers serving as effective sponsors, empowered cross-functional teams, high risk tolerance, failure analysis, increased cross-organisational generosity, acceptance of small beginnings, discretionary resources allocated to lower levels, and less reliance on command-and-control managerial styles and more on inspiration, coaching, and vision.

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Understanding Global Environments and Digital Entrepreneurship

13

Opportunity Pursuit in Foreign Markets and the Impact of Digital Technologies

Di Song and Aiqi Wu

Abstract

Digitalization has tremendously challenged how international opportunities are created and captured. Inspired by researches in the field of both entrepreneurship and international business, this study provides a comprehensive framework toward the impact of digital technologies (DTs) on opportunity pursuit in foreign markets. We identify two perspectives of DTs, i.e., DTs as 'driving force' and DTs as 'disrupting force,' which characterize DTs as a catalyst of experiential knowledge acquisition, and as a factor altering the relative significance of experiential knowledge to opportunity pursuit, respectively. By bridging these two perspectives with the notion of market-specific knowledge and general knowledge within internationalization process theory, some arguments with regard to what specific influences DTs play on international opportunity pursuit are further introduced. We hope this study can potentially offer some nuances to both practitioners as well as the research in the interaction of digitalization and international opportunity.

1 The Relevance of Digitalization to International Opportunity Pursuit

It is undeniable that an increasing number of firms pursue international opportunities in an era of digitalization. In China, for instance, some leading Internet companies such as Alibaba and Tencent make a profit in the global market. Meanwhile, thousands of manufacturing firms are also dependent upon emerging

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technologies to reach their customers outside the domestic country. Indeed, digitalization has challenged the traditional way of entrepreneurial opportunity pursuit. With the help of new technologies, firms can better access to online communities, incubators, and accelerators (Glavas et al. 2019), connect with foreign experts (Sigfusson and Chetty 2013), involve in international activities without abundant investments (Coviello et al. 2017), and so forth. In essence, thanks to this trend, international opportunities are becoming more available for the firm than the past.

However, as international business scholars have repeatedly underscored, practitioners should consider the unique characteristics of foreign markets while conducting cross-border activities. Despite profound effects made by emerging technologies, some differences between the home country and host countries still exist. Cultural distance between each economy cannot be ignored, and protectionism in trade and finance has been strong in recent years. So, how international opportunities could be created and captured in a digitally enabled world? In this article, we aim at offering a conceptual framework by drawing on the research in entrepreneurship, international business, and digitalization to understand this important issue.

2 Background

In order to systematically examine the impact of digitalization on international opportunity pursuit, we first review some associated arguments in literature of both entrepreneurship and international business.[1]

Opportunity is a central concept for international entrepreneurship research in particular (Reuber et al. 2018; Oviatt and McDougall 2005) and for entrepreneurship research in general (Shane and Venkataraman 2000; Kirzner 1997). Following Eckhardt and Shane (2003: 336), entrepreneurial opportunities can be defined as 'situations in which new goods, services, raw materials, markets and organizing methods can be introduced through the formation of new means, ends, or means-ends relationships.' As such, cross-border opportunities are assumed to objectively exist, and necessary knowledge is needed to pursue them (Foss et al. 2013; Shane 2000). Though indispensable role of opportunities has been underscored, some scholars were skeptical about studying entrepreneurial activities exclusively based on the notion of opportunity (e.g., Davidsson 2015; Alvarez and Barney 2014). Empirical researches indicated that entrepreneurial opportunities cannot be automatically translated into superior performance (Wu et al. 2019; Hmieleski and Baron 2008). To interpret the results, we should be aware that Shane and Venkataraman (2000) have already insightfully proposed that there are

[1]We argue that to examine these two streams of literature is reasonable. It should be noted that, while the concept of 'opportunity' is central for international entrepreneurship (Oviatt and McDougall 2005; Mainela et al. 2014), international entrepreneurship was regarded to be the intersection of IB and entrepreneurship (McDougall and Oviatt 2000). Further, the analysis of 'opportunity' is a common theme for these two research areas (Reuber et al. 2018).

opportunity costs to take advantage of an entrepreneurial opportunity. Opportunities are always intertwined with the environment where pursued (Young et al. 2018). Therefore, it is of vital importance to jointly consider opportunities and the context where opportunities are created and captured.

To pursue opportunities in the global context, firms are supposed to decide on where, when, and how to create and capture them (Knight and Liesch 2016). To answer these important but related questions, internationalization process (IP) theory (Johanson and Vahlne 1977) provides us a useful guideline on which the current analysis could potentially rely. Inspired by a series of case studies primarily conducted by researchers of Uppsala University in 1970s, IP theory has become one of the prominent perspectives in mainstream international business literature.[2] As IP theory maintains, firms expand abroad in an incremental way because they should accumulate enough experiential knowledge so as to mitigate perceived risks that prevents them from effectively creating and capturing opportunities in foreign markets (Johanson and Vahlne 1977).

In specific, Eriksson et al. (1997) divided international business knowledge into three conceptually distinctive forms, i.e., foreign business knowledge, foreign institutional knowledge, and internationalization knowledge. The first two types of experiential knowledge, highlighting market-related knowledge (i.e., knowledge about customers, suppliers, and competitors) and non-market-related knowledge (i.e., knowledge about rules, norms, government policy and regulations), respectively, were termed as market-specific, whereas internationalization knowledge, termed as general knowledge, is associated with organizational structures for international operations, and thus characterized as those universal and versatile across different markets. The explanation for different types of knowledge is summarized in Table 1. The accumulation of either type of knowledge can be potentially beneficial for lowering perceived risks in foreign markets (Fletcher and Harris 2012; Hilmersson and Jansson 2012; Zhou 2007; Blomstermo et al. 2004), and thus encourage the firm to create and capture opportunities in the market.

Although IP theory was originally developed to study the internationalization pathway of well-established firms, subsequent researches have observed IP theory is also applied to new ventures (Lopez et al. 2009; Hashai 2011). In theory, new ventures are faced with great difficulties to pursue international opportunities, as they have relatively little experiential knowledge and should invest existing resources to create routines adapting to businesses in foreign markets (Sapienza et al. 2006). As such, their activities are largely constrained by insufficient knowledge introduced by IP theory as well. Therefore, it is theoretically and practically meaningful to investigate how cross-border opportunities can be pursued in a digitally enabled world by focusing on elements of IP theory.

[2]Some evidence can support this argument. Johanson and Vahlne (1977), as the founding article for IP theory, have been on the list of 'Most cited articles' of *Journal of International Business Studies* (JIBS) (https://www.palgrave.com/gp/journal/41267/volumes-issues/most-cited-articles). As of Dec 13, 2019, this article has been cited for 14,099 times based on Google Scholar. Furthermore, Johanson and Vahlne (2009), as a revised version of the IP theory, have been awarded JIBS decade award in 2019.

Table 1 A brief description of each dimension of experiential knowledge

	Knowledge type	Definition
Market-specific knowledge	Foreign business knowledge	Experiential knowledge about clients, the market, and competitors
	Foreign institutional knowledge	Experiential knowledge about government, institutional framework, rules, norms, and values
General knowledge	Internationalization knowledge	Experiential knowledge about the firm's capability and resources to engage in international operation

Source Adapted from Eriksson et al. (1997)

3 Conceptual Model: The Influence of Digital Technologies to International Opportunity Pursuit

According to Tilson et al. (2010: 749), digitalization refers to 'a sociotechnical process of applying digitizing techniques to broader social and institutional contexts that render digital technologies infrastructural.' Building on this notion, the understanding of international opportunity pursuit in a digitally enabled world can be enriched by an exploration of how digital technologies (DTs) impact on the way of pursuit previously characterized (Autio et al. 2018). The concept of DTs has been broadly defined, and in line with Nambisan (2017), DTs consist of many elements which could be classified into three groups, i.e., digital artifacts (components and functions of product or service), digital platform (architectures hosting complementary offerings), and digital infrastructure (broad digital tools and systems). These three groups of DTs are intertwined with each other and collectively influence entrepreneurial activities (Nambisan 2017).

As aforementioned arguments indicate, either market-specific knowledge or general knowledge is closely associated with international opportunity pursuit. To investigate the impact of DTs, we are now interested in how DTs affect the original relationship. We propose that DTs could be viewed as either one of the two roles, which were labeled as 'driving force' and 'disrupting force,' respectively. The explanation for these two roles is summarized in Table 2. When DTs are viewed as 'driving force,' it is assumed to be a facilitator for acquiring market-specific knowledge and general knowledge. DTs are positioned as the antecedents of knowledge acquisition. In this sense, DTs can be understood as a 'reformer.' By contrast, when DTs are viewed as 'disrupting force,' we regard DTs as the factor that alters the relative importance of experiential knowledge to international opportunity creation and capture. The effect of market-specific knowledge and general knowledge on opportunity pursuit is moderated by DTs. In this sense, DT can be paraphrased as a 'revolutionary.'

To better facilitate the interpretation of two distinctive roles of DTs, we integrate DTs with the model based on IP theory, which is illustrated in Fig. 1. It is shown that DTs can be either viewed as the antecedent of the experiential knowledge or as the contingent effect of the knowledge–opportunity relationship.

Below, we discuss two perspectives of DTs in detail.

Table 2 Two perspectives of DTs

	DTs as 'driving force'	DTs as 'disrupting force'
Assumption	DTs facilitating experiential knowledge acquisition	DTs changing the relative importance of experiential knowledge
Role	The explanatory variable for knowledge acquisition	The moderating effect for the influence of knowledge
Metaphor	DTs seen as a 'reformer'	DT seen as a 'revolutionary'

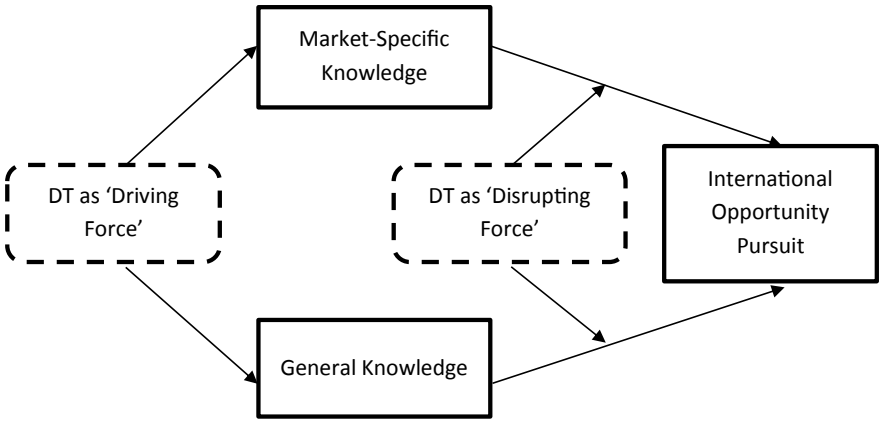

Fig. 1 Influence of Digital technologies (DTs) on international opportunity pursuit

3.1 DTs as 'Driving Force'

The perspective that views DTs as 'disrupting force' underlines the way of experiential knowledge accumulation is influenced by these emerging technologies (Coviello et al. 2017). According to this perspective, both market-specific knowledge and general knowledge could be increasingly accumulated with the help of technologies. Thus, DTs would be indirectly associated with international opportunity pursuit, and the relationship is mediated by experiential knowledge. We discuss how this can happen as follows.

Market-specific knowledge

Enhanced knowledge availability owing to DTs application can directly bring information about the potential market, allowing them to identify which markets are attractive for them (Coviello et al. 2017). Generally speaking, accelerated market-specific knowledge accumulation is gathering an increasing amount of knowledge about other players. By investigating a group of Indian IT firms, Paul and Gupta (2014) claimed psychic distance is largely reduced in recent years, as a consequence of learning from virtual community through online interactions.

Similarly, Pergelova et al. (2019) found that DTs encourage the improvement of international marketing intelligence that would potentially enhance export propensity of SMEs.

In specific, information accessibility about customer's need can be brought by DTs (Autio 2017; Okazaki and Taylor 2013; Yamin and Sinkovics 2006). Many digitally enabled facilities, including e-mails (Prasad et al. 2001), customer databases (Yamin and Sinkovics 2006), and social networks (Alarcón-del-Amo et al. 2018), would encourage international business activities by offering valuable information about customers for the focal firm. In an empirical test concerning internationalization of online apps, Shaheer and Li (2020) observed that between-country distance still has an impact on foreign expansion of these digitalized product providers. However, barriers resulted from distances can be lowered by proactive online user-friendly strategies, including social sharing strategy and virtual community strategy, which encourage the firm to acquire necessary updated information about foreign customers.

Except for customers, experiential knowledge about collaborators and competitors in target market can also be accessed as a result of DTs (Mathews et al. 2016). Gregory et al. (2007) observed from their empirical results that exporters gain knowledge about local distribution channels by using the Internet, which would optimize communication and distribution for these exporters. Overall, a greater amount of information with regard to other players can encourage opportunity creation and capture in specific market by lowering perceived risks.

In particular, compared with established counterparts, we conjecture new venturing firms can benefit more from DTs which help overcome liability of newness (Gabrielsson and Gabrielsson 2011). As novices, new ventures usually deal with the situation where other players are overwhelmingly strangers (Stinchcombe 1965). Such risks would be mitigated through the application of DTs. Glavas et al. (2019) found owners of small firms can utilize digital platforms to collect information about potentially available customers, supporting the notion that DTs might be meaningful for new ventures in this sense.

Foreign market knowledge can not only be accumulated by firm-level business network, but also be derived from entrepreneur's social network through DTs. Especially, social networking platform has transformed the process of information transfer. For instance, by examining how international entrepreneurs accumulate foreign market knowledge on LinkedIn, Sigfusson and Chetty (2013) found some entrepreneurs directly look for reliable foreign partners who possibly provide confidential information.

Furthermore, foreign institutional knowledge, both informal and formal one, can also be acquired with the help of DTs. Knowledge about informal institutions, such as customary habits in a certain market, may be explored and thus fulfilled in a more sophisticated way with the help of DTs (Yamin and Sinkovics 2006; Prasad et al. 2001). The application of DTs allows the reduction of the cost associated with information search beyond the national border. In terms of formal institution, Glavas et al. (2019) found that a more nuanced understanding of regulatory

institutions can be encouraged by participating digital platforms, which is achieved via multiple search engines and multimedia resources.

General knowledge

While market-specific knowledge acquisition process can be largely influenced by the application of DTs, it is also true for the acquisition of general knowledge. In particular, the application of DTs may potentially reshape the organizations. Building on a cultural perspective, Mathews et al. (2016) proposed that the emerging technology platforms force the firms to be exposed in a global context, which encourages decision-makers to be more adaptable to and more willing to learn and appreciate about other cultures. This leads to the firm to take a more international identity, and force the firm to know better about how to internationalize. In a similar vein, Autio (2017) underscored that DTs enable a more an adaptable organizational structure for foreign operations, by enhancing the flexibility of the structure to better orchestrate resources and try varied value propositions in foreign markets.

Contingent factor: knowledge acquisition heterogeneity

Although DTs would encourage the firm to accumulate knowledge, it should be highlighted that not all firms can equally benefit (Alarcón-del-Amo et al. 2018; Sigfusson and Chetty 2013; Moen et al. 2008). There are at least three reasons leading to this heterogeneity. Firstly, the amount of knowledge can be accumulated and can be dependent on for what purposes DTs are utilized. To illustrate this notion, it is observed that applying DTs for information search or relationship development can contribute to knowledge accumulation, while using DTs only for sales activity would not bring significantly more knowledge (Moen et al. 2008).

Secondly, knowledge acquisition is also influenced by firm's degree of commitment to technologies. Some past studies support this argument (Glavas et al. 2019; Sigfusson and Chetty 2013). For instance, Alarcón-del-Amo et al. (2018) investigated the role of social media application among export-oriented companies, concluding that only those with high commitment of social media can obtain sufficient market knowledge by communicating better with their customers. In a similar vein, Sigfusson and Chetty (2013) indicated knowledge accumulation could be more effective when proactive activities are taken in the cyberspace.

Thirdly, firm characteristics could also explain the source of this heterogeneity. For example, Moen et al. (2008) argued that firm age could be a significant contextual factor for foreign market acquisition enabled by DTs. To maintain the extant customer relationships, older exporters may be less motivated to use DTs as a way to accumulate new market knowledge. This position is consistent with an organizational learning argument in international entrepreneurship literature which highlights younger organizations are in general more flexible for knowledge acquisition than older ones (Autio et al. 2000; Sapienza et al. 2006). Furthermore, Glavas et al. (2019) observed the internationalization stage and pattern, including the phase of internationalization (i.e., pre, early, later) and the pace of internationalization (i.e., incremental, non-incremental), can also be influential for types of acquired knowledge.

3.2 DTs as 'Disrupting Force'

Another perspective understands DTs as 'disrupting force,' which highlights that functions or affordances of DTs can reshape business activities (Autio et al. 2018; Nambisan 2017; Yoo et al. 2012). The internationalization pattern has fundamentally changed (Coviello et al. 2017; Alcácer et al. 2016; Autio 2017), and the relative significance of experiential knowledge with regard to international opportunity creation and capture is assumed altered, no matter experiential knowledge still plays a role or not. From this perspective, by changing the way of business activities are conducted in the international marketplace, these emerging technologies allow the pursuit of cross-border opportunities less constrained by the amount of knowledge firms possess as suggested by traditional IP theory. Sometimes, DTs also introduce new forms of knowledge and capabilities that firms require in order to pursue international opportunities.

Market-specific knowledge

With regard to market-specific knowledge, there are at least two reasons why it is not equally significant for opportunity pursuit in a digitally enabled world. In the first place, customers get involved in value creation with the help of DTs (e.g., Chandra and Coviello 2010; Amit and Han 2017). Chen et al. (2019) emphasized the relative importance of knowledge for market entry is decreased from the point view of network effects. For app developers, foreign market penetration is sometimes not purposeful since borderless user networks can help to channel to product information to consumers in other countries. Inspired by the research, we conjecture that international opportunity creation and capture is realized largely owing to demand-side network effects rather than purely supply-side knowledge accumulation.

In the second place, alternative governance approach is available enabled by DTs (Coviello et al. 2017; Alcácer et al. 2016). Different from 'prudent' within-firm administrative control documented in early IP theory literature (Johanson and Vahlne 1977), the prevalence of emerging technologies allows the firm to loosely separate each unit of the whole firm in different countries. As such, firms are able to conduct business abroad easily by cooperating with foreign contractors instead of controlling tangible assets. Therefore, enabled by DTs, ownership advantage is not only associated with the proprietary rights over certain resources, but also in connection with the ability to orchestrate resources across the globe (Alcácer et al. 2016). In an empirical investigation of international technology alliances, Lew et al. (2016) observed that fragmentation of product modular permits alliance with the internalization of partner's specialized knowledge, and the relationship between alliance partners is less susceptible to the cultural distance. It demonstrates that comparatively loose collaboration is likely among the international technology alliances setting. Overall, this suggests that with the help of DTs, even if not familiar with the specific market, the firm is also likely to international opportunities.

General knowledge

Digitalization further revolutionizes international business by lowering the relative significance of general knowledge to international opportunity pursuit. Foremost, DTs enable internationalizing firms, especially exporting manufacturers, to sell their products through cross-border electronic commerce channels or platforms by simply clicking the mouse (Tolstoy et al. 2016). This has fundamentally changed the original international business manner since little foreign business knowledge is already adequate for some activities.

At the same time, some other kinds of general knowledge, however, are becoming increasingly indispensable for opportunity pursuit in the international marketplace. For example, Reuber and Fischer (2011) identified three types of online resources, i.e., online reputation, online technological capabilities, and online brand communities, can be instrumental for new venture internationalization. The general knowledge about how to encourage the firm to accumulate these online resources can buffer the risks of doing business abroad (Fischer and Reuber 2014), and facilitate opportunity pursuit. In sum, whereas some part of general knowledge highlighted by traditional IP theory would be less significant for internationalization, successful international opportunity creation and capture requires other additional knowledge.

4 Examples from Practice

EXHIBIT 1: Selling ambers to China with the help of WeChat (DTs as 'driving force')

It is undeniable that China is an attractive market for enterprises around the world. However, it has also been widely acknowledged that doing business in China would not be easy (Ahlstrom et al. 2000), as cultural distance is usually so pronounced and China's institutional development is not as fast as its economic development.

In order to accumulate sufficient knowledge to create and capture opportunities in China, many foreign firms rely on survey reports and business networks. Meanwhile, other entrepreneurs and managers realize that DTs can also play an essential role. For example, WeChat, as one of China's most frequently used social networking platform, has attracted an increasing number of users outside China. Released in 2011, WeChat penetrates into Chinese people's daily life thoroughly and has become a main channel for information exchange of works and social activities in China. It is reported that the number of monthly active users (MAU) has reached 1112 million during the first quarter of year 2019 (Tencent 2019).

Many Chinese tourists find it quite cost-efficient to buy ambers while visiting Poland. In line with the tradition, some Chinese ladies have a habit of wearing the amber necklace to show the elegance. For Polish sellers, accessing to Chinese market means a lot to their amber business. However, without sophisticated knowledge about the market, it seems to be a challenge for Polish businessmen to

pursue profitable opportunities in the Far East. The idea of 'beauty' is historically and socially constructed, and the values are sharply different between the East Europe and China. Moreover, as small-sized independent business, Polish sellers have comparatively limited understanding with regard to China's markets and institutions.

To address these shortcomings, a group of amber sellers in Warsaw registered their accounts on WeChat platform after observing a wealth of Chinese clients sent pictures of ambers and sought for advice from their friends through WeChat while visiting the store. By adding WeChat friends with Chinese buyers, these Polish amber sellers repeatedly interact with their customers, delivering ambers through the international express transportation. Some of them even established the WeChat group which allows to introduce new products and simultaneously receive valuable feedbacks from Chinese customers. Because these WeChat groups are generally open for everyone, consumers on occasions invite their friends and relatives who are also interested in Polish amber to the group chat. Through the use of WeChat, amber sellers expand the market scope by accumulating knowledge about the potential customers, which partially overcome the liability of foreignness (Zaheer 1995). Furthermore, these Polish businessmen acquire first-handed knowledge about their customers and competitors in China, as well as significant information regarding values and habits through informal interactions, which allows them to design their products more popular among Chinese customers than before.

EXHIBIT 2: Internationalization at home (DTs as 'disrupting force')

China is one of the major exporters of world's production. Although a growing number of factories have been built in Africa and South Asia over the course of last decade, many companies on the planet still expect for the long-term procurement of a large number of commodities from China. 'Made in China' is perceived to be attractive if price and quality are jointly considered. To explore reliable partners, foreign businessmen used to come to some Chinese cities such as Yiwu[3] and Guangzhou, in order to search for necessary information about the market and the institution. Managers and entrepreneurs in these cities are scarcely trained to speak foreign languages, and therefore, it spends foreign businessmen a lot of efforts to discuss and make the deal. Furthermore, institutional voids in many places of China also discourage foreign companies from collaborating with Chinese counterparts. As a consequence, even though a wide range of valuable opportunities could be possibly explored in China, many foreign companies are blind to them because of possessing insufficient knowledge about China.

In recent years, with the development of digitally enabled trading and payment platforms, there is an alternative approach to do business with suppliers in China. The exchange of commodities is realized through the cross-border e-commerce platforms such as AliExpress (www.aliexpress.com) and DHgate (www.dhgate.com). These digital platforms connect thousands of Chinese small businesses to the

[3]Yiwu, a county-level city situated in the center of Zhejiang Province of China, has been widely regarded as 'world's largest wholesale market for daily commodities.' Thousands of village and township enterprises that manufacture various kinds of daily commodities are established in Yiwu.

customers worldwide, and registration on the platform is required for both sellers and buyers before transactions take place. The platform can be accessible for individuals anywhere in the world only if there is an Internet connection. Geographical distance is no longer a big deal.

In DHgate, for example, the platform owner provides the Web page with a number of language versions. Chinese suppliers are allowed to display their products online on a Chinese-language Web page, while foreign buyers could visit the Web site and choose what they expect to order on an English-language Web page. Furthermore, instead of requiring adequate knowledge about Chinese suppliers, foreign businessmen are able to make their decisions by browsing the reviews and the ratings from other buyers. Online payment system endorsed by the platform could also go against the potential opportunistic behaviors, which make the exchange process smooth.

These functions facilitate foreign companies with very limited experiential knowledge about China's institutions and markets to touch the profit opportunities in this market. It illustrates that, with little experiential knowledge, international opportunity creation and capture is also likely when DTs are properly applied.

5 Discussion and Conclusion

5.1 Contribution

By examining how international opportunities are created and captured in a digitally enabled world, the current study would have some implications for both theory and practice. In terms of theory, we provide some nuances to understand the intersection of digitalization and international opportunity pursuit by identifying what roles DTs play in firm internationalization. Drawing on insights from the research in entrepreneurship, IB, and digitalization, we develop a conceptual framework and classify the role of DTs into two distinctive perspectives, namely DTs as 'driving force' and DTs as 'disrupting force.' Whereas DTs as 'driving force' can be interpreted as a catalyst for acquisition of market-specific knowledge and general knowledge, DTs as 'disrupting force' maintain these emerging technologies alter the relative significance of experiential knowledge to international opportunity creation and capture by both lowering the importance for some and putting forward new requirements for the firm. While digitalization and its impact on international opportunity pursuit has been a hot topic (Eduardsen and Ivang 2016), the current study would guide the research in this stream by structuring the role of DTs.

In terms of practical implications, our analysis along with the introduction of the conceptual model might offer some insights for practitioners regarding how DTs have transformed the way that cross-border opportunities are pursued. Primarily, practitioners can learn from this study about the way the accumulation of knowledge conducive for successful opportunity pursuit is facilitated in a digitally

enabled world. By demonstrating how firm's stock of both market-specific knowledge and general knowledge can be enriched by using DTs, practitioners are provided some guides with respect to the mitigation of risks associated with international activities.

Secondly, as highlighted by the perspective of DTs as 'disrupting force,' the significance of experiential knowledge may not be as important as how traditional IP theory predicts, because of DTs could disrupt the way how international opportunities are pursued. Thanks to these emerging technologies, new approaches to pursue opportunities are introduced, which allow experiential knowledge less indispensable, but requires some additional knowledge intertwined with the trend of digitalization. By doing this, we offer some insights for practitioners which help to think about their design of business models.

Thirdly, our study also encourages practitioners to scrutinize how to utilize DTs in their activities. Though firms are nowadays extensively exposed to DTs, not all firms can equally benefit from digitalization. In practice, only a portion of firms could successfully take advantage of these technologies and achieve a favorable outcome. Our study emphasizes a few factors that theoretically explain the heterogeneity of the amount of knowledge that firms can accumulate with the help of DTs, which offers some illustrations allowing practitioners to consider how DTs matter for their businesses.

5.2 Future Research

Though some insights are provided by this study, we should acknowledge that we have only done initial works and several avenues can be considered for future researches. Primarily, since we are not ambitious to cover all arguments in this article, some very important insights in the literature may be overlooked. Furthermore, as IP theory, a prevalent approach among international business research, was the basis for developing our conceptual model, readers should be aware that IP theory itself relies on strong assumptions of the firm and the entrepreneur. In general, entrepreneurs are assumed to be basically risk-aversive (Welch et al. 2016), and thus experiential knowledge becomes the cornerstone for international opportunity creation and capture. In this sense, firms largely prefer long-term profits and organic growth. Although some entrepreneurs are quite conservative in practice, other ones are not concern much with international business knowledge (Zahra 2005) and hope to pursue opportunities across the globe as rapidly as possible. Thus, while our conceptual model may be useful, the heterogeneity of both the firm and the entrepreneur is ought to be taken into considerations.

Relatedly, in line with IP theory which fundamentally claims some necessary knowledge should be possessed for effective international activities (Welch et al. 2016; Sapienza et al. 2006), we take a more objective stance which assumes

opportunities are 'out there.' However, in entrepreneurship literature, another prevalent stance (i.e., creation perspective) denies this assumption and maintains entrepreneurial opportunities can also be created (Alvarez and Barney 2007). Although a thorough discussion of these two contrasting views is beyond the scope of this study, we should admit that the topic of international opportunity pursuit in a digitally enabled world can possibly be better understood if this creation perspective would be addressed.

A further investigation of DTs as 'driving force' and DTs as 'disrupting force' is another area which can be explored. For instance, scholars can continue to investigate and identify other factors regarding how these emerging technologies facilitate knowledge accumulation and change the relative importance of experiential knowledge. Moreover, as we discuss these two perspectives separately, some efforts can be taken to examine whether and how some specific categories of DTs can play both roles at the same time.

In addition, while our primary focus in this chapter is to explore how to acquire knowledge and how knowledge matters for opportunity pursuit in a digitally enabled world, knowledge perspective studies have also underlined the importance of knowledge application (Alavi and Leidner 2001; Grant 1996). The ability of knowledge application by nature varies across the firms (Wu et al. 2019), and therefore should be considered as the boundary condition for the conceptual framework proposed here.

5.3 Conclusion

There is no doubt that digitalization has challenged the traditional pattern of doing business including opportunity pursuit in foreign markets. Past studies have offered many valuable insights with regard to international opportunity creation and capture in a digitally enabled world, but they are generally scattered and fragmented. Drawing on entrepreneurship literature and IB literature, this study develops a conceptual framework and adds knowledge to the literature by categorizing the role of DTs into two perspectives, that is, DTs as 'driving force' and DTs as 'disrupting force.' We hope this framework is instrumental and could potentially serve as a guide for future researches.

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Developing Countries and Digital Entrepreneurs: Obstacles and Opportunities

Georges Samara and Jessica Terzian

Abstract

This chapter explores the obstacles and opportunities that digital entrepreneurs encounter when they operate in developing countries. Drawing on the varieties of institutional systems framework and on three interviews (two digital entrepreneurs and one consultant), this chapter chalks out the idiosyncratic challenges and opportunities for digital entrepreneurs operating in a developing context. Our findings indicate that digital entrepreneurs face a weak institutional infrastructure and an environment characterized by corruption that obstructs their operations. These weak infrastructures result in the inaccessibility to necessary start-up funds, the lack of policies and regulations that protect and support e-commerce, a weak digital infrastructure, and to a deficiency in digitally competent and experienced labor capital. At the same time, our findings indicate some opportunities stemming from the unique institutional setting in which digital entrepreneurs operate. The opportunities translate into the use of family wealth as a source of start-up financial capital, the use of personal connections as a source of social and human capital, and the rising education on digital entrepreneurship and its benefits. We conclude with some suggestions to improve the current institutional infrastructure for digital entrepreneurs in developing countries.

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1 Introduction

Digital entrepreneurship is defined as the identification and pursuit of entrepreneurial opportunities based on the creation of digital artifacts, platforms, and infrastructures that provide services through technology (Schmidt 2011; Giones and Brem 2017). Digital artifacts consist of applications or any media component that offers a specific function to users (Ekbia 2009; Kallinikos et al. 2013). A digital platform is the collection of a common and shared set of digital artifacts that provide entrepreneurs with a venue for production, marketing, and distribution processes. In the last two decades, digital entrepreneurship has opened new venues for entrepreneurial activities and has transformed the nature of uncertainty inherent to entrepreneurial processes and outcomes (Nambisan 2017).

In a world witnessing continuous and radical innovations, entrepreneurs are developing business ideas that capitalize on the power of technology. Entrepreneurs have the opportunity to offer new products and services to consumers through social media platforms and to use artificial intelligence to measure their impact and reach. Nevertheless, there exists a heterogeneity among digital businesses, where some are entirely tech-dependent (e.g., Web design, e-retail), while others just use digitalization in their marketing and communications operations. In this chapter, we focus on entirely tech-dependent businesses.

Digital start-ups have very low barriers to entry, more porous and fluid boundaries, and do not require costly equipment (Nambisan 2017).They are characterized by flexibility of products or services such that there is no fixed product or service whose features remain constant; rather, product offerings, features, and scope continuously evolve and expand. Furthermore, digital entrepreneurship is no longer restricted to privileged capitalists. Digital entrepreneurs gain access to funding and resources through venture capitalists, crowdfunding, and bank loans (Lingelbach et al. 2005). Crowdsourcing and crowdfunding systems allow the engagement of collective stakeholders in the venture creation process, where entrepreneurs interact with customers, who provide ideas, and with investors that provide capital.

Despite the many opportunities that digital entrepreneurship brings, it has also been linked with high risks of failure given the continuous and radical technological innovations and since the role of employees in a digital business is ambiguous and undefined. Thus, the absence of a mechanic or solid structure makes it more difficult for entrepreneurs to decide and plan a clear operations process that assigns each employee to its corresponding tasks (Brem et al. 2016). The previously mentioned challenges and opportunities for digital entrepreneurship are well documented in the literature, which was mostly conducted in developed countries. However, knowledge about the obstacles and opportunities for digital entrepreneurship in developing countries remains scant.

While the above-mentioned challenges and opportunities to digital entrepreneurship can persist when entrepreneurs operate in developing countries, the embeddedness of a country in a developing context adds additional

complexities that may create new challenges and opportunities not usually encountered in developed countries. Indeed, developing contexts are hurdled by the presence of institutional voids, with the state having low law enforcement capacity, and low generalized trust within society (Fainshmidt et al. 2018). Nonetheless, these countries are also characterized by supportive family capital (Samara and Arenas 2017) and sometimes by a high level of knowledge capital, both of which can create opportunities for digital entrepreneurship.

In the following, we first draw on institutional theory and the varieties of institutional systems to describe how the developing context can affect the obstacles and opportunities for digital entrepreneurs. Then, we present two case studies coupled with one expert opinion, to have a closer look on whether the theorized obstacles and opportunities fit with the reality that digital entrepreneurs encounter when they operate in a developing country. While the empirical setting is contextualized in Lebanon; we argue that the findings can be extrapolated to other developing contexts that are subject to similar institutional pressures.

2 Institutional Theory and Varieties of Institutional Systems: Digital Entrepreneurship in a Developing Country Context

Institutional theory emphasizes the role of the social context in determining the behavior of individuals and organizations (Meyer and Rowan 1977). According to institutional theory, individuals are embedded within a social context that has distinct formal and informal rules and regulations that determine the cognitive process through which individuals and organizations behave (Fainshmidt et al. 2018).

In this context, the Varieties of Institutional Systems (VIS) framework has been advanced to discuss how institutions in developing countries may have a distinct impact on individuals and organizations. According to the VIS, there are five institutional dimensions affecting organizational behavior in developing countries: The role of the state, the role of financial markets, the role of corporate governance institutions, the role of human capital, and the role of social capital (Fainshmidt et al. 2018).

In developing countries, institutional voids, which are defined as weak or non-functioning market mechanisms (Jamali et al. 2017), are prevalent. While these voids may lead to challenges for digital entrepreneurs, they may also open new opportunities. Using the VIS framework, we are able to classify institutional voids into internal factors, which are part of the microenvironment, and external factors, which are part of the macroenvironment. Internal institutional voids of a business include human capital, along with their exposure to Information and Communications Technology (ICT) skills, their level of technological awareness, skill-based resources, financial status, and perceptions and attitudes toward society and technology. The external institutional voids include the government, market

e-readiness, level of trust in society, the financial market, and supporting industries e-readiness. Despite the fact that successful online venturing is associated with the preceding institutional elements, material and cultural aspects are essential to account for when discussing the success or failure of digital entrepreneurial ventures.

The State can influence the economy through its direct and indirect interventions in the market and through the diverse forms that it can take. There can be four types of states: Welfare State, Developmental State, Predatory State, and Regulatory State, the latter being the state that sets and enforces rules, thus, directly impacting economic activity (Rosecrance 1996). A Welfare State protects and promotes the economic and social well-being of its citizens, mainly through the redistribution of wealth by the government. A Developmental State is concerned with engaging in advancement of business sectors through industrial policy. Within a Developmental State, governments strategically monitor and facilitate business activities, transactions, and e-commerce initiatives. If present, developmental states can develop the needed infrastructure for the reinforcement of new digital infrastructure, hence allowing the necessary ground for entrepreneurs to share and edit their ideas in the process of opportunity formation. Unfortunately, development states are scarcely found in developing countries, where, more often than not, Predatory States dominate. Predatory States are known for being elites who monopolize power through the absence of market competition, discreet decision-making processes, and weak institutional supportive capacity, which translates into the state withdrawing from any activity that can assist, organize, and protect digital entrepreneurs (Carney and Witt 2012).

Financial markets are the core element of institutional systems as they acquire and distribute capital (Davis and Marquis 2005). Developing economies tend to substitute financial markets with internal capital markets, usually based on accumulated family wealth (Steier 2009); thus, limiting in part the growth of businesses as family capital is considered as a finite source. Financial resources play a critical role in digital entrepreneurship. Although online ventures require lower entry cost than that of a bricks-and-mortar business, the lack of financial resources present significant challenges, specifically to those belonging to lower socioeconomic social class.

Corporate governance relates to how companies are managed and controlled. In developing countries, ownership of companies is concentrated within family hands (Khanna and Palepu 1997; La Porta et al. 2000). Therefore, ownership concentration affects how owners, labor, and management interact with each other. The existence of wealthy families is well noted in the Middle East, Latin America, Northern Africa, and Asia. This leads to family firms being the predominant organizational, and the latter are not only concerned with financial returns, but also with nonfinancial benefits such as the family's identity and preserving family influence in the business (Samara and Paul 2019). In the context of digital entrepreneurship, corporate governance levels refer to the extent to which top management leads and organizes a business through incorporating technology and e-commerce ideas and projects. Creating a family supportive environment in which

corporate digital entrepreneurship can thrive therefore becomes a double-edged sword. On one hand, digital entrepreneurs may have easy access to family wealth to pursue their entrepreneurial endeavors, but on the other hand they may be faced with family seniors that are reluctant to fund such unknown and uncertain entrepreneurial paths.

The fourth aspect of the VIS taxonomy includes the formation of knowledge and skill within an institutional context and how labor is organized. Labor relations are essential to optimizing human capital and predict whether or not employees in organizations will have the necessary knowledge and skills to engage in strategic activities. More fragmented labor markets result in higher employee turnover rate and flexibility, thus making labor less efficient and effective and shifting the organizing principle to political and/or family connection-based foundations (Aguilera and Jackson 2014). Furthermore, technical knowledge is considered as human capital resource. Particularly in the developing context, acquiring knowledge on digital selling tools and technologies is necessary in developing an online presence and effective communication with Web site developers, industry professionals, and tech-support providers. The level of technical knowledge and resources acquired can be contingent on the availability of a qualified workforce capable of providing digital businesses with the required human capital support. Furthermore, the level of knowledge capital within a nation determines how productively organizations engage with employees. For instance, the availability of knowledge capital in companies allows organizations to invest in firm-specific skills (Jackson and Deeg 2008), while scarcity in knowledge capital may reduce incentives to invest in specific sectors or competencies. In this context, the scarcity of certified and highly skilled ICT specialists might be attributed to the high cost of recruiting and retaining them. Subsequently, the availability of employees with adequate experience and exposure to ICT skills required to successfully undertake e-commerce projects indicates the formation of entrepreneurial prospects. This means that entrepreneurs in developing countries might have to incur the additional cost of recruiting expert-level employees. The low level of ICT awareness among staff members refers to the low level of awareness of e-commerce potential, which could be due to the lack of long-term strategic planning. Moreover, small businesses may not benefit from ICTs due to their lack of knowledge, skills, and resources necessary to excel in the world of digital entrepreneurship. The adequacy of ICT skills such as the number of local content creators and communication and software engineers is an important factor in the level of adoption of technology in entrepreneurship. Furthermore, the adequacy of technical support also plays a role in determining the level of technological incorporation.

From a cultural perspective, in developing countries, societal perspectives on gender play an important role in the credibility and validation of women's resources, which create disadvantages to their entrepreneurial success. Even in the digital workspace and in terms of professional qualification, women face sexism and hostility. There is a disadvantaged stereotype about femininity and beliefs about technological competence (Kelan 2009). Other views on race and social class demonstrate how in advanced Western countries, white elite and upper middle-class

males dominate positions of power; so, whiteness and masculinity form the "ideal" entrepreneurial type and consider to be intangible resources to entrepreneurial legitimacy (Ahl 2006).

The role of social capital refers to the degree to which members of society trust other members, also known as the level of generalized trust (Inglehart 1999; Putnam 1993). Prior studies have shown that trust plays an important role in a country's economic activity (Knack and Keefer 1997). The lack of generalized trust implies that individuals and organizations depend on informal networks that are centered on more specific trust, such as family ties. When applied to digital entrepreneurship, market e-readiness refers to the company's, customers' and suppliers' willingness to conduct business electronically. Supporting industries e-readiness consists of the assessment of the development level and cost of support-giving institutions such as IT, telecommunications, and financial ones, whose activities might influence e-commerce adoption and initiatives in developing countries. Hence, trusting a business partner through an e-platform may be a significant factor affecting digital entrepreneurship in developing countries. For example, given that the level of corruption in developing countries is high, people often question whether a business is reliable, safe to deal with, or will accomplish the task given at hand. Trust is built upon "long-term experience of social organization, anchored in historical and cultural experiences." (Rothstein and Stolle 2008, p. 311). This especially applies to developing economies, where corruption is prevalent and has consequences on the trust of the government, in business, and in society. Prior studies have found discrepancies in the level of trust and corruption in developing economies. From the digital entrepreneurship perspective, instead of being a neutral space where all stereotypes differences, or labels are eradicated, the online environment shows to be reflecting social inequalities among aspiring entrepreneurs. Therefore, citizens might find it difficult to trust the validity and fairness of systems in society. Additionally, the importance of social and human capital gathered in previous higher status employment challenges the idea that just about "anyone" can start a credible online business with minimal investment.

3 Cases and Expert Opinion

Below, we present two cases and an expert opinion, which exemplify how embeddedness in a developing context affects the obstacles and opportunities encountered by digital entrepreneurs. The expert opinion provides a wider perspective as our expert has more than ten years of experience working with digital entrepreneurs across the Middle East. Furthermore, the two cases, that we purposefully choose, exhibit the situation of a large business as well as a small business. This allows to show a holistic perspective on the various challenges and opportunities that digital entrepreneurs can face when operating in developing contexts.

3.1 Expert Opinion

We interviewed Dr. Diala Kabbara, a Lebanese emigrant who works in Italy as a consultant for some local and Middle-Eastern companies and is a professor of Entrepreneurship in University of Pavia, Italy. Dr. Kabbara shared her insight and expert opinion via Skype, during the course of an hour-long interview.

According to Dr. Diala., a primary driver to opening any online store is creating a high-value proposition that is customer-oriented targets to solve problems that customers face and eases their pain points.

1. Role of the "3F"s:

Dr. Diala highlights the opportunities that digital entrepreneurs have through capitalizing on the "3F"s: family, friends, and funds. Family and friends are considered as social and/or human capital, and funding includes raising money through crowdfunding, which is exposing one's innovative idea to the public and getting supported financially. Another way to get funded is through creating relationships with accelerators and incubators.

It is crucial for digital entrepreneurs to have capital for their start-ups. Dr. Diala speaks about the importance of financial markets in digital entrepreneurship and introduces the term financial "bootstrapping," which refers to, "launching new ventures with modest personal funds" (Winborg and Landström 2001, p. 235), and satisfying the need for resources without depending on debt or external finances (Smith 2009). Financial bootstrapping techniques are essential for business start-ups, particularly tech-based ones, and include making deals with customers, borrowing from suppliers, low-cost labor, and creating special relationships with individuals and organizations (Smith 2009).

A challenge of digital entrepreneurship in developing countries is funding. In developed countries, you may have a lot of grants to fund businesses. Here, we can refer to the role of the state. The state can either be a barrier to digital entrepreneurship by imposing heavy regulations and bureaucracy, or a supporter, by providing financial support. The government could financially support a specific age or gender group. For instance, in developed countries, the state can hold events and competitions for a specific age or gender group (e.g., female entrepreneurs under the age of 30), where a selected applicant gets funded by the government.

2. Customer Expectations:

Customers in developing countries are accustomed to purchasing items in physical stores, having the experience of trying things on, and using their senses. Virtual purchasing is still a somewhat foreign concept, contrary to that prevalent in developed countries. This could be due to cultural differences nested therein. Developed countries tend to value "the hustle and the grind" and can't afford to

waste time or effort. So, it's easier and quicker for them to purchase things online, whereas in less individualistic countries or developing counties, people don't mind and might even be excited to do things the "physical way."

Internet issues pose challenges to digital entrepreneurship in developing countries. For example, Internet fees in Lebanon are very high compared to that in other developed countries. Dr. Diala says, "in Italy, Wi-Fi is even sometimes free in parks, whereas in Lebanon, Internet is expensive and very slow."

Cultural differences among target audiences can play a role in expanding an online company to other regions. As our interviewee mentions, "you can't just scale your online business to another country in the Middle East. Maybe an app in Lebanon may not be accepted in the gulf area."

In addition to these challenges, in developed countries, the types of industries are wide and diversified, whereas in developing counties, industries are narrower and more limited to specific sectors.

3. Network Opportunities:

A network can have two dimensions: personal and professional. Personal links such as family and friends can spread awareness and share one's business through media. Professional connections are crucial, especially in digital entrepreneurship, for they can also provide mutual benefit for both parties. As Dr. Diala mentions, "personal connections are important for creating partnerships with other companies in the future, such as alliances or collaborations." Dr. Diala mentions, "personal connections determine the quantity of people in a network, and social capital determines the quality and variety of your connections." Personal connections can also count as human capital and/or a source of knowledge. Dr. Diala says, "if some of your personal connections have had experience in digital entrepreneurship, then they can give you valuable and useful insight, and share their experiences with you."

The family plays a role in digital entrepreneurship, for it provides financial support, as well as moral support like trust. Families can tolerate and support the trials of their next of kin despite the risk. The family could help in idea generation and may provide consultation in various matters. Dr. Diala mentions, "the family could play an even more important role if a member in the family has had experience in the field of digital entrepreneurship." Families can also pave the way for various networking opportunities.

Increasing one's social capital, being the number of network relationships among people who live and work in society, is crucial for the success of a digital company. That means it is preferable to diversify one's networks, for instance, by making personal connections in different professional fields to gather a variety of suggestions and ideas. Dr. Diala says, "the more networks you have, the more the possibility to get funded."

4. Rise of Tech Devices:

Dr. Diala pointed out an opportunity in the digital industry, being the rise in the number of tech-device (smartphones, computers, etc.) users. Students are being educated on the use of technology, and it is observable that the younger generations avidly use their smart devices.

5. Syndicate and Lack of Human Capital as Challenges:

Dr. Diala discusses the role of syndicates by suggesting that syndicates are not as necessary for freelance jobs such as digital entrepreneurship as it is for other fields. She says, "for digital entrepreneurship, syndicates would mainly be used to share risk, or to provide funds for digital entrepreneurs, and for security or insurance."

Another challenge might be the lack of competent, digitally skilled, and experienced labor capital. According to Dr. Diala, employees should have a set of specific digital skills, competencies and knowledge, such as skills in SEM (search engine marketing), content marketing, social media marketing, and social selling. As Dr. Diala says, "if you don't have these skills, you may not be the right person to go into *digital* entrepreneurship." For recruitment, it is preferable to recruit technologically competent people, rather than only entrepreneurially competent or "business-minded" people. Thus, education is crucial for this matter. The sources of education could be the information and skills acquired during higher degree education, such as courses on data analysis, artificial intelligence (AI), e-computing, digital entrepreneurship, or through paying for online learning, tutorials, and software.

3.2 Case Studies

3.2.1 LebMall Start-up

We interviewed the founder of a start-up called LebMall.com, John (the name of the company and the interviewee has been changed to ensure anonymity). LebMall.com is an e-commerce, multi-vendor Web site that offers brands a platform to sell their items and make commission off of sales. LebMall company has twelve employees that can support up to 1000 orders per day. In addition, LebMall.com offers shipping of its products. In the founder's terms, it's like the "mini-Amazon" of Lebanon. LebMall.com management is currently focusing on the growth of two departments, which are those of electronics and apparel.

1. John's Vision:

The main driver behind starting this digital enterprise was the founder's and his family's search to start a new project that would satisfy the market demands and gaps in the market. John says, "it all started when I witnessed the crisis of brick-and-mortar clothing stores in Jounieh," the city where John was raised, where shops were shutting down. "It is true that there is an economic crisis in Lebanon, in real estate and in big companies, but this crisis can't be applied on clothes since the

demand for apparel is a constant." He adds, "stores in malls are also closing, not because people stopped buying clothes, but because people are purchasing them through online platforms such as Aliexpress.com." John elaborates by saying, "one day, my family and I had gathered for a family meeting, where we concluded that the Lebanese economic situation had been declining, negatively impacting our real estate business." Thus, leaving their real estate business on hold, John and his family decided to come up with a new business venture. John suggested e-commerce, and the family board agreed.

2. Personal Connections/Family as Opportunities:

Personal connections can be considered as part of social capital and can serve digital entrepreneurs during their journey. John ardently emphasizes the role of his personal connections in the process of setting up his business. He says, "had it not been for my personal connections, I wouldn't have the number of vendors that my business has, nor would I have been able to equip relatively fast Wi-Fi to LebMall as quickly as I did, through the help of my connections. It would've taken me a year." His family's reputation played an essential role in building those connections and on capitalizing on old connections. Therefore, John's privileged position provided him with sufficient preceding social and financial resources that overcome knowledge limitations to develop his entrepreneurial ideas.

Family can be regarded as a source of both social and financial capital. The level of trust among family members, as well as their moral and financial support, benefits digital entrepreneurs. Family wealth provides advantages in the launch of any type of business. For instance, John attributes the launch of LebMall.com to his family's tremendous support with financial resources. John mentions that the basis of his family profession is real estate. His family enterprise provided the necessary capital to launch LebMall.com; hence, he did not need to search for funding. He says, "if it weren't for my family's enterprise, LebMall would've shut down by the end of the first day."

3. Weak Institutional Infrastructure as a Challenge:

John emphasized the weak institutional infrastructure of Lebanon, which leaves the digital entrepreneur unprotected. In Lebanon, there isn't a law or database that protects e-commerce. John says, "for example, if I lose my password, there is no backup." Nobody can complain about the mishaps or errors that occur in the online world in Lebanon. Additionally, there is a lack of protection for consumers in e-commerce. He says, "if you receive a broken or malfunctioning product, there is nothing you can do about it." As a result of the absence of law for digital entrepreneurship, there isn't a syndicate for e-commerce in Lebanon. This absence indicates that there are no forces that can instill pressure on the government for the declaration of the rights of digital entrepreneurs, such as protection laws or services.

The founder was not hesitant to express the challenges he had faced along his process of launching LebMall. He states that these challenges range from cultural

differences to a lack of an online payment system and the deficiency in digital infrastructures for online business transactions. John says, "in developed countries such as the U.S., vendors communicate and sign contracts with the e-commerce platforms via email, whereas in Lebanon, I have to prepare a hard copy version of the contract with a customer. This consists of a lengthy process of going to lawyers, making the contract official, and giving them commission; thus, increasing the probability of customers backing out of their online purchase." He continues by saying, "the stock in Lebanon is not electronic and it's not easy for someone to prepare a feasibility study for investors to invest in or fund online businesses."

John states that the Lebanese bank has prohibited PayPal (the most popular online payment and monetary transaction system), and that the only payment system available in Lebanon is "Ariba," which takes 3% commission on each transaction, when it should only be taking 0.5%, again hinting at corruption disrupting business affairs.

Another difference that John states is that the concept of "e-signature" is not acknowledged in Lebanon: "we send contracts by PDF and ask our vendors to print it out and send it to us by Aramex. So, whereas others do this in a minute, this process takes us two weeks." John adds, "in other countries, it is very simple and easy for anyone to upload a product they want to sell online, whereas, in Lebanon this process is more complicated and time-consuming." In addition, John pays $2000 per month for Wi-Fi, whereas in developed countries, the price of even faster Wi-Fi is $50 per month.

Despite all the disadvantages that digital entrepreneurs face in Lebanon, the founder still wants to make a business footprint in his country: "to begin with, Lebanon is my home. Secondly, in developed countries such as the USA, there exists a lot of monopoly and competitors in e-commerce, like Amazon.com. So, launching LebMall.com in Lebanon gave me an advantage of being a first mover."

John elaborates by saying, "Lebanese citizens consider the price of their online shopping items expensive since they aren't accustomed to paying a large amount of money online; however, little do they know that they already spend its equivalent sum in daily activities or expenditures such as fuel and groceries." He states that Lebanese citizens aren't well informed about e-commerce and digital entrepreneurship isn't well integrated in the Lebanese culture.

The founder also states that LebMall.com has been facing challenges in the apparel department. LebMall.com imports clothes for women in containers from Turkey. During the importing process, they pay shipping taxes on these containers from Turkey to Lebanon, as opposed to people who bring clothes from Turkey in vans or suitcases without paying taxes.

4. Competition as a Challenge:

John expresses that the biggest problem that e-commerce, specifically his company, faces is the competition that imposter stores set by selling knock-off products and fooling customers.

LebMall.com wouldn't be settled in Lebanon if it's not registered in the ministry of economy. John says, "every picture owned by the business has to be registered for copyright; regardless, these pictures are being "stolen" and copied by other stores."

John brought and installed Internet servers from abroad called "Cloudflare" into LebMall.com, which costed him $2000 per month since he realized that with Lebanon's relatively slow internet, customers won't wait more than twenty seconds to press a button and place an order online. Additionally, the financial sector in Lebanon poses a threat to John's online business through imposing high bank interest rates.

Due to weak institutional structures and the prevalence of corruption, people in Lebanon are often not propelled/compelled to properly follow procedures. So, to get things done as efficiently as possible, John likes to keep people motivated by engaging in gift-giving to those who assist him. This can be considered as an additional cost to the business.

5. Human Capital as an Asset:

With respect to the role of human capital, the founder emphasizes on the efforts he and his team have been making to study the Lebanese market and grow the business. For example, they conducted feasibility studies regarding the success of LebMall.com prior to its launch.

This is an indication of his individual drive that led him to train himself. He says, "I know how to develop Web sites through my personal education and curiosity." The founder demonstrated signs of passion for entrepreneurship, determination, will to succeed, and a strive for knowledge and growth during his interview. John, as well as other entrepreneurs operating in developing countries must be willing to take risks, be able to bounce back from failure, and have thorough knowledge of the market and its demands. They must step out of their comfort zones and push themselves to improve their skill-set to attract their customers' attention and engagement. John stated that he's eager to learn, and as a compensation for the low levels of knowledge capital, he and his team are ready to go out of their way to learn further and excel in this endeavor.

Digital entrepreneurs have different approaches and intentions for each of their businesses. For instance, John expanded his company within several industries (electronics, apparel, etc.) with LebMall.com, since he had the capital to do so, whereas below entails how Lynn, the founder of WIB.com (WIB stands for "Women in Business"), targeted a specific industry (beauty industry), having a more limited capital. In addition, John communicated with his costumers solely in the digital space, whereas Lynn, other than using social media and online tools to advertise, adopted a technique dependent on human contact and face-to-face interaction with her customers.

3.2.2 WIB Start-up

We interviewed the founder of WIB.com (WIB stands for "Women In Business") Lynn (the name of the company and the interviewee have been changed to ensure anonymity). WIB.com is an online beauty and health shop. Lynn is a young entrepreneur, who started by selling and managing a single makeup brand, which was the official provider of an original makeup brand in Lebanon. She later decided on incorporating a variety of beauty and skin care brands, and health and fitness items, expanding it into WIB.com.

1. Lynn's Vision:

Lynn's vision was selling good-quality makeup at very fair and reasonable prices compared to other makeup brands. She says that she's been working on the main beauty brand in WIB.com for two years. She spent this time positioning and advertising the brand, in addition to testing the waters with her overseas supplier to make sure she could trust them. Therefore, WIB.com started as a small-scale business at first, but after gathering feedback from customers regarding the quality and the packaging of the products, Lynn has been rapidly growing her business. The founder points out that she associated her drive for starting and succeeding at her venture with the concept of self-actualization, which is "end-goal" in Maslow's Hierarchy of Needs. Self-actualization includes personal development and satisfying one's inner needs of achievement. She says, "as a woman in the Middle East, I am achieving something and contributing to society."

2. Role of Education:

With respect to her education, Lynn has a bachelor's degree in marketing and is currently finishing up her master's degree in finance. The university she received her higher education from did not offer any courses on digital entrepreneurship. Lynn, not having a business background, was motivated to start her online shop by being influenced by her friend who is an entrepreneur and also hadn't studied business. Hence, Lynn participated in workshops and received certificates on online marketing (e.g., the tools to use to promote a brand on social media). Lynn's marketing degree helped in marketing the brand and her store. Additionally, Lynn taught herself some necessary entrepreneurial and technical skills by watching videos and tutorials on online shopping and trend marketing.

3. Role of Social Capital:

Lynn's family was very supportive of her decision to start a business: "my family has always supported me in everything I do that they deem feasible."

In addition to her family's moral support, Lynn's family ties provided her with an opportunity to expose her business to the public. At a dancing event organized and hosted by her brother, where most of her dance students and friends had attended, Lynn found and used the opportunity to promote and sell her brand.

During the event, Lynn sold makeup products at a stand near the entrance, where everyone who walked in was introduced to the what WIB has to offer, along with its quality level and price ranges.

Lynn states that, "personal connections really help in Lebanon; that's just how the way things work here. If you need something, you refer to someone." She gives the example of the time when she needed and was in search for a delivery agency for her business. One of her acquaintances had worked with a particular delivery agency and recommended them to her; so, she didn't face any hesitation in choosing, trusting, and working with this agency.

Moreover, Lynn's close friends supported her and offered various ideas and suggestions regarding her business.

Our interview with Lynn hinted at an important link between social and human capital. The social capital, including personal connections, can serve to form a company's human capital. This is the case with Lynn, as her friends and herself make up WIB's team. When asked about her employees, the founder states that she doesn't refer to them as employees, but rather as members of a team comprised of herself, an editor who is responsible for graphic design and Photoshop, an entrepreneur who also has a cinematography (photography and videography) background, a person responsible for customer support, and another for answering messages on social media. This small team built her Web site and keeps track of inventory. All members of the team constantly work on developing and expanding their skill-set.

In addition to Lynn's personal connections contributing to the company's human capital, they ended up being a big part of the clientele and supporters of her online shop. Lynn says, "in Lebanon, everything is based on Public Relations." When Lynn first introduced WIB to her friends, family, students, and other acquaintances, they weren't reluctant to purchase its products, for they trusted that she wouldn't sell and promote an arbitrary brand of bad quality; thus, they weren't dubious of it being a rip-off due to her good relationships with students and friends and assumed the brand to be of good quality.

Thus, Lynn's asset was her social capital and the trust that comes with it. She gained a lot of customers through her friends, students, and other personal connections. Due to their trust in Lynn and her assessment of quality and standards, many ended up purchasing products to try them out. As she says, "because they know me and trust me, they trusted the brand." So, upon hearing Lynn being associated with the brand, more people were inclined to try out the brand, but this really only goes so far as a "first impression."

Hence, according to Lynn, the key to creating long-lasting customer relationships, maintaining customers' trust, and having loyal customers is not only to consistently deliver of-value products and show them their quality level, design, and packaging, but also to provide them with after-sale services such as customer support and delivery.

The founder points out that for her, "it's also a matter of self-satisfaction or self-esteem." If people were to be dissatisfied with the products and started giving bad reviews or feedback, not only would people lose trust in the brand but also in

her judgment. She tries to avoid disappointing people's expectations of anything she promotes and sells for this would affect her self-esteem as an entrepreneur. She says, "that's why I took the time to really work on this brand."

During the process of building customer-brand trust, a crucial step is to be able to experience a product "hands on"; thus, customers use their senses to assess quality. Lynn says, "in the online world, and especially in the makeup business, customers want to see, smell, and touch the product for themselves." Another challenge for Lynn has been the willingness of customers to pay delivery fees. She expresses that due to Lebanon's unemployment crisis, weak economy, and corruption, citizens tend to find delivery charges inconvenient (She charges $5 for delivery and free delivery if a purchase exceeds $75). Lynn mentions that a challenge she faced at the start was her lack of contacts and know-how to go about things.

4. Role of Weak Digital Infrastructure and Risk:

According to Lynn, the payment process has caused her some hurdles: "in Lebanon, it's very difficult to have online money transactions like PayPal; so, I'm using a cash-on delivery system, which slows the process."

Lynn also expresses that as some parts of her entrepreneurial journey got easier, such as getting accustomed to the process of it all (logistics, new-item negotiation, delivery, relationship with supplier, etc.), other areas like customer satisfaction got more challenging, for she had to perform analysis on customer demand.

When it comes to risk management, Lynn says that at first, the risks facing the success of her business were high, but they decreased since she started selling in small quantities, which come with low cost of loss. Moreover, Lebanon has a weak infrastructure and is continuously hurdled with uncertainty and disruption. All of these are obstacles to Lebanese citizens' creativity because they are too preoccupied with such problems that restrict them from devoting their mental energy to innovate ideas and from tackling their creative sides. As Lynn further explains, "an observation for this could be that that Lebanese citizens who immigrate to another country end up being entrepreneurs or innovators and excel in their fields." Moreover, there aren't any bank-loan offers for entrepreneurs to start their business and borrow money from banks as their initial capital. Lynn says, "banks don't support entrepreneurs or digital entrepreneurs. And even if some do, they have really high interest rates. So, it's basically just advertising. Nothing more."

Despite the mentioned impedances, Lynn states that an online business is portable: "the advantage of having an online business is that it can be run from anywhere around the world; so, when I travel, I can take the Web site and online shop with me and simply change my target market and/or language."

5. Role of Financial Capital:

Lynn said that she saved up a bit to gather the necessary financial capital. Furthermore, she states that she didn't need a lot of money as investment for she found that with her digital business, the majority of her costs weren't monetary, rather,

they were the time and effort she devoted to grow her store. The founder says that it's much cheaper for one to open an online shop than a brick-and-mortar store, to save oneself from the additional costs it incurs, such as rent and electricity bills.

6. Social Issues:

The terms "young" and "female" are certainly not the standard and typical notions that come to Lebanese citizens' minds when they think of entrepreneurship. Lynn finds it puzzling that the Lebanese don't find being accomplished at a relatively young age usual or normal.

Moreover, gender discrimination is an issue that forms a barrier to women's success in digital entrepreneurship. Lebanon, though can be regarded as a modern country, is still part of the Middle East, where traditional male-dominating mindsets and societies are prevalent. People view women's work as an "attempt," rather than legitimate, added value to society, and this could be demotivating for female entrepreneurs. Lynn says, "in some aspect, I can still sense that because I'm a woman, since whatever I do, people will still think my job is less competent than that of men's. Nevertheless, I'm glad that my team and I are still achieving something." Furthermore, Lynn says, "obviously, I feel a sense of achievement, being a 24-year-old entrepreneur, but people often get shocked when I tell them about my career and academic path, considering my young age."

4 Discussion and Conclusion

We started this chapter by highlighting that we know little about the obstacles and opportunities encountered by digital entrepreneurs embedded in developing countries. Through our study, we unpack these obstacles and opportunities and we present a comprehensive framework highlighting them (see Table 1).

As shown in Table 1, digital entrepreneurs encounter a variety of challenges when operating in developing countries. These challenges include a deficit in funding, lack of policies and regulations that protect and support e-commerce and digital entrepreneurs, deficiency in digitally competent and experienced labor capital, lack of adequate online payment systems, and cultural differences among target audiences. Digital entrepreneurs in developing countries face the challenge of inaccessibility to the necessary funds, due to the scarcity of venture capital markets and "business angels." The state hasn't established laws that provide security for digital entrepreneurs. Syndicates organizing the work of digital entrepreneurs are absent and digital entrepreneurs are left to gather financial resources through crowdfunding, investors, or through family supported funds. The main obstacles for the success of digital entrepreneurship in developing countries are the lack of digital competence, the lack of adequate skills of the workforce, and the lack of information about appropriate laws and regulations. Therefore, recruiting the right human capital with the right skill-set, background and education (self-teaching or

Table 1 Challenges and opportunities for digital entrepreneurship in developing countries

Challenges	Opportunities	Suggestions for improvement
Inaccessibility to the necessary funds, due to the scarcity of venture capital markets and "business angels"	Family as a source of social, human, and financial capital	Encourage funding through both the public sphere and private channels
Lack of policies and regulations that protect and support e-commerce and digital entrepreneurs	Personal connections as a source of social and human capital	State reforms aimed at mandating more protective laws for digital entrepreneurs
Weak digital infrastructure	Rise in the number of technology users	Improving the digital infrastructure, such as providing 5G Internet infrastructure, and introducing and legalizing the "e-signature"
Deficiency in digitally competent and experienced labor capital	Education on digital entrepreneurship (technical skills, online marketing, etc.)	Filling the digital skills gap through educational programs in universities and schools
Lack of online payment systems	Selling niche products	Introducing online payment systems
Cultural differences among target audiences in developing countries	N-A	Producing relevant content and market offerings
Weak institutional structures and corruption	N-A	Taking measures that fight corruption and ensure equal opportunity and legitimate competition

university courses) is essential. Another challenge is the absence of online payment systems, which causes issues during delivery of products. Cultural differences among areas of consumer behavior and societal norms are obstacles to the growth and expansion of digital companies in various developing countries. Lebanon's weak digital infrastructure, slow Internet, and limited industry are all barriers to digital entrepreneurship. Another challenge is the absence of online payment systems, which causes issues during delivery of products for the success of an online business. Therefore, recruiting the right human capital with the right skill-set, background and education (self-teaching or university courses) is essential. Cultural differences among areas are obstacles to the growth and expansion of digital companies in various developing countries. Lebanon's weak digital infrastructure, slow Internet, and limited industry are all barriers to digital entrepreneurship. In addition, as seen in the first case study, high tax rates on importing goods create resistance among digital entrepreneurs to import and in turn to sell their products.

The opportunities of digital entrepreneurship in developing countries include family and personal connections as a source of social, human, and financial capital. Other prospects include an increase in the users of digital devices and excelling in

digital entrepreneurship in Lebanon through selling niche products via online stores, for they are high in demand. Furthermore, starting up a digital business in developing countries, where online businesses are scarce provides digital entrepreneurs with the first-mover advantage, as opposed to in developed countries, where there exists a lot of monopoly and high competition in the e-commerce industry (such as Amazon.com).

The two case studies and expert opinion indicate that digital entrepreneurship is a relatively novel concept in developing countries such as Lebanon and requires further development. Digital entrepreneurship requires a variety of competencies and skills, ranging from technical, financial, and managerial to risk-taking, and having an entrepreneurial and innovative culture. Therefore, we suggest that the state needs to mandate more protective laws to digital entrepreneurs and fill the digital skills gap, through education on digital entrepreneurship (technical skills, online marketing, etc.)

To overcome the digital infrastructure through, digital entrepreneurs could spot areas where the Internet is relatively faster and base their businesses around those areas, or pay an additional amount for instilling faster Internet, such as 5G Internet infrastructure. Another challenge is the lack of an adequate legal infrastructure that allows, for example, for an "e-signature," where entrepreneurs have to deal with a time-consuming process of printing, scanning, and faxing. In addition, digital entrepreneurs would benefit from getting funded through both public and private sectors to finance risky, early-stage ventures, and ensure persistence and continuity of funding to these technological projects (Fig. 1).

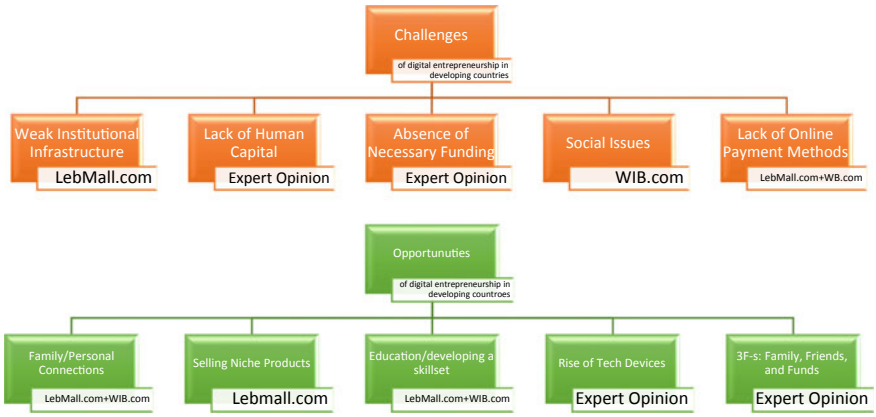

Fig. 1 Challenges and opportunities of digital entrepreneurship based on the case studies

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15

Sustainable Development Goals and Digital Entrepreneurship

How Entrepreneurs Can Impact Our Race Towards the Sustainable Development Goals

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Abstract

In 2020, the UN launched the "Decade of Action" to achieve the *Sustainable Development Goals* (SDGs) by the year 2030. As the SDGs are interdependent, intersectional and interdisciplinary, so must be their solutions. This chapter argues that the best way to identify, develop, and scale solutions of such quality is (digital) entrepreneurship, building on the principles of open innovation, cutting-edge technologies, and social business. The COVID-19 pandemic in early 2020 in particular serves as a stark reminder of the interconnected nature of the SDGs and the challenges we face in achieving them. In this article, we explore the third SDG (SDG-3), "Good health and well-being". We show the potential for digital entrepreneurship to foster the rise of new forms of digital health care and to accelerate the digitalization of the healthcare sector. Due to both perceived and real issues of regulatory compliance, user experience, and long investment/equipment use cycles, SDG-3 has been one of the slowest to adopt innovative solutions by far. We discuss specific areas, such as blended reality or quantum computing, for emerging and future digital health applications. In this chapter, we

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provide: the "memoreBox" of social start-up RetroBrain R&D, a special edition of gamelab.berlin's app "Singleton", and D-Wave's free access to its cloud quantum computing services. All these examples of digital entrepreneurship utilize in whole or in part a combination of *open innovation*, *future and emerging technologies*, and *social business*, thus supporting our rationale. The article closes with recommendations for different stakeholders of entrepreneurial ecosystems, demonstrating both the necessity and the potential of digital entrepreneurship for the SDGs and the "Decade of Action".

1 Introduction

> We have a choice—either we go back on the old tracks, or we build new tracks to take us to a new civilization. We are now in position to build new tracks. We missed our chance in 2008 in building those after the global financial crash. Let us not miss the chance this time.
> Muhammad Yunus[1]

The 17 Sustainable Development Goals (SDGs) initiated and adopted by all United Nations Member States in 2015 have been a driving force behind numerous initiatives and projects around the world. They constitute an *agenda for sustainable development* that "provides a shared blueprint for peace and prosperity for people and the planet, now and into the future" (United Nations Department of Public Information 2015, p. 1) while also serving as calls to action for a better future. At their core, SDGs are interdisciplinary, intersectional, and interdependent and address a variety of areas that are of critical importance for both humanity and the planet: environmental protection, ending hunger, and reducing inequality are closely linked to, e.g. sustainable consumption and management of natural resources, improving education and providing elementary health care and sanitation for all. Still, five years into the programme timeframe, many initiatives and projects still fail to address this fundamental interconnectedness. These risks fall short of not only their potential, but also interference and competition for already scarce resources. In consequence, the UN declared the 2020s to be the "Decade of Action" (Guterres 2020, p. 1) and has since then appealed to states, corporations, non-governmental organizations, and other stakeholders to more consistently and deliberately combine forces in order to deliver on the goals set out in 2015 (United Nations 2020).

The global COVID-19 pandemic that began to unfold in late 2019, severely shuttering the global economy starting from February 2020 and expected to cause the worst global recession in almost a century (BBC 2020), serves as an additional stark warning of just how necessary an alignment of forces is. At the time of this writing (end of May, 2020), despite rapid and extensive public health measures being taken in many countries, there are more than 5.4 million confirmed cases and

[1]Corona Pandemic: Time Is Running Out Fast, A Letter from Prof. Muhammad Yunus (2020).

over 345.000 deaths (WHO 2020). The outbreak of COVID-19 not only sent whole countries into lockdown, but also demonstrated how relatively ill-prepared the world is for a global health crisis, even one that has long been anticipated: Corona viruses, like influenza viruses, have been the cause of previous pandemics and have been actively studied as likely candidates for future pandemics. Despite drawing on lessons learned from recent pandemics caused by CoV, e.g. SARS, MERS, the global response has been mixed (Park et al. 2020; Malik et al. 2016; Hayward et al. 2014), partly because of inadequate databases, comparable to other global public health challenges like antibiotic-resistant infections (Shamsrizi et al. 2020). In many cases, the responses to the crisis from governments, healthcare professionals, and the public demonstrate a significant gap between the claimed commitment to the ideals of SDG-3, i.e. "Good health and well-being", and actual reality in the face of a crisis. This is of particular relevance as health (SDG-3) serves as a foundation for many of the other SDGs (Rosling et al. 2018). Considering the current situation, the slow adoption of digital health in general and digital therapeutics in particular—partly because of plausible reasons (including issues of trust, data protection and reimbursement)—over the past couple of years seems alarming. Still, *digital health* and especially *digital therapeutics* are expected to have a tremendous and positive impact on society if they are adopted by more and more patients, doctors, and other healthcare professionals (Deloitte 2019). One way to foster digitalization in the healthcare sector and to bring better care to more people is through digital entrepreneurship. Technological developments and advances in infrastructure create various opportunities for entrepreneurs (Kraus et al. 2018). However, research on digital entrepreneurship is still in its infancy (Kraus et al. 2018).

In this chapter, we apply a holistic perspective and see entrepreneurship as more than just starting up a new business. Following Hsieh and Wu (2018), we understand entrepreneurship as "the process of designing, launching, and running new business" with its distinct characteristic of "new value creation" (Hull et al. 2007). However, entrepreneurial activity arises from the interplay of stakeholders, institutions, and entrepreneurs themselves (Palmer et al. 2018). Referring to Kraus et al. (2018), providing a state-of-the-art literature review of "Digital Entrepreneurship", we understand digital entrepreneurship "as a "subcategory of entrepreneurship in which some or all of what would be physical in a traditional organization has been digitized" (Hull et al. 2007, p. 293) and is thus defined as "the sale of digital products or services across electronic networks" (Guthrie 2014, p. 115). To summarize, due to the numerous opportunities for entrepreneurial activity, created through digitalization (cf., Hull et al. 2007) and its ability to develop interdisciplinary and intersectoral solutions for complex problems (Breidenbach et al. 2020), digital entrepreneurship offers an impactful instrument for the advancement of sustainable innovations (Kraus et al. 2018), thus the SDGs in general.

2 Digital Entrepreneurship as a Game Changer for Sustainable Development Goals (SDGs)

Every new tech-generation makes our societies more inclusive, healthy, and democratic and leads to our institutions having greater transparency and accountability (Pinker 2018). Through digital transformation, which can generally be understood as the "disruptive implications of digital technologies" (Nambisan et al. 2019, p. 1), many new business and science areas have spawned—and numerous implications for culture and society will most likely be enormous (Hausberg et al. 2019). Murphy et al. argue that it is *entrepreneurship* which has been the main driver for the increase in (western) per capita income over the past 200–300 years (Murphy et al. 2006). Entrepreneurship can transform whole industries and scale solutions in a quicker and more agile way than other economic approaches. It is not only one of the "transversal key competences applicable by individuals and groups", (Bacigalupo et al. 2016, p. 10) as defined by the European Commission, but also a key driver for economic growth "at the heart of national advantage", as Porter (1990, p. 125) noted. Digital transformation has had an enormous impact on most aspects of daily life and has also changed the way organizations and whole industries operate (OECD 2019), facilitating new types of work and self-employment—and paving the way for digital entrepreneurship: "the enterprising human action in pursuit of the generation of value, through the creation or expansion of economic activity, by identifying and exploiting new ICT [Information and Communications Technology] or ICT-enabled products, processes and corresponding markets" (Bogdanowicz 2015, p. 4). The pervasive accessibility of Internet services has lowered the barriers to start a project, organize, and interact online; this fosters ever-new forms of digital entrepreneurship, especially by allowing even those who could not or would not have formed a company traditionally to find an audience and a market (Allen 2018). At the same time, the current state of accessibility and inclusiveness should not be overstated: it is still the privileged elite that utilizes and benefits from digital entrepreneurship opportunities the most (OECD/European Union 2019). When the United Nations Millennium Development Goals (MDGs) were formulated in the year 2000, digital technology had already become a major part of everyday life, but few foresaw the degree to which it would permeate our lives only fifteen years later. In consequence, where the MDGs were mostly formulated in a technology-agnostic manner, the SDGs embrace the central role digital interconnectedness and technology generally have to play in improving the state of the world (Noville-Ortiz et al. 2018).

New ventures can and, more importantly, have a strong incentive, to catalyze structural changes in sectors currently held by large incumbents, whose incentives usually lie with maintaining the status quo (Apostolopoulos and Liargovas 2018; Hockerts and Wüstenhagen 2010). While it is by no means a given that entrepreneurs will be intrinsically motivated towards founding ventures which particularly take into account the SDGs, recent data from countries such as Germany is encouraging. It shows a trend towards more new ventures directed at solving social

challenges, expanding renewable energy or improving health (Bundesverband Deutsche Startups 2018). Start-ups are able to challenge established companies by disrupting "existing conventional production methods, products, market structures and consumption patterns, and replace them with superior environmental and social products and services" (Schaltegger and Wagner 2011, p. 223). If this trend is to be harnessed and further encouraged, it is crucial to understand (a) what motivates these entrepreneurs, (b) whether their ventures actually end up providing a sustained and positive impact towards the transition to a "sustainable and resilient path" as laid out by the United Nations (General Assembly of the United Nations 2015; Apostolopoulos and Liargovas 2018), and (c), if not, what can be done to assist or direct them towards providing such benefit. At present, research into these questions remains scarce (Moon 2018). To conclude, we contend that digital entrepreneurship might have the biggest impact on the SDGs, if it is successful to utilize three concepts: *open innovation*, *future and emerging technologies,* and *social entrepreneurship.* To show how these concepts can help digital entrepreneurs achieve their goals, we will explain each of the three concepts and present examples as case studies of impactful implementations. While every single concept in itself can help elevate digital entrepreneurship in a meaningful way, we argue that a combination of all three may have the biggest impact on the challenges linked with the SDGs, which shall be elaborated using SDG-3.

2.1 Open Innovation as a Key Driver for Digital Entrepreneurship to Enhance SDGs

Open innovation provides a central element in speeding up the digitalization in the healthcare sector through the development and implementation of innovative technologies. As the United Nations Conference on Trade and Development stated (2017), we need "digitally enabled open and collaborative innovation: Fostering open, digital collaborations. Such innovation approaches draw on and recombine multiple sources and forms of knowledge, especially through digitally enabled open collaboration". However, as von Geibler et al. (2019, p. 20) argue, "this early innovation stage proves to be a challenge for corporate practitioners and innovators, largely due to the concept's intangible, qualitative nature and the lack of data".

Open Innovation evolved into an approach that many incumbent firms use regularly. They do not rely solely on knowledge generated within the company, but also facilitate knowledge outside their company to innovate (Bogers and West 2012). Chesbrough (2003) argues that the border between firms and their immediate intellectual environment is not impermeable and therefore enables companies to acquire new knowledge. Sources of valuable knowledge for innovation can be customers, suppliers, and universities (Dahlander and Gann 2010; Brunswicker and Vanhaverbeke 2015). Start-ups face different challenges than incumbent firms, but can just as well facilitate open innovation to succeed. They often lack intangible (e.g. technological expertise) and financial resources (Baum et al. 2000) and are seldom able to form strong strategic alliances (Freeman and Engel 2007). By opening up to

external partners (outside in), start-ups are able to compensate for their resource constraints which can positively affect overall firm survival (Eftekhari and Bogers 2015). As Pakura (2020) points out, open innovation acts "as a driver for new organizations", which is especially true at three levels of impact: *firm development*, *technology development*, and *technology commercialization*. The findings show that start-ups can use different types of relationships with a variety of network partners in order to drive the development and commercialization of innovations. Such relationships can range from loose and informal networking ties to close and formal partnerships, e.g. R&D collaborations with universities and incumbent firms. Although all types of relationships can forward innovation processes of start-ups, Pakura (2019) concludes that "synergetic partnerships, such as R&D collaborations with universities and incumbent firms, create opportunities at all three levels" and that innovation benefits the most from those partnerships. Recent findings suggest that increased links to and knowledge flows from various external partners, particularly in uncertain environments, lead to improved innovation outcomes (West and Bogers 2011). Especially towards the end of the twentieth century, the shift from closed innovation approaches to open innovation models was fuelled by the emergence of digitalization processes (Bogers and West 2012). While the world became more and more digitized, open innovation became a key driver for entrepreneurship and allowed for reducing research costs, spreading risks, and commercializing innovations faster and on a global scale. In recent years, open innovation has been successfully applied in many industry contexts, for example, health care and IT, as well as in academic entrepreneurship (Siegel and Wright 2015), government innovation (Gascó 2017), and social innovation businesses (Nambisan et al. 2019). Chesbrough (2020, p. 3) pointed out how "[o]pening up will speed up [the firms] internal innovation process, and allow you to take advantage of the knowledge of others in your business (outside in), even as you allow others to exploit your knowledge in their business (inside out)". Opening up has the power to create even more experiments, generate more knowledge, and explore more ways to apply that knowledge for challenges (Chesbrough 2020). It can help solving a variety of challenges, but those with a higher level of complexity profit the most from this interconnected approach. The more complex a challenge seems, the more a firm must engage in extensive knowledge sharing to get closer to a solution. Furthermore, opening saves time, which is critical in the healthcare sector, especially when facing a pandemic (Chesbrough 2020). In a global pandemic, where time is of the essence, openness and open innovation can even save lives (Chesbrough 2020). To conclude, digital entrepreneurs that engage with large-scale problems, and/or want to impact complex ecosystems (like the healthcare sector), must consider open innovation approaches.

2.2 Future and Emerging Technologies as Enablers of Digital Entrepreneurship Towards SDGs

While the future is arguably uncertain and many believe that we are living in an "Age of Paradox" (Handy 1995), there are several future and emerging technologies

that entrepreneurs can exploit today or where entrepreneurship can profitably contribute to the development or implementation of future technologies. Thinking ahead and implementing future technologies can give entrepreneurs a competitive edge or even enable them to create entirely new markets. So-called future and emerging technologies (FETs) are also part of the "Horizon 2020" programme by the European Union with the goal to "create a fertile ground for responsible and dynamic multidisciplinary collaborations on future technologies and for kick-starting new European research and innovation ecosystems" (Horizon 2020, 2018, p. 4). Future and emerging technologies are self-evidently complex and not widely known and implemented. Implementing them requires a strong strategic focus and the ability to innovate by means of tools that are currently not available in the mass market. Moreover, deeper factors are necessary to obtain economic and social value from technology. Generating technology alone is insufficient and must also be broadly disseminated, and then absorbed and put to work before its full value could be realized, as Chesbrough (2019) argues. To get a short overview of presumably impactful FETs, the World Economic Forum (2020) created an overview that we adopted (Table 1) and that shows not only how FETs like artificial intelligence and quantum technologies will potentially shape our future, but also how they will affect the different SDGs.

While we cannot go into detail regarding the different technologies and their respective effects on society, we will focus on two major technological concepts that we assume will have tremendous impact on achieving the SDGs and which we will take up and reflect in our case studies (see Chap. 4): *Quantum Computing* and *Blended Reality*.

Although it might sound puzzling, quantum technologies are already widespread: "computers, data networks and the majority of medical imaging techniques could not have been achieved without quantum effects. This is because components such as transistors, diodes and lasers all make use of principles of quantum physics" (Federal Ministry of Education and Research 2018, p. 6). These are examples of first-generation quantum technologies that started as scientific endeavours which were then implemented in a myriad of ICTs and everyday devices that we use today. Almost a century after the field of quantum physics was created in Central Europe, an increased understanding of those quantum technologies is now creating new opportunities. As Krutzik and Shamsrizi (2020) outline, the "second quantum revolution" will massively impact the twenty-first century, and is widely seen as "[that which] comes *after* the digital transformation". The manifold areas in which this impact can be seen include "measuring devices with much higher precision, vastly enhanced data communication security, and […] higher-performance satellites and computers" (Federal Ministry of Education and Research 2018, p. 6). Quantum technologies and their specific applications are based on quantum principles that, in turn, exploit the unique physical principles of the quantum world.

The second example of a potentially impactful FET is the concept of so-called blended reality: Many Health and Exergames use virtual or augmented reality to promote active living and exercise despite the still widely held preconception of gaming being an "unhealthy" (or at least not health-positive) activity. The popular

Table 1 Examples of future technologies

Technology	Impact on the following SDGs	Technology	Impact on the following SDGs
Quantum computing determined optimal carbon capture material	SDG-7, SDG-13	Ultra-high speed, zero-emissions long haul transport, including underground, surface, aviation, shipping and drones	SDG-7, SDG-9, SDG-11, SDG-13
4IR-enabled deployable nuclear fusion using AI to predict disruptions that halt feasibility	SDG-7, SDG-13	Zero-waste advanced materials for clean energy and advanced waste heat capture and conversion	SDG-7, SDG-9, SDG-11, SDG-12, SDG-13
Advanced materials for generation of low-cost and zero-emissions gaseous fuels, incl. ammonia and hydrogen	SDG-7, SDG-13, SDG-14	Quantum-enabled extreme efficiency data centres and supercomputers	SDG-7, SDG-9, SDG-12, SDG-13
Genetic rescue and genome modification for endangered and extinct species and resilience	SDG-14, SDG-15	4IR-enabled internet connectivity for all (drones, satellites)	SDG-1, SDG-4, SDG-5, SDG-8, SDG-9, SDG-10, SDG-11
Attracting and removing micropollutants (synthetic biology)	SDG-6, SDG-11, SDG-13, SDG-14, SDG-15	Quantum cryptography for the prevention of cyberattacks on AI/quantum computers	SDG-9, SDG-16
Low-zero emissions and ultralow-cost desalination technology using advanced materials	SDG-3, SDG-6, SDG-13	AI-enabled privacy-protected, public good digital health platform collating healthcare data, sensors, wearables and genomic data	SDG-3, SDG-16
End-to-end automated, connected and optimized food and fibre system, incl. elimination of spoilage, loss and waste	SDG-2, SDG-12, SDG-13, SDG-15	AI-enabled development of new antibiotics to address microbial resistance to current antibiotics	SDG-3, SDG-10
Low-cost, low-GHG emissions synthetic proteins (AI and synthetic biology)	SDG-11, SDG-12, SDG-13, SDG-15	4IR-enabled "access to care" digital technologies, distribution and delivery systems	SDG-3, SDG-10
Advanced materials for durability of energy-intensive products and materials	SDG-2, SDG-9, SDG-12, SDG-13	Decoding well-being and longevity using AI and sensors for personalized health maps and sequenced genomes and phenotypic data	SDG-3, SDG-10

(continued)

Table 1 (continued)

Technology	Impact on the following SDGs	Technology	Impact on the following SDGs
Zero-emissions chemicals, steel, aluminium, cement using advanced materials and/or biotech (e.g. biocement)	SDG-11, SDG-12, SDG-13	Gene editing (e.g. CRISPR) to tackle human diseases driven by gene mutation	SDG-3

Source Adopted from: World Economic Forum (2020)

VR rhythm-game *Beat Saber,* for example, is "widely considered a good option for exercise in VR" and uses the technology to reach people at home and motivate them to move and stay healthy (Fingas 2020). In a study on the potential health impact of Pokémon Go, Duke University's School of Medicine was able to show that "increases in physical activity were highest among individuals who stood most to benefit from additional activity, such as individuals who are overweight or obese, or who get little regular exercise to begin with" (Will Will 2017). Another illustrative example is provided by blended reality exercise equipment or applications, such as those provided by Peloton (onepeloton.com). Their smart exercise equipment enables its users to sign up for training regimes overseen by remote trainers, to exercise and receive instruction "together" via integrated video conferencing. Other offerings such as *Supernatural* even allow for exercise in full virtual reality (Oculus 2020). Many of these technologies are actively used today, but big technological leaps will make true "Blended Realities" a part of our everyday life. Steincke defines blended reality as the seamless transition between the fully physical and fully virtual, described as a continuum between these two poles. Steinicke (2016) anticipates that in about 30 years, virtual and "real" reality will not only be blended, but even merged, and humans will not be able to perceive any difference The consequences of such a situation have been described as potentially even turning "real" reality into a "homeopathicum" (Sedláček and Shamsrizi 2017) (Fig. 1).

2.3 Social Business as an Essential Element Towards SDGs

As we are entering the second decade of the new millennium, one can observe rather unexpected changes even among thought-leaders of both theory and practice in economy and business: Michael Porter wants his students to create *Shared Value* (Porter and Kramer 2011), BlackRock is "making sustainability integral to portfolio construction and risk management" (Fink 2020) and lets its portfolio companies know that "purpose is the engine of long-term profitability", and the founder of the World Economic Forum, Klaus Schwab, opened this year's WEF Annual Meeting by pointing out that while "'stakeholder capitalism' has been around for a half-century, it has only recently begun to gain traction against the prevailing

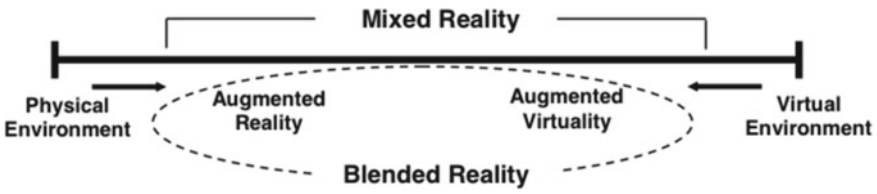

Fig. 1 Blended reality in relation to the physical-virtual environment continuum. *Source* adapted from Milgram and Kishino (1994), in Bower et al. (2010)

shareholder-primacy model of profit maximization" (Schwab 2019). Consistently, the "Ethics in Action"-initiative of the UN Sustainable Development Solutions Network pointed out that "the challenges of sustainable development are primarily ethical in nature"; thus, "the Sustainable Development Goals require 'moral capacity' as much as financial or technical capacity" (Annett et al. 2017). At the core of this SDG-driven transformation is the idea of a "new capitalism", in which both traditional for-profit (blue, cf., Fig. 2) and not-for-profit (red, cf. Fig. 2) organizations are complemented by social entrepreneurial actors in all of their varieties (green, cf. Fig. 2), including the supporting impact investing ecosystem surrounding them:

While "debates about the definition of social business versus social entrepreneurship keep coming up at conferences", the scientific community is "getting closer to clearer definitions" (Grove, as cited in YY Foundation 2019, p. 22). Independently of the definition, it seems that social entrepreneurs may play a

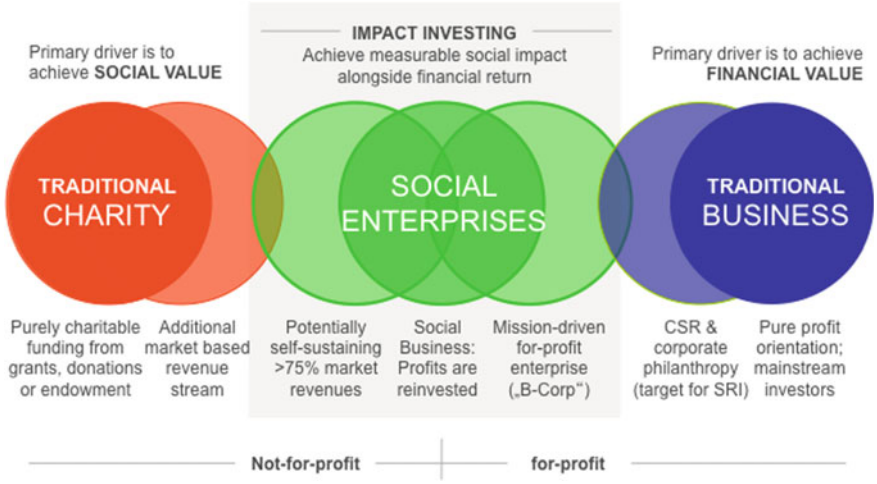

Fig. 2 Continuum of varieties of organisations in the "new capitalism". *Source* Ryder and Vogeley (2018)

major role in creating more inclusive societies (European Commission 2015) and solving the most pressing issues of our time. In particular, social businesses "work in many different areas where they often have a direct impact, such as health, education and infrastructure", as Gass sums up (Gass, as cited in YY Foundation 2019, p. 30). Regarding the definition of social business, the OECD (2014, p. 188), for example, follows a twofold definition of Muhammad Yunus: Type 1) a "'non-loss, non-dividend company' that creates social benefits through the nature of its products, services and/or operating systems", and Type 2) a "profit-maximizing company owned by its poor or otherwise disadvantaged target beneficiaries, or by a dedicated trust". As such, the concept of social businesses is notably distinct from any form of charity. In this sense, combining digital entrepreneurship and social business, we assume that stakeholders are enabled to create scalable solutions—especially in the light of the "Decade of Action". Furthermore, it has also been argued that large corporations/multinational enterprises (MNEs) "[need] a change of course to achieve the UN's Sustainable Development Goals by 2030" (Bruysten et al. 2020). This transformation is strongly driven by "a breed of entrepreneurs who work as employees within companies to develop business solutions for social or environmental problems:" social intrapreneurs. The OECD anticipates that "social businesses can create new sources of income, raise productivity, reduce 'aid' dependency and provide low-income consumers with access to products and services for their basic needs" (OECD 2014, p. 187). With the pressing issues in front of us and the COVID-19 pandemic as a huge "call to immediate action", solutions that tackle a SDG like "Good health and well-being" should and can facilitate both of these worlds, as "Social businesses will have a direct impact on whichever SDGs they engage in" (Gass, as cited in YY Foundation 2019, p. 30).

3 A Conceptual Framework and Canvas of Digital Entrepreneurship for a "Decade of Action"

We see digital entrepreneurship as a necessary component in achieving many, if not all, of the SDGs. A variety of conceptual models, policy frameworks and measurement instruments have been developed to study the driving and impending factors influencing digital entrepreneurship as well as the factors influencing organizational decision-making which furthers sustainable and more generally SDG-oriented business practices. Many of these frameworks, however, adopt a macro-perspective with a focus on the incentives and obstacles faced by multinational enterprises, or organizations that are designed to quickly scale to a global level (George and Bock 2011; George et al. 2016). Yet the vast majority of all enterprises in both highly industrialized and less developed countries are actually small- and medium-sized enterprises (SMEs) (Ayyagari et al. 2017; European Union 2018; Small Business Profile 2018). While the disproportionate impact of MNEs on the overall sustainability should not be understated, SDG-oriented Digital Entrepreneurship, presenting the right overall conditions, potentially may rapidly

develop and adapt to niche opportunities. This is due to the domain expertise of its founders and significantly lower regulatory, organizational, and structural constraints with the SDGs being nevertheless supported through socially/environmentally responsible practices. At the same time, it seems unlikely that any single framework could adequately quantify and qualify the wide variety of factors that influence the entrepreneurial activities of SMEs. Following the argument put forward by Kuratko et al. (2015), we agree that only a synthesis of multiple frameworks has any potential to adequately represent Digital Entrepreneurship, especially social digital entrepreneurship. All economic systems are complex networks that are interconnected and interdependent (Bair and Palpacuer 2015; Rasche et al. 2013), and the formation of networks among entrepreneurs, the start-ups they create, and the SMEs they become have been found to be crucial to success (Austin et al. 2006; Dacin et al. 2011). Based on these underlying considerations, we explored the possibilities to help potential digital entrepreneurs to successfully support the SDGs thus positively impacting the "Decade of Action" through the structured application of open innovation, social digital business approaches, and future and emerging technologies. To use these concepts effectively, we developed a special variant of Osterwalder's Business Model Canvas (BMC) (Osterwalder and Pigneur 2010). Our "*Digital Entrepreneurship for the Decade of Action*"—Canvas (short: "Decade of Action"-Canvas) adds multiple layers to the well-known version by Osterwalder to let digital entrepreneurs better engage with the SDGs.

The canvas implements three major new aspects, which we derive from our theoretical triad of open innovation, future and emerging technologies and social (digital) business. These new aspects will directly help future digital entrepreneurs to evaluate how their solutions benefit the SDGs. First, in this canvas, not only the "usual" value propositions are to be explored, but, referring to the definition of social business, also the proposed value to the SDGs. This means that the potential project and its value proposition needs to relate to the SDGs and to explain how it supports achieving them. Second, we refer to the concept of open innovation and the importance of multiple and different types of relationships with a variety of network partners in order to drive the development and commercialization of innovations. We delimited key environmental actors and influencers from key partners. By answering the question "Who is mostly impacting your field of impact/SDGs in the next ten years?" potential entrepreneurs learn that it is often the network to regulatory authorities or other societal or economic multipliers that can bring a competitive advantage. Working on your network and keeping key actors that affect your field of impact can pay off early on. Third, Beneficiaries are of utmost importance to consider: in contrast to customer segments, thinking about beneficiaries enables digital entrepreneurs to embrace the "triple bottom line", where environmental, social, and governmental actors benefit. This sensitization is supported by referencing concepts like Ashoka's Theory of Change, or the social business approach (Drayton 2003). Fourth, referring to future and emerging technologies, "Key Activities" and "Key Resources" force the digital entrepreneurs to

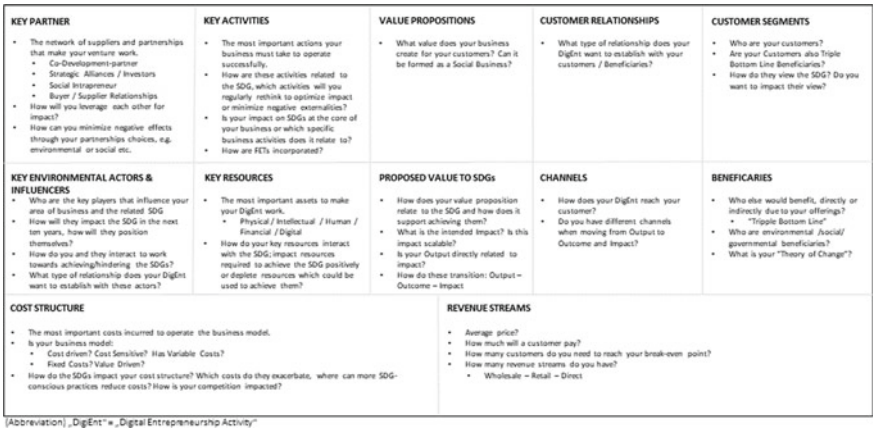

Fig. 3 "Decade of action"—Canvas. *Source* Own table (adapted from Osterwalder and Pigneur 2010)

re-evaluate their solutions with regards to other, more emerging technologies, which might have the potential to improve the impact and/or efficacy of their approach.

To summarize, we developed the "Decade of Action"-Canvas with these four specific adjustments, whereas the other fields of Osterwalder's BMC remain mostly unchanged (Fig. 3).

The most current version can always be found at http://www.doacanvas.org/.

4 Case Studies

4.1 RetroBrain R&D GmbH: MemoreBox

Germany's Federal Ministry of Health's Health Innovation Hub responded, among others, to the COVID-19 pandemic by compiling a list of recommendable "Digital Tools", which either mitigate COVID-19 directly or help address its wider societal impact (Health Innovation Hub 2020). One of the companies mentioned on this list is **digital-therapeutics** company RetroBrain R&D, a spin-off of Humboldt-Universität's Cluster of Excellence. RetroBrain R&D develops a fully gesture-controlled video game console named "memoreBox", which has been called "a benchmark in the therapeutic gamification industry" (LIFT Basel 2015). The overall goal of RetroBrain's solution is to extend the quality of life of the elderly by developing state-of-the-art, evidence-based therapeutic video games. The video game system—classified as a class 1 medical device—supports the prevention of typical age-related diseases and accompanies the therapy of diseases such as dementia or Parkinson's disease.

In a pilot project under the patronage of among others Germany's Minister of State for Digitalization, which studied the health-promoting effects regular gaming has on the social, physical, and cognitive resources of senior citizens, the findings were clear: Compared to non-gamers, gamers showed significant improvements in cognitive performance, gait stability, motor skills, stamina, and coordination. There are also moderate improvements as it pertains to the health-related quality of life, the extent of which is practically significant. There were also positive trends in the subjective experience of pain, which was reduced by regular gaming. As a result of this study, "BARMER [one of Germany's largest health insurance funds] is convinced of RetroBrain's memoreBox", as Dr. med. Mani Rafii, member of the board, comments: "The concept combines movement with enjoyment and games and makes it possible for elderly people to remain mentally and physically fit and to actively participate in society. Since we had positive experiences with the concept within the framework of a pilot phase, we are now rolling it out nationwide, so we can give even more elderly people the opportunity to take part in the preventive and health-promoting capabilities of this video game platform" (Rafii, M., as cited by Jakob-Pannier 2019, p. 1). In 2019, Germany's National Association of Statutory Health Insurance Funds commissioned the Institute for Innovation and Technology of VDI/VDE-IT to conduct a study on the potential impact of digital tools in care and nursing. According to this study, the memoreBox "proves, how people in need of care profit from the use of a digital tool in different fields including their cognitive abilities, social interaction and conclusion, as well as gait quality", and furthermore even the nursing staff benefits" (GKV-Spitzenverband 2019, p. 151). What opened memoreBox the door to the Healthcare Market was the German Act to Strengthen Health Promotion and Preventive Health Care, which has been in effect since the summer of 2015. The need for this law shows how diametrically opposed the two poles of "having fun" and "getting/being healthy" were at that time. The legislator created this law to motivate the health insurance industry to invest more money in prevention. Given that it generally takes fewer resources and is more promising to keep people healthy—instead of trying to heal them after they have taken ill, which takes much more effort and has far lower chances of success,—the legislator created the Prevention Act obligating health insurance companies to allocate sufficient funds to promote meaningful prevention. Like many social business start-ups making use of digital technology, RetroBrain R&D operates in an ecosystem of cross-sectoral quality; besides the "PEP Program" of Ashoka, one may particularly mention the "Impact Factory".[2] Thus, RetroBrain R&D can be studied as an exemplary case for aspects like "key partner", "key environmental actors and influencers", and "beneficiaries" of our "Decade of Action"—Canvas.

[2]A joint initiative of a diverse group of founding partners including German family equity company Franz Haniel & Cie. GmbH, Beisheim Foundation, KfW foundation (of the KfW, the German government-owned development bank), and Anthropia gGmbH, a social business itself.