

CAN SMALL BUSINESS SURVIVE INDUSTRY 4.0 AND 5.0?

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ABSTRACT

This study explored a phenomenon that might have vast impact in our societies on a global scale; whether small and medium enterprises (SMEs) will be able to survive the technological boom that industries 4.0 and 5.0 are bringing with them. The importance of this research is huge as possible negative implications for SMEs in the years to come will devastate our societies, especially since SMEs can be considered their backbone. Research method: This study used the structured library/ literary analysis under a qualitative prism. I gathered a few dozens of relevant papers which the author analyzed in order to be able to find some answers to his research question. The study used many papers and books from different university libraries and a few trustworthy internet-based sources. The research question: The research question is: "Can small and medium enterprises survive the advent of industry 4.0 and 5.0?" Findings: The research found that SMEs can survive industries 4.0 and 5.0 only if they will be able to take certain steps which include training of employees and owners and change in their mentality, solving their financial problems, leveraging local conditions, increase their innovation and start collaborations e.g. Keiretsus or business ecosystems etc.

INTRODUCTION

Small business is the back bone of our societies. According to the European Union (EU) recommendation 2003/361, the main factors that are used in order to determine whether an enterprise is a small and medium one, are staff headcount and either turnover or balance sheet total, Table 1.

Company Category	Staff headcount	Turnover	Balance sheet Total
Medium Sized	< 250	≤ £ 50 m	≤ £ 43 m
Small	< 50	≤ £ 10 m	≤ £ 10 m
Micro	< 10	≤ £ 2 m	≤ £ 2 m

According to the Globalnaps.org (n.d.), there are approximately 400 million SMEs (Small and Medium Enterprises), around the world, which since they are the main job creation source globally and they accounting over 95% of all business and 60-70% of employment, they deserve to be characterized as the back bone of economies. It is also amazing that they represent approximately 99% of all business in the European Union (EU), while they create around 85% of all new jobs, while the provide two thirds of the total private sector employment in the same economic zone (Globalnaps.org, n.d.) Table 2.

Table 2 SOME INTERESTING FACTS ABOUT SMEs
We have approximately 400 million SMEs around the world
SMEs accounting 95% of all business on the planet
SMEs accounting of 60-70% of employment on the planet
SMEs represent 99% of all business in the European Union (EU)
SMEs create around 85% of all new jobs in the EU
SMEs provide about 66% of the total private sector employment in the EU

From the above it is obvious that SMEs play a very important role in both societal and economic level and it is extremely important for everybody, to sustain their operations as he opposite will have unpredictable consequences that can change dramatically the societal and economic equilibrium in a negative way.

Having that in mind, we can understand why it is very important for our societies to continue standing upon the strong pillar which is called SMEs and why we need to take some action in order to assist these companies to survive and thrive.

The advent of industry 5.0 will bring many changes in workplaces and n jobs in general. This will change dramatically how business operates, while many jobs will be lost and many others will arise. During these very challenging years, SMEs need to be ready to fight for their own survival.

Problem and Aim of the Research

This research addresses he problem of the danger that appears due to the advent of industry 5.0 and because SMEs, in their big majority cannot afford to support the technological advancements that industry 5.0 will bring, something which might bring them to the verge of extinction with many negative outcomes for the global economy and the societal structure of all societies around the globe.

Research Question

This library and literature research has as its main goal to shed some light on what is going to be the future of SMEs in the years to come due to the advent of industry 5.0. The research question that we will try to meet is the following:

“Can small and medium enterprises survive the advent of industry 4.0 and 5.0?”

Significance of the Research

The significance of the research is huge as the answer to the research question will show us a tendency that exists among professionals and academics in terms of what the future of SMEs will be in the years to come. This is extremely important as if SMEs won't be able to survive this might change the world as we know it in both societal and economic level. Of course, this research cannot predict the future as it is based on existing literature and opinions, but it can act as a strong initiative for everybody who is sensitive enough to explore ways that will help SMEs to adapt to the presented technological and not only changes that will arise in the next decades.

METHOD

The method that was followed during this research is a combination of structured library and literature research. Many online university libraries were used, while the author gathered information from trustworthy and reliable online sources. In that way it will be possible to depict a clear and concise picture of some of the most prevalent ideas, predictions and trends on the research topic that will help him in answering the research question.

The information that was gathered was categorized, organized and combined in a way that the research question was met. In terms of the quality of the information that was gathered, the author collected data from sources which were checked for their reliability and authority. This is why; its majority comes from academics and well-known professionals from all over the world.

RESEARCH FINDINGS

In this chapter we are going to stress our research findings, but first we are going to present some of the more important SMEs' characteristics in order to assist towards the apprehension of the research findings.

SMES' Main Characteristics

SMEs are all around us. They are indispensable part of our everyday lives. In this chapter we will stress the bibliography which deals with SMEs' capability to adopt the new technologies via the use of three categories; innovation, A.I. and technologies in general. Before stressing this information, which will help us to determine whether SMEs are able under specific circumstances to adopt new technologies and survive the industry 4.0 and industry 5.0, we will stress SMEs' main characteristics, which are very important in order to help us understand further how the above mentioned three categories can define SMEs' ability to thrive throughout industries 4.0 and 5.0. So, SMEs' main characteristics can be summarized as follows:

Limited resources: SMEs of all kinds have this very characteristic. It comes into play especially when we discuss about new companies or start-ups. Financing SMEs was always a very difficult to handle task. No matter in which country they operate, SMEs can only be characterized as financially frustrated as they are having difficulties in finding formal funding, especially if we compare them to bigger companies. Especially nowadays, during the Covid-19 pandemic and due to the lock-downs that were imposed by governments all over the world, their access to funding is extremely difficult. Due to such difficulties, the majority of them are basically based on their internal financial resources.

Due to their importance as the backbone of the markets worldwide, financing SMEs was always a crucial topic for both academic and policy makers all over the world. In general SMEs worldwide can be described as financially frustrated as they are facing important difficulties in accessing formal finance in comparison with large companies. The majority of them are mainly based on their internal finance (i.e. owner's capitals and/or loans and retained earnings).

Organizational structure: SMEs, which usually can be said that are family owned companies, have a more centralized management with the owner usually in the epicentre, they offer less work assigned, their decision making is centralized as well, while task allocation is usually limited and unclear (Abu et al., 2015).

Procedures: All operations and activities involved are controlled via the use of informal

procedures. Decision making many times follows gut feeling and experience (Abu et al., 2015).

Corporate culture: Corporate thinking of business usually not exists. Management usually encourages individuals' creativity instead of team's creativity, while there is high commitment to the mission and vision of the company in question. Appreciation usually comes in the form of rewards, usually monetary, while when something goes wrong, employees won't take the blame (Abu et al., 2015).

From these characteristics, the most important which defines their growth and sustainability is the "*limited resources*" one.

SMEs and Sustainability via Innovation

According to Hsu et al. (2017), SMEs, unlike large companies facing many difficulties in terms of achieving their sustainability, because a lack in their resources can be said that it is a very common problem for them.

A very important characteristic that SMEs need to have in order to sustain their development is ambidexterity. (O'Reilly & Tushman, 2013). SMEs in order to be able to cultivate such characteristic need to have the resources needed. Otherwise, it will be very difficult, or almost impossible for them to achieve goals towards their sustainable development.

According to a research that was conducted by Woschke et al. (2017), SMEs that they experience constrains in their resources, especially when these constrains refer to financial ones, should rather concentrate their innovation activities on incremental innovations rather than on radical ones.

Via the use of incremental innovation SMEs will be able to achieve their competitive advantage while having a low cost. Since scarce resources are the problem, this kind of innovation won't create any kind of deficiencies and won't destabilize the company due to a sudden lack on its resources.

According to the same research (Woschke et al., 2017), SMEs that are facing resources' limitations have two main options towards their efforts to implement incremental innovation actions; to acquiring new resources, or to re-combining their available ones. Especially the last option is extremely important towards their incremental innovation.

But in order SMEs to be able to be successful with their innovation efforts, they need to be based on two pillars; their management and their R&D (Research and Development) (Lukovszki et al., 2020). In addition, Lukovszki et al., argue that another paragon that plays an important role, although not that important as the two pillars that we have just mentioned, towards that direction is the company's marketing.

Since, global markets become very complicated and since SMEs have an almost embedded scarcity of resources, it is important for them to innovate. According to Nordman and Tolstoy (2016), SMEs need to increase their collaborations, in terms of their innovation efforts, on a global scale. They need to create "*innovative partnerships*" with foreign market partners in order to be able to convert opportunities which might arise both in home and in international market networks into innovative outcomes that will help them grow and sustain their development. As opportunities become increasingly contextually remote, collaborative business relationship become more and more important for SMEs (Nordman & Tolstoy, 2016).

SMEs and A.I

An important, for our research, question is whether SMEs can use new technologies and

especially A.I. (Artificial Intelligence) in the years to come, especially since there is an issue in terms of whether they can afford it. Also, we need to take under consideration that SMEs in order to use A.I. and new technologies, not only need to afford them but also to have the necessary for their adoption, skills. According to a prospex.ai (n.d.) article, the answer to that question is that neither cost nor expertise can be seen as an obstacle for SMEs in terms of their A.I. adoption and integration into their business reality.

What it is important here is that SMEs need to see A.I. as a challenge and an opportunity in the same time via which they can level the competition between them and big companies as it was the case with e.g. big data and cloud computing the last two decades (prospex.ai., n.d.). The author of the article additionally argues that the cloud computing advances the last years and their as-a-service model, has lowered the SMEs' who want to adopt A.I. and machine learning technologies entry point. This is why the most ambitious and agile SMEs, will have the opportunity to adopt and integrate A.I. within their business in a way that they can acquire their so worthy competitive advantage in a world with fierce antagonism (prospex.ai., n.d.).

According to a 2021 OECD (Organization for Economic Co-operation and Development) report, SMEs face several barriers in terms of the adoption of A.I. technologies in their business. These barriers can be a lack in data culture; a lack in terms of what A.I. could bring the years to come; an urgent need for managers' retraining in the new technologies; high cost for the internalizing of A.I.; a need for engagement of more funding for the adoption of A.I.; few evidence and low visibility on their R.O.I (Return on Investment); reputational and legal risks that might arise from such adoption (OECD, 2021).

According to the same report, SMEs in order to tackle all the above -mentioned issues can source external A.I. expertise and solutions in a way to deal with the lack of their internal capacity to deal with them (OECD, 2021).

SMEs can leverage the use of technologies like Cloud Computing, Software as a Service (SaaS) and Machine Learning as a Service (MLaaS) which can offer them several advantages like scalability of A.I. solutions and costs, no needed technical knowledge as a prerequisite and digital security embedded directly into the software (OECD, 2021).

According to the same source (OECD, 2021), SMEs' managers are a critical component of the whole "*equation*" which describes how SMEs can adopt to new technology and A.I. National and local governments are important to co -ordinate and implement actions that will help towards the direction of training SME managers and workers in a way that they can contribute via their experience and business knowledge in the redesigning of the SMEs' work processes via the use of A.I. models.

Another research that was conducted between 438 SMEs with a domestic and international character (Denicolai et al, 2021) found that SMEs' international performance towards growth is heavily influenced by how ready these companies are in terms of adopting in their operations cycle the use of A.I. In addition, the research highlights that digitalization and sustainability are also key elements which are positively related with SMEs' international growth (Denicolai et al., 2021).

The way SMEs behave, has vastly to do with their local conditions, so when it comes to countries which cannot be considered as "*A.I. hubs*" for example, their way of viewing the adoption of this kind of new technologies is quite different. This is why, according to a recent research which was conducted in Germany among 283 SMEs, the results indicated that SMEs tend to use more traditional technologies like rule -based systems, while they perceive as a huge barrier in A.I. adoption their employees' lack of qualifications (Ulrich & Frank, 2021). This kind

of perception it can create severe problems for the local economy which is heavily driven by SMEs and this is why they can be considered as a critical success factor for the country's economy (Ulrich & Frank, 2021).

SMEs and New Technology

According to a very interesting research with a big sample of about 3,500 Greek SMEs, the paragon that are capable of increasing the likelihood of adopting new technologies in SMEs are the following:

R&D activities, collaborations, well-educated and skilled workers, decentralized decision making, visionary leadership (Giotopoulos et al., 2017) Table 3.

Table 3
PARAGONS THAT CAN INCREASE THE LIKELIHOOD OF NEW TECHNOLOGIES ADOPTION IN SMEs
R & D activities
Collaborations
Well -educated & skilled workers
Decentralized decision making
Visionary leadership

Since, as we already discussed, the way SMEs are dealing with the new technologies has vastly to do with the local conditions and special needs, we stress here the results of a research that was conducted in Nigeria between 67 SMEs located in Aba, Ibadan, Lagos and Nnewi (Lal, 2007). According to that research, in of the main paragons that inhibit the ICT diffusion and intensive utilization by SMEs is the poor physical infrastructure, represented by adequate and uninterrupted electricity supply and communication connectivity infrastructure (Lal, 2007). Also, the same research analysis indicates that factors like financial capacity and the ability to absorb technology are strong influencers in terms of having vast impact in the adoption of ICTs (Lal, 2007). The author of the above research suggests as a measure that can assist ICT adoption by the local SMEs, the institutional support in terms of human resources development for their competitiveness increase in both the domestic and the international markets (Lal, 2007).

Sultan (2011), argues that SMEs are able to adopt to the new technology, while he is underlying the importance of cloud computing for such companies, as he denotes that such technology is likely to be proved commercially viable for many of the SMEs, due to its flexibility and pay-as-you-go cost structure, especially in the current climate of economic difficulties inside which SMEs need to operate (Sultan, 2011).

The new digital technologies that SMEs are trying to adopt throughout industry 4.0, can create many opportunities for them as long as they will be able to stay in alignment with their business model, as their business model is the way via which SMEs create value (Soondka & Smuts, 2021). So, their success which will bring economic sustainability is very close related to the way that they will be able to create value via their business model with the use of the digital technologies that industry 4.0 brings (Soondka & Smuts, 2021). The question of course is how these technologies will be able to be embedded inside their business model.

Although the advent of industry 4.0. has created many new jobs the last years, something which made people employed in work positions that did not exist ten years ago, the new technologies that are used by all companies and of course by SMEs will tend to increasingly

displace physical labor and put ever -increasing demand on intellectual job positions (Grenčíková et al., 2020). This fact can be food for thought for SMEs' owners who need to understand that training of their human resources to these new technologies is something that they need to consider.

Under the same prism, comes a research from Llinas and Abad (2019), which deals with the role of high -performance people management practices in the development of the industry 4.0 technologies in SMEs. The researchers argue that the consolidation of such practices should be the number one priority of the SMEs which want to adopt the industry 4.0 technologies and thrive (Llinas & Abad, 2019).

Since, industry 4.0 at its core is about productivity improvements through business process and business model innovation and since people management practices are strongly related to both of them, it is imperative that such practices should be in the epicenter of SMEs business models in order to embrace the technological revelation of industry 4.0 (Llinas & Abad, 2019).

Another important element found by a research, conducted in India, is that SMEs in the era of industry 4.0 and circular economy are found to be under major pressure in terms of achieving their sustainable development under an ethical prism (Kumar et al., 2020). Observations have identified that the application of industry 4.0 technologies can help SMEs towards the direction of achieving this important goal (Kumar et al., 2020). So, what the authors of this research observed is that there is a lack of motivation from SMEs' partners and customers on the application of industry 4.0 technologies, since there is a strong fear of failing of their implementation (Kumar et al., 2020).

DISCUSSION

SMEs are facing many challenges. Especially the last years with the advent of industry 4.0 and the near to come industry 5.0, they will probably need to re- invent themselves in terms of the adoption of the new technologies. This challenge is a very difficult and a very complicated one and can be analyzed in three parameters; the connection between SMEs and innovation, the connection between SMEs and technology in general and the connection between SMEs and A.I.

Innovation

In terms of innovation, we need to say that SMEs need to become innovative, as innovation can assist them in terms of the adoption of the new technologies. What it is important here is that SMEs are facing a lack of resources and this lack will definitely have a negative impact in their innovation efforts. This of course can be handled efficiently enough if they will be able to increase their ambidexterity.

Another way to deal with this lack of resources while in parallel to be able to increase their innovation status is to gradually improve their innovation efforts by adopting an incremental innovation approach.

Of course, management is a very important part of the equation, as we all know that decision making is also crucial and need to be based upon a very capable and knowledgeable management team.

R & D is another important paragon which can drive innovation and change the status-quo of the SME in question.

Another parameter that can help in that direction is the right use of marketing, which will open new roads and will improve the SME's brand name, something that it is crucial as it can

lead to sales and sales can lead to increased profits, especially since SMEs need to be able to support their innovation steps with the needed resources.

Finally, collaborations like joint ventures, can lead to the conclusion of serious innovation projects that can boost SME's productivity and resources and help it to acquire the needed technology in order to be able to level as much as possible the competition with bigger companies that already have adopted the new technologies.

Ere, it is important to stress that collaborations towards innovation can take a more concrete form than with the joint ventures which usually refer to specific time frames and specific projects. This kind of collaborations can take the form of the Japanese Keiretsus or of a business ecosystem which can focus on innovation but also they can assist SMEs in increase their sustainability and fundraising, while they can be valid for a long time.

Via this kind of collaborations SMEs can tackle potential financial issues and can enjoy stability during turbulent times. They can also benefited by adopting new technology from the stronger members of the Keiretsu or the ecosystem under a knowledge and/ or technology exchange agreement. This kind of collaborations might be the solution to many SMEs problems that cannot be addressed in another way and they can also open new roads towards helping SMEs to change their technological level.

We can see from the above that SMEs' adoption of innovation is something viable as long as specific characteristics like managers' mentality, collaborations, R & D, ambidexterity, right use of marketing and of course resources. Since innovation will be achieved, SMEs will be able to cope with the new technologies and survive throughout industries 4.0 and 5.0.

Artificial Intelligence

SMEs want to adopt A.I. in the years to come in order to be able to level the competition with bigger companies. But this is something that it is not that easy and has as prerequisites many things.

So, SMEs cannot be prevented from the A.I. adoption neither from its cost nor from their experience. These factors can be overcome and can transform the A.I. adoption into an opportunity for SMEs to level competition with larger organizations.

A paragon which is extremely important in order to help SMEs to adopt A.I. is the use of cloud computing. Since this kind of technological solution is easy for SMEs to be adopted and is of low cost, it can be the springboard towards the A.I. and even machine learning adoption.

We also saw in the previous chapter that SMEs are facing certain important barriers towards the A. I adoption in their operational environment. Lack in data culture is an important one and has to do with the lack from the part of SMEs of a digitalization in data perspective. This is important and if it will be combined with other factors like the high cost in terms of the A.I. internalization, the lack in managers' training and different legal issues that might arise and which are extremely costly sometimes, we suddenly have an explosive mixture in our hands which will not help us at all, to adopt A.I. as SMEs' owners.

In order to overcome such obstacles, SMEs need to do two main things; the first one is to change their overall perspective in terms of the company's digitalization, something which can only be achieved by the CEO's training towards that direction and secondly, by increasing funding.

As we can see, funding is again an important impediment and this is why SMEs need to find a way to fund their projects which have to do with their sustainable development via the adoption of the new technologies.

Bottom line is that SMEs can adopt A.I. in their business as long as they will be able to change their perspective in terms of the company's digitalization and train their CEOs in that direction in order to implement that change. Also, funding is an obstacle that needs to be overcome and this can be achieved as we already discussed, via their participation in different kind of collaborations like joint ventures, Keiretsus and business ecosystems etc.

New Technology

In terms of the new technologies that SMEs already have started adopting due to the advent of industry 4.0, the research results were similar. SMEs can cope with the adoption of the new technologies that industry 4.0 and industry 5.0 will bring and remain competitive on an international level as long as they can take certain steps towards their R & D, collaborations, the increase in their well -educated and skilful employees , decentralized decision making, which can e.g. be achieved via the transformation of their organization into e.g. a flat one and above all via the implementation from the SME's owner of a visionary leadership style.

Another important paragon which influences the SMEs' adoption of the new technologies is the local factor. This can be translated into different legal, political, economic, technological, social factors, the available infrastructure (e.g. internet speed etc.). Since SMEs usually do not have the ability to maintain international branches, their degree of adoption is heavily based on the local conditions.

There are also other issues that usually stall their technological trip and these issues have to do with the fear of implementation failure, something which can lead to a lack of motivation which is crucial as can backfire to the company's performance anytime. Also, one other issue is that the adopted new technology sometimes is not aligned with the SME's business model, something that brings confusion, can lead the company away from its targets and can create a lack of communication and collaboration between the different departments.

Finally, another aspect that SMEs need to deal with in order to be able to adopt to their technological advancement is the fact that due to the new technologies we can witness the last years a shift from physical labour to more intellectual job positions, something which in simple words mean that SMEs need to train their personnel in order to make it suitable to fill these new positions and handle effectively the new technology.

So, we can say that SMEs can also cope with the new technology as long as they will be able to train their personnel, to change their leaders' mentality, to overcome potential local barriers, to collaborate, to improve their R & D moves and to align this new technology to their business model.

ANSWER TO THE RESEARCH QUESTION

The research question that we addressed is: *“Can small and medium enterprises survive the advent of industry 4.0 and 5.0?”*

So, from the above analysis we can say with safety that SMEs can survive the advent of both industry 4.0 and 5.0 via the use of the new technology that these two bring with them. Of course this can be achieved only if SMEs will be able to change their perspective, get the best out of their local conditions, change their mentality, train their employees and owners, collaborate, innovate and solve their financial issues.

Future Research

In terms of SMEs, the future is very promising, but also very challenging. Future research can focus on the internal paragon that can prevent their adoption to new technologies, like different approaches that can clash and create problems to the company. Also, the future researcher can investigate how the state can assist SMEs in order to solve their financial issues or whether the state need to involve into such issues or SMEs need to find other ways of financing their projects.

Another interesting research could be to investigate whether SMEs will be able to afford robotics as part of industry 5.0 at least in the beginning when usually is when new technology is quite expensive and if they would not, since this will result in a competitiveness lost, would they be able to stay competitive enough in order to survive until this new technology will be affordable?

Finally, SMEs have a more human centric character as a big portion of them is family owned. One question that arises here is whether SMEs will be able to embed in the culture the use of robotics working hand by hand with humans.

CONCLUSIONS

SMEs are one of the most important parts of our societies as there are about 400 million of them all over the globe, while they are the main responsible for the job creation on a global scale accounting over the 95% of firms and 60-70% of employment (globanaps.org, n.d.). This numbers are just indicative of their importance. This is why in this research we tries to underline some of the most important paragon that industry 4.0 and 5.0 will bring and will be able to affect SMEs' overall performance and sustainable development.

This research indicates that SMEs can survive the technological boom of industry 4.0 and 5.0, but only if they will manage to do the right steps which include the successful confrontation of their financial problem, the increased collaborations, e.g. under the form of Keiretsus or business ecosystems, the leverage of the local conditions that might be helpful, the employee and owners' training and the change of their overall mentality, increase in innovation. The use of these new technologies can level he gap between SMEs and big companies only if it will be take place with the addition of the above mentioned actions.

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