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# MANAGING TECHNOLOGY IN MACEDONIAN SMEs CONTEXT: PERCEPTIONS, PRACTICES AND CHALLENGES

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**ABSTRACT.** Academicians and policy makers alike state that technology is the catalyst of growth for small medium businesses (SMEs). The review of past research reveals that the strategic upside of technology is the accomplishment of competitive advantage through their business strategies. The effective implementation of advanced technologies enables companies to achieve economies of scale and scope simultaneously. That is, investigating advanced technologies reduces the cost of future product innovation, allowing the company to increase its speed of response to market and competitive changes. Therefore, investment in advanced manufacturing technologies represents a strategic option. Despite the great importance of technology in small sized businesses, not many studies attempted to explore technology embraced by them, especially within the Macedonian context. The purpose of this paper is to gain an understanding of advanced technology knowledge and usage within the specific SME sector in the Republic of North Macedonia and to discover, if technology is used, whether it is seen as crucial to their competitive strategy. Moreover, the main research question is how advanced technology affects different aspects such as costs, sales and profitability, employee productivity, customer care, share of the e-market and competitiveness. Primary data were obtained through a questionnaire survey, carried out in small and medium sized businesses in the Republic of North Macedonia and evaluated using the tools of descriptive statistics and the methods of comparison, induction, deduction and synthesis. The research results indicate that advanced technology influences favorably the overall costs and also increases profitability. Likewise, the findings show that advanced technology leads to increase of productivity and sales. One of the conclusions of the paper is that small businesses find it important to invest in advanced technology in order to promote competitiveness.

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## Introduction

Our starting premise in this paper is that creating and maintaining competitive advantage is one of the main and most challenging tasks of today's businesses growth. One of the most basic questions that trigger the managers nowadays is how firms can manage strategically their product offering, value chain system, product strategies and technology, competences and capabilities in complex changing business and technological environment (Burgelmann, 2001). With other words, the key to raising growth is the ability to compete in increasingly global markets, both at home and abroad, and to build competitive advantage. In fact, the need to innovate constantly in order to achieve and sustain a competitive position is the central challenge to managers of all companies. Therefore it can be noted that today in the market survive only those companies which quickly and constantly introduce new products and services. Over the years, company's strategies follow some kind of pattern that emphasize difference and competition and strategies that recognize the roles of technology and innovation. As technology advances, organizations are moving towards adapting the best options so as to enjoy a competitive edge.

## Review of Literature

In a broader sense, technology includes many tools and innovative processes that managers and employees use to help company to achieve its goals. In regards to the strategic management process that mostly

relates to planning how to use resources for goal achievement, technology is something that ensures the best use of resources and capabilities. As early as 1961, the great Schumpeter has acknowledged that technological competition on global scale makes a significant managerial challenge for firms or organizations since technological advancements have brought about drastic changes in form of emergence, fusion, disruption and evolution of industries over time.

Burgelman et al. (2001) defines technology as " technology refers to theoretical and practical knowledge, skills and artifacts thatcan be used to develop products and services as well their production anddelivery systems. Technology can be embodied in people, materials, cognitive and physical processes, plant, equipment, and tools". According to Durrand (2018), technology relates to design, production and distribution of goods and services in response to market needs. What he points out is that technology should be managed even it includes tacit know how that is very hard to be managed. According to Dosi (1982), technology is naturally related with innovation since the technology requires continual improvement through a flow of incremental innovations which construct and shape a technological trajectory. Some scholars have considered technology also as the attainment of strategic goals by suggesting product innovations. It provides an input in the product development process to be utilized effectively in a strategically managed company. Technology refers to information systems that businesses use to maintain their competitive advantage by responding to their business markets. A strategically managed organization sets goals for developing new technologies, or new capabilities, to introduce in a target economy, not just product innovations. This relates to expanding the organization's market position, another goal of strategic management. A firm can create new markets when it introduces new technologies if it believes in front-end investment in technology development.

When it comes to the concept of "advanced" that is defined as any technology used in the design, engineering, fabrication and assembly, automated materials management, as well as the development of systems of information, integration and control (Trott, 2008). Thus understood, advanced technology in enterprises can be divided into advanced technology in production and advanced technology in the information communication and management. Advanced technology can be also considered as knowledge,

where employees are both producers of knowledge and keepers of knowledge. Their knowledge is an asset that managers seek to develop through the strategic management process, including identifying what the organization will do to develop employees through training and professional development (Collins at al.2010).

The implementation of advanced technologies allows companies to diverge from the traditional strategies of striving for low-cost leadership and differentiation. Effective implementation of advanced technologies enables companies to achieve economies of scale and scope simultaneously. That is, implementing advanced technologies reduces the cost of future product innovation, allowing the company to increase its speed of response to market and competitive changes. However, technology itself can have important strategic implications for the companies and can exploit competitive advantages, but yet not all of them are strategically beneficial. In addition, technology alone cannot provide a competitive advantage. The way these technologies need to be applied (technology strategy) and implemented (technology management) needs to be understood by both the academics and the practitioners. In this regards to this, the performance of firms, besides other factors, basically relies on effective management of these technologies. According to Biggler (2009), a firm's ability to build competitive advantage depends on the practices of general management. In fact, general management who create the distinctive set of practices and also develops a context for technology development manage to stay ahead, offering the highest quality products with lowest cost and doing continuous, incremental improvements that are value driven. Pandza et al. (2004) posit that "Advances in technology have moved companies toward a new competitive landscape. Managers are experiencing the emergence of new concepts or even a new paradigm". The rapid change in technology over the last two decades has raised concern on two major issues. These have been defined by Mitchell (1998) (1) poor linkage between technology and strategy planning and (2) over-reliance on short-term measures, both of which masks the more strategic plans. Strategic importance of technology has been recognized as helping to provide competitive advantage.

Furthermore, many scholars recommend that technology strategy should be aligned to corporate strategy in order to reap out benefits like performance and competitiveness for the company and therefore

the more attention should be paid to technology in strategic processes. (Ansoff, 1986, Mei &Nie, 2008, Dodgson et al., 2008). In 1980, Kantrow was the first that advocated a better integration of technology into strategic management. Technology strategy is a key ingredient in strategic technology management and has become a primary factor in devising business strategy and to sustain a competitive advantage, so companies do need to connect and align technology strategy with business strategy. (Bleicher, 2004). Characteristics and capabilities of a technology need to be developed and evaluated across the company. Considering the importance and relation of technology with the firms' broad competitive strategy, technology should be connected and aligned to business strategy. Moreover, firms' strategy on products, services and processes must be devised in relation to technology throughout the value chain process (Dodgson et al., 2008).

According to Burgelman et al. (2001), in current era, technology strategy has become a key factor in devising business strategy and to sustain a competitive advantage. He studied this fact and concluded that it helps to answer questions such as, which competences and technologies are to be adopted for competitive advantage, what should be the investment level on technology development, and how to organize technology development and its management etc. Although, scope and importance of technology strategy is defined in companies, but the extent to which such strategy is incorporated into business strategy and the existence of an explicit technology strategy varies even in technology oriented firms (Kropsu-Vehkapera et al., 2009).

According to Bleicher (2004), strategic management is a big umbrella, in which strategic technology management is one colour and food for thought. Portfolio of technological evolution in a company should be managed strategically by taking into account technology during strategy formation and execution process of a company. Herewith, strategic technology management is expected to provide means or ways to manage complexity, ambiguity and dynamic nature of businesses, caused by the technology. Porter (1985) stated that technology is involved in all activities of value creation process of a company so technology aspects must be considered properly during strategy formation. Therefore, companies do need to cater for technology matters in line to product and business strategy. In his book Competitive Advantage (1985), Porter noted that technology has

the potential to change the structure of existing industries and to create new industries. It is also a great equalizer, undermining the competitive advantages of market leaders and enabling new companies to take leadership away from existing firms.

In the context of SMEs, since the major focus in this paper is given to them, the adoption and use of technology is widely seen as critical for their competitiveness in the emerging global market. The benefits of advanced technology in SMEs are quite enormous and should not be underestimated. They include cost reductions and improved marketing strategy, more efficient and effective communications as well as superior procurement and methods of distribution (Collins et al., 2010; Pool et al., 2006; Singh, 2011; Pickernell et al., 2013; Ajayi and Olayungbo, 2014). However, it should be considered also that SMEs generally struggle with limited resources in terms of time, money and expertise. Juggling competing demands, SMEs are often cash poor and most lack the range of internal expertise available to the large firm. In fact, it is the skill and enthusiasm of the owner-manager that typically drives the business forward and shapes the character of investment decisions (Caldeira & Ward, 2002).

Compared to large businesses, SMEs are facing a lot of obstacles and lag behind in their use of technology in both ways-operationally and strategically. One of the primary shortcomings that characterize them is actually the lack of managerial skills to conceive, plan and implement and reluctantly update technology (Caldeira & Ward, 2002). According to Pool at al. (2006), SMEs are" constrained by resources, hemmed in by competing demands, caution and suspicion often greet new technological opportunities. Therefore large firms for example, have adopted e-commerce much faster than SMEs. The evidence is showing that when it comes to introducing e-commerce, SMEs managers are acting with caution to its opportunities and approach very slowly in their strategic and operational actions. (Al-Qirim, 2005).

In case of developing countries, such as the Republic of North Macedonia itself, a very specific obstacles can be identified on the issue how SMEs manage technology and innovation. Internal barriers are those that typically include organizational culture, lack of resources, owner/managers' attitude toward strategic technology, and the level of training of employees. The external barriers are those that lie outside and include a lack of

infrastructural facilities and limited funds from banks and other governmental bodies. Kapurubandara and Lawson (2006) suggest that in order for these inhibitors to be overcome, SMEs need to work collaboratively. Perhaps one of the most surprising barriers to advanced technology adoption is the lack of knowledge of ICT solutions, how they work, their implementation and perceived benefit to the SME sector. The attitude of management in an organization plays a crucial role in the adoption of ICT as in most cases in SMEs the managers are also the owners. Support from the management of an organization, most especially top management, is essential for successful technology implementation and adoption for SMEs. If the management is not disposed to its adoption and utilization, then SMEs will not be able to use. The owner/manager's weakness therefore becomes a limitation of the business as well. Lastly, most SMEs do not have the capability to expand their advanced technology resources due to limited access to capital (Paul et al., 2008). This is a common factor that affects the adoption of advanced technology in SMEs.

Overall, there are not exiting common frameworks that can lead SMEs how to better integrate technology and innovation into value chain model of a business. This is because of the rapid changing and increasingly competitively and high complexity of the global economy. In general, companies have to evolve their own strategic management technology practices according the nature of their business, R&D pursued, organizational culture and structure etc. However, what can be highlighted as common are the basic aspects related to value creation and business model, strategy formation and execution, technology strategy, technology management, innovation management, and interface between technology and innovation strategy. This would allow SMEs to better understand concepts and intermediary steps, required to formulate a technology and innovation framework for them to develop and sustain technological capabilities. With this, they will be able to benefit from their internal strengths, overcome their weaknesses, exploit external opportunities and minimize their external threats. Foremost, main variables affecting innovation are consisting of firm strategy, expenditure on research and development, use of technological information sources and overall performance of the firm.

In addition, it can be acknowledged that most of SMEs do not pay much attention to technology strategy or technology management. The reasons are very broad, such as lack of awareness and low interest on

the part of management, very narrow focus on managing everyday operational activities, lack of funds for research and development etc. certainly, they are SMEs that innovate or invest in technology but this usually happens when customers require new offerings, suppliers propose new modes for transformation or competitors power increases. What we can state here is that in most of the cases, there is passive innovation and the reactions are mostly related to the innovations that are coming from outside. The major challenge of SMEs should be greater operationalization of the technology strategy as a core competence.

In the Republic of North Macedonia, small and medium sized companies (SMEs) play a significant role in the country's economic development. As of 2018, SMEs comprise of 99.7% of businesses and account for almost two thirds of total value added and nearly three quarters of all jobs, well above the respective EU averages of 57% and 66%. In 2008-15, the value added by SMEs increased by 17%, while employment grew by 19%.(European Commission Report, 2017). In the EC Report, it is noted also that especially small and micro companies face problems in particular with skills and innovation. In this perspective, there is a notable need to catch up as regards online transactions, lack of ICT skills and R&D support to SMEs. Other remaining problematic issues include regular access to finance with a dearth of alternative non-banking financing sources, and a lack ofentrepreneurship which is viewed negatively by those who believe that setting up a business is the only option to find work. The majority of SMEs in North Macedonia do not have access to bank loans or funding to support the development of advanced technology in their businesses. Moreover, paying back loans that have high interest rates/bank charges can be too much of a burden for the majority of typical SMEs. The lack of a skilled labour force and basic business skills are a bottleneck for most Macedonian SMEs, affecting their potential for growth in productivity and competitiveness and, consequently, in new employment.

Due to the importance of this sector, the development of the small and medium enterprises is listed as one of the main priorities of the government. Overall, the efforts are already focused on improving the business environment for the development of SMEs, while strengthening the efforts for improving the competitiveness and innovations. (National Strategy for SMEs 2018-2023) This attitude is also evident in the latest

review of the Economic Policy Index of the EU, (OECD, 2016) where OECD acknowledges Macedonia for its institutional framework and operational environment, where the country is considered "one of the most advanced economies in the the region of Southeast Europe in terms of advancement of its SME sector". This assessment is positive aspect and should encourage the authorities to continue with the policy of fostering entrepreneurship and SMEs growth and also ensure adequate provision of services that meet the needs of SMEs. What is worth to be stressed here and in regards to the topic of this paper is that besides the policies and programs, what is more specifically very crucial is the given support in terms promoting the use of technology in SMEs as a strategy for stimulating increased productivity and competitiveness. All these facts indicate the importance of advanced technology as a key factor for the development of SMEs. As Polland (2006) noted "in the information society environment successful enterprises produce high technology goods and services and transform human effort materials and other economic resources into product and services that meet customers need. In such society, in order to be successful, SME would need high quality information and must always provide superior value, better than competitors, when it comes to quality, price and services." For these reasons, the Government of Macedonia should emphasize the importance of advanced technology and its uses by SME's as a strategy for increased productivity and competitiveness. The adoption and use of advanced technology is critical for the competitiveness of Macedonian's SMEs in the emerging global market, while promoting significant positive consequences on the nation's economy. Also, it can help SMEs to may tap the rapid growth of e-commerce to expand globally. The Internet is revolutionizing the way businesses operate and compete, as e-commerce transcends the limitation of geographical boundaries. For example, by effectively harnessing the internet, SMEs are able to search the international business community for potential partners and suppliers without the need for expensive and time-consuming travel. Moreover, high value-added services may be delivered via e-commerce at relatively low costs. On its part, the government has invested considerably in the necessary infrastructure to make e-commerce possible.

## Results and Discussions

Primary data were obtained through a questionnaire survey, carried out in small sized businesses in the Republic of North Macedonia and evaluated using the tools of descriptive statistics and the methods of comparison, induction, deduction and synthesis. The questionnaire was answered by 47 respondents (sent to 98 respondents) from small and medium sized companies in the Republic of North Macedonia. The data was collected over a two-week period of time and the response rate was 47%. The majority of the respondents were managers (74.8% or 35 respondents), followed by those who stated that they are both owners and managers (20% or 9 respondents) and lastly those who are owners (6% or 3 respondents). The majority of the respondents came from businesses operating for more than 10 years (70%), followed by those that exist between 1 and 5 years (22%) and those that operate between 5 and 10 years (8%). The majority of the surveyed companies 81% were small sized (up to 50 employees), while 19% were medium-sized (up to 250 employees) as defined by the established national classification. Regarding the competiveness internationally, 35 (74%) of the interviewed managers responded that they mostly compete on the global market. For the rest of the interviewed managers (12), the local market is the key for their operations.

The questions were designed to gain an understanding of advanced technology knowledge and usage within the specific SME and to discover, if technology is used, whether it is seen as crucial to their competitive strategy. It is important to once again highlight that this research makes use of a quantitative approach in trying to answer the research question. The replies are based on the perceptions and practices of the SMEs' managers as they run their businesses. To begin with, the respondents were prompted to provide their opinions of the importance of advanced technology to them based on their previous experiences. Most of them perceived advanced technology as a crucial factor, as something that is necessary for success, as a pathway to development and improvements. Some connected advanced technology to their everyday operational activities. There was only one answer that shed a slightly more worrying tone to the term advanced technology accentuating that it can be a terrifying thing, but something that has to

be done, by accentuating that small changes and adjustments happen all the time.

Asked about the usage of advanced technology in their business operations, the survey shows that almost all (93.62%) of the respondents agree that their business uses some form of advanced technology in their business processes. When asked about the technology employed, 27(57%) of the managers consider their current technology sufficient for the product strategy requirements. Nevertheless, they would consider additional investment if needed and 20 (43) of them answer that they will definitely need to change the applied technology if new products are to be added to their current product lines.

The next question provides deeper insight into whether the companies have a technology strategy as a part of the overall strategic management process. It also tries to test whether the respondents are familiar with the concept of technology strategy. The respondents were offered set of options for answering this question. For most of the respondents (68%) technology strategy means a primary factor in devising business strategy and to sustain a competitive advantage, so companies do need to connect and align technology strategy with business strategy. As this is one of the most relevant definitions of technology strategy the answer uncovers that the respondents are familiar with the concept itself. The other answers were related to pursuing new technology opportunities, overall change of the business model, research and development etc. However, on the question do they have a technology strategy as part of their strategic management process? only very few firms (10%) have declared that they have a specific technology strategy to support the overall business strategy. Regarding their general attitude towards the investment in technology, only few of the managers of answered that the needed investment is very often an issue in his company if the market requires a particular investment. What was mentioned as problematic issues were the financial resources as a very relevant factor for the new technology decisions. Very often the regular budgets are quite limited. Regarding the research and development budgets, 16(34%) of the managers reported their regular budgets for these purposes, limited budgets for R&D have 19(40%), while other 16(34%) have no R&D budget at all.

One of the main driving motivation to invest in advanced technology was to gain competitive advantage and to increase their operational efficiency (70%). Improving employee productivity was marked by 50%, followed by profitability and improving customer care respectively with 50%, while increasing market share was indicated as the most by 35% of the managers. Very few firms (17%) have chosen employee satisfaction as reason to invest in advanced technology.

We have also investigated the perceptions about the benefits that SMEs have from advanced technology. When asked about the main benefits from the usage of advanced technology, the most cited benefit as a result of advanced technology use is the opportunity for market expansion and facing with competition (80%). The second rated answer from the surveyed managers is improved operations and quality of service (75%) while advanced collaboration with customers and suppliers is experienced by 53% of managers. Close to 48% of the managers cited, cost reduction as the main benefit, followed by increased productivity.

In the following section, the main question in focus is how advanced technology affects more specifically the aspects such as costs, sales and profitability, employee productivity, customer care, share of the e-market and competitiveness. Asked about the cost reduction brought by the advanced technology, answers were split between 28% of the surveyed managers, who put forward the reducing the cost of the inventory, 33% who indicated on the advertising and distribution and 32% who think that it is the reduction of the total cost. We also questioned the impact of advanced technology on increasing customer care and the responses have indicated the greatest influence on the fulfillment of the requirements of customers/ partners, such as increasing loyalty and consumer confidence. The impact on sales was elaborated thorough to its major effect on impact on reducing the cost of offering sales (35%), identifying the needs of consumers (27%), increasing sales due to suggestive products and services (20%), and lastly on rising sales. On the question how advanced technology influences on increasing profitability the respondents see that it mostly increases net profit, due to the increased time and increased efficiency of employees. When it comes to the question how advanced technology affects the employee productivity, the answers provided have indicated the greatest impact on internal vertical communication, horizontal communication and as

well as the on the efficiency increase. For the question how does the advanced technology impacts on increasing share of the e-market, participants respondents see most benefits thorough a better positioning on the market, acquiring new Internet access partners and identifying the most profitable customers / partners. Lastly the respondents were asked about the impact of the advanced technology on their competitiveness. Most of the companies (54%, 25 companies) had major effect on their competitiveness, followed by those which experienced moderate effect on their performance (44%, 21 companies). On the other hand very few companies (2%, 1 company) reported either minor changes or no changes to their competitiveness.

## Conclusion

Advanced technology is crucial to SMEs if they seek to increase their effectiveness and productivity. Through increased usage, they can reduce operating costs, but also the use of quality information could result in an improvement in the value of their output. Using new technologies facilitates the global connectivity of companies and provide new ways of delivering products and services. The new business strategies empowered by the development of advanced technology enable to small and medium-sized companies' access to new markets and new sources of competitive advantage, which are the basic conditions for growth.

This paper has intended to explore the perceptions and practices of Macedonian SMEs managers' regarding the application of advanced technology in their companies and the benefits thereof. According to the results of the survey, a positive aspect is that most of the SMEs already use some kind of technology in their business operations. Encouraging is the fact that the small and medium-sized companies recognize the benefits that they would gain by applying advanced technologies, such as to opening new business opportunities, cost efficiency, increased productivity, increased competitiveness etc. All these benefits will enable increased growth and development of small and medium-sized companies and thus of the overall economy of N. Macedonia. The results have also shown that overall the managers find important to invest in advanced technology, whereby the main motivation is related mostly with creating competitive advantage and increasing the operational efficiency, followed by improving

employee productivity, profitability and improving customer care respectively. However, although the managers SMEs, in general, are motivated to invest in advanced technology, there is a lack of technology strategy to be updated with new strategic management trends. With regard to awareness of the benefits of the technology strategy, almost all of them use and invest in advanced technology lacking the vision of strategic core competence. Indeed, the findings of this work show that though the applicability of technology strategy is not widespread at the highest level among SMEs; albeit, the better integration of strategic management within the technology usage and implementation is overwhelming and SMEs who pursue it can expect further enhancement in the level of performance. Lastly, while SMEs should continue with the intention of adopting new advanced technologies to achieve greater competitiveness, growth and development of companies, the Macedonian Government should also foster its efforts to create an environment that will be good enough to stimulate the application of advanced technology and provide support to small and medium-sized companies in their aggressive usage and implementation in their operations.

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