The predicted effect of utilizing modern technologies in firms' development

Ayat Sami Odeibat[1], Andrea Matkó[2]

A B S T R A C T

This study aim is to creates preliminary investigations of the impact of implementing modern technologies on companies' overall development and productivity. In order to attain the goals, a qualitative methodology has been conducted by using a case study method. The case study took up a Jordanian company and applied some modern technology in their strategy development. Toward obtaining an in-depth comprehension of their impacts on reality. Along with discovering new opportunities can be used for other researches in the future. The study provides a clear understanding and incorporation of the managers and employees who participated in this investigation directly as key stakeholders. As well as it played an important role in developing a Jordanian company by applying new methods in marketing, improve communication, leadership skills used, and improve overall productivity.

1. Introduction

Modern technology plays an important role in the firms' management, as it has become a basic element for successful and sustainable business. Companies' main target is to make a high profit (Jones 2018). Recently, companies trying to develop machines and techniques due to the increase of awareness about the importance of using technology in management. Many studies claim that modern technology has positive effects on companys' productivity, through saving human effort making their job easier, save time and cost by utilizing AI-applications, Automation, and software's which takes place instead of human or works alongside them (Friar & Balachandra 1999; Camiña, Díaz-Chao & Torrent-Sellens 2020; Paschen, Pitt & Kietzmann 2020). Also, according to Meteab, Sadiq and Hadrawi (2020); Goh, Heng and Lin (2013) they mentioned that companies should use modern technologies because of their effect on customer behavior, they also claim that communications channels have improved between customers and the firms due to the applications of modern technologies, which made it easy to access at any time. In addition, the technology supports the business to save time, cost and improve the communication channels between employees through using programs like CRM (customer relationship management), AI (Artificial Intelligence) applications and various social media applications like Skype, Facebook, Twitter, and Instagram. Further, it has an effect on the marketing sector by making it more widely with less cost and helps to develop performance measurement methods (Makarius, Mukherjee, Fox, J& Fox, A 2020; Davenport & Kirby 2015; Davenport, Guha, Grewal, & Bressgott 2020). To enhance growth for firms' future it is essential to understand what is coming next. It is important to understand the capability of technologies in developing the business (Huang & Rust 2018). Canhoto and Clear (2020) stated that the leaders are responsible to estimate the risk of implementing the technologies to avoid any negative consequences or delay of the technological adoptions. The aim of this research is to investigate the impact of implementing modern technologies on companies' overall development and on productivity. In order to achieve the aim, a qualitative methodology has been conducted using a case study method. The article dived to into five sections as the following: the next section is the literature review, section

[1] Ayat Sami Odeibat
University of Debrecen
ayat.odeibat@mailbox.unideb.hu
[2] Andrea Matkó
University of Debrecen
andim@eng.unideb.hu

three is the research methodology, section four present the case study. The last section is the conclusion.

2. Modern technologies comprehensible and applications

Modern technologies such as AI can be found in all our life aspects. Starting from our daily life up to work environments, such as smartphones, washing machines up to Robotics, self-driving vehicles, and automation. It is becoming crucial to understand and research how to deal with this technological development. Specifically, the change in the work environment requires us to be prepared for the new job requirement (Huang & Rust 2018). Artificial Intelligence the most controversial technological achievement of modern times. In many ways, the magic of AI is that it is not something you can see or touch. You may not even realize that you are using it today. When your phone automatically corrects your grammar or when a Tesla car navigates a road autonomously–that's AI at work (Wysocki 2011). Recently Computers began carrying out typically human things like seeing and hearing, which they do as good as, if not better than humans (Russell & Norvig 2002). Nilsson (2009) defined it as "Artificial intelligence is a branch of the computer science field in which scientists are attempting to develop enhanced intelligence within computer systems". As well Haugeland (1989) defined AI as "The exciting new effort to make computers think machines with minds, in the full and literal sense". The applications of AI are numerous and ever-increasing. As they can be found in household work, farming, manufacturing, medical care, banks, insurance companies, schools, and universities almost everywhere (Purwanto, Kuswandi & Fatmah 2020; Winston 1993; Makarius, Mukherjee, Fox, J& Fox, A 2020; Wheeler 2020; Ivanov, Kuyumdzhiev & Webster 2020). For example, Google can recognize exactly which things are present on an image and Siri can understand what you are saying (Brill, Munoz & Miller 2019). Many applications can support the business process such as intelligent robots, machines' automation, software, digital assistant, chatbots, social media applications, feedback forms, etc (Brill, Munoz & Miller 2019; Baier, Rese & Röglinger 2018). This article investigates the effect of using social media applications, quality assurance scores, and Scorebuddy software, and other tools. To build a base for the technological tools and applications that shows their impact on firms' development, as mentioned in section four.

2.1. The benefits and the challenges of modern technologies

In the social domain, technologies strengthen the economy through supporting a progressive evolution in the job market that integrates humans and machines, which will be the new common in the workforce of the future. As well as enhancing our lifestyle, by creating more efficient businesses and health care. (Russell & Norvig 2002). However, according to Novakova (2020) study that mentioned if integrating machines will cause job loss without finding out a solution, which will result in an overall market imbalance, due to the income loss which will affect the business demands and workforce market. In the personal domain, it frees up people to do the interpersonal and creative aspects of the work, as machines can do tedious tasks instead of humans and make the jobs easier. Also, improving the living standers. (Friar & Balachandra 1999; Ivanov, Kuyumdzhiev & Webster 2020). Although technologies can improve efficiency, productivity, save time and money, and more accurate results. It is essential to take into consideration safety, legal decision-making, privacy, and the unemployment rate (Guihot, Matthew & Suzor 2017). A clear benefit of AI can be found based on our mature use of it (Russell & Norvig 2002).

3. Methodology

The aim of this article is to investigate the impact of implementing modern technologies on companies' overall development and on productivity. A qualitative methodology was chosen to achieve the goals of the research. The data have been collected by using a case study method. Denzin and Lincoln (2005) defined qualitative research means as "a situated activity that locates the observer in the world. It consists of a set of interpretive, material practices that make the world visible" while

Miles and Huberman (1994) defined qualitative research as a "source of well-grounded, rich descriptions and explanations of the process in an identifiable local context." According to Denzin and Lincoln (2005), the qualitative query needs to be related to the research model even if it is positive or explorative and links the data to the research model that strengthens the efficiency of the qualitative research. Meeting, observing the participant and, communications consider as qualitative methods that can provide us with rich information and data. The methodology includes two sections. The first part is data collection, and the second part is a case study applied in a specific company in Jordan. The data collection includes two phases the first one by using research databases such as ScienceDirect, GoogleGate, Google Scholar, Elsevier, EBSCO Discovery Service (UDiscover), Scopus, ProQuest, Web of Science. In addition, to the data which was through interviews, questioner, and observation in the company. Moreover, the case study's first step was defining the company diagnosis by using SWOT analysis, Ishikawa Diagram, Problem, and Cause Analysis, and Pareto analysis where the data were collected from the employees and the leaders by using questionnaires. Case study methods consider a good option that could provide deep investigation and reveal unknown information, subsequently provide a better understanding of suitable technology for the Jordanian company. It is important to consider that the case study chosen in this paper is based on the study gaps and problems. In the case study, the most important point is to highlight that it can understand certain phenomena with a clear understanding and generally there is not systemically sampled. The sample includes 60 volunteering participants consist of the management and the employees. According to Merriam and Tisdell (2016), they mentioned that the number of samples in a qualitative study does not matter, as the number presents the possibility of each participant contributing to the development of prudence into accepting the phenomenon. Since a statistical outcome is not the main objective of qualitative research. Therefore, a small sample is possible in qualitative research These above points justify the small number of cases used in this paper.

4. Case study: analysis of the company

The case study has applied on a water desalination company located in Jordan. Which primarily works in water treatment field and produces bottled water and delivers it to customers, as the tap water is undrinkable there. The case study analyzed Jordanian company that was struggling with decreasing in revenues, communications conflict, and other problems. To find out the reasons behind the problems. The first step was to collect the data about the situation from the previous reports. Then conducted a questioner and analyzed it. Furthermore, categorize it to internal strength and weakness, external opportunities, and threats with taking into consideration the other factors such as politics, economics, society, and technology that affect the company operating system. The next step was to define the problems and analyzed the causes and consequences by using Ishikawa, Pareto diagrams, and other Methods. In addition, the study implements a different type of modern technology, matrices, methods, and tools to develop the company's goals by utilizing indicated development plan. As the following a SMART analysis conducted using new methods for marketing. In the beginning, the team started to use social media applications like Facebook for advertisement and using Skype for communication channels between the employees them-self and the leaders. As well as the leaders start to use the digital assistant that supports them and makes the work easier. Also, they started to have a monthly survey test that helps the leaders to check performance and quality as well as create a new incentive system using KPI (key performance indicators) that checks the quantity, quality of the work in order to improve the work overall productivity. The last part was comparing the data before and after applying the development plan for six months. All the steps, tables, graphs, information are explained in detail in the case study below.

Organizational Diagnosis analysis

SWOT analysis purposes to diagnose the strength and weaknesses within an organization and determine the opportunities and threats in the surrounded environment. According to Dyson (2004), he defined "SWOT analysis is an established method for assisting the formulation of strategy". The SWOT analysis data have been collected from a questionnaire that included the leaders and the

employees. The analysis results summarize the following, the strengths include experienced employees, good division of the company, and availability of raw materials. However, the weaknesses highlighted the lack of communication, weak marketing strategy, as well as the lack of implementing modern technologies. Moreover, the opportunities could be expanding and opening new branches, improve prosses and improve the efficiency of the work. The Threats reflect the economic crisis or disasters, customer loss, and initiate new taxes.

Fishbone Diagram (Ishikawa)

The template below clarifies a cause-and-effect diagram, also called a Fishbone or Ishikawa Diagram. Cox and Sandberg (2018) mentioned that the Fishbone diagram helps managers to find out the root cause of the problems and why did it happen. The paper discusses the communication problem found from the previous SWOT analysis questionnaire. Further, a brainstorm conducted to find the major causes and the effect of the problem. After that, the suggested solutions have created based on the Fishbone diagram which sorts the causes into specific groups to find out the most affected ones.

Table 1. Problem and cause Analysis for the company

Problem 1: Lack of Communication	Problem 2: Absence of updated marketing strategy
Causes:	Causes:
Poor leadership and technology	There is no specific team for that
Spontaneous meetings	Weakness in implementing the previous strategy
Personal issues in workspace	Using old methods for marketing
Lack of motivation and Poor teamwork	Lack of awareness of the market
Cultural diversity and Bureaucratic structure	Ignore the competitors
Unclear goals	Poor and old technology
Insufficient equipment and roles not defined	

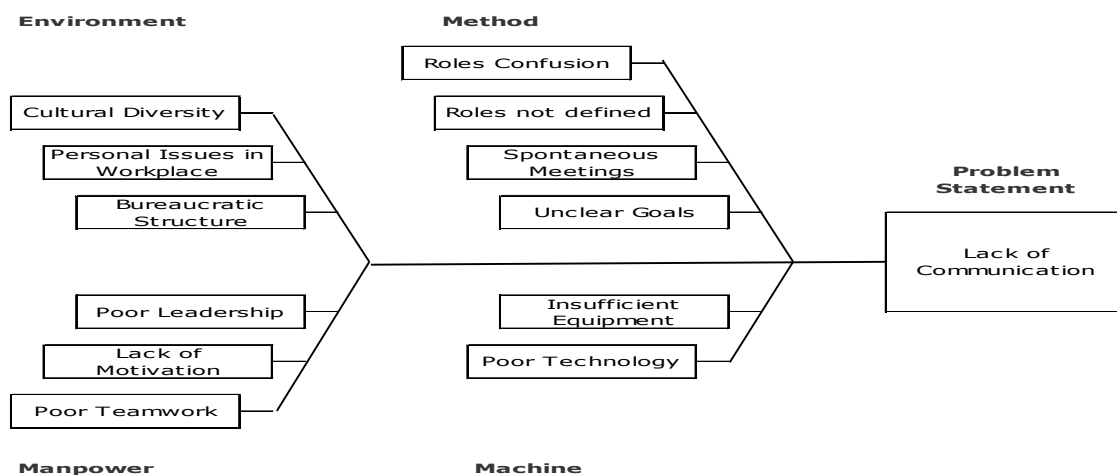Source: 'Author's own work

Figure 1. Fishbone Diagram for the company
Source: 'Author's own work

Fishbone diagram analyzed the lack of communication problem by showing the causes of the problem and categorizing them for four groups includes the environmental causes, methods, machines, and manpower causes. The environmental causes include cultural diversity, the company structure, and the workplace environment. For manpower, there were leadership and teamwork gaps and a lack of motivation that can be solved by implementing more training and meeting as well as using

communication applications, digital assistants, and software. The method causes show the job roles and goals confusion for the employee while the Machines cause comprises the equipment capacity and the poor technology usage that can be solved by renewing the machines and applications to support it.

Pareto Analysis

Pareto Analysis is a clear technique that can be used for prioritizing problem-solving work. The first part of the work resolves many problems. It is based on the Pareto Principle also known as the 80/20 Rule the idea that 80 percent of problems may be caused by as few as 20 percent of causes (Brooks, 2014). The research has selected one of the problems occurring in the company and brainstormed some of the primary causes of it. Furthermore, each cause has scored according to its severance. To generate sufficient data, a discussion session with leaders and employees created. In order to obtain their opinions by creating a scoring system and each of them needs to score the most affect cause. The participants' number was 60 and the scoring system depends on percent out of 100%. The responses for the severity of each cause were recorded as below. The figure includes the frequency on the left side and the cumulative percentage on the right side. As well as it displays the lack of communication problem causes sorted based on their cumulative percentage and the frequency.
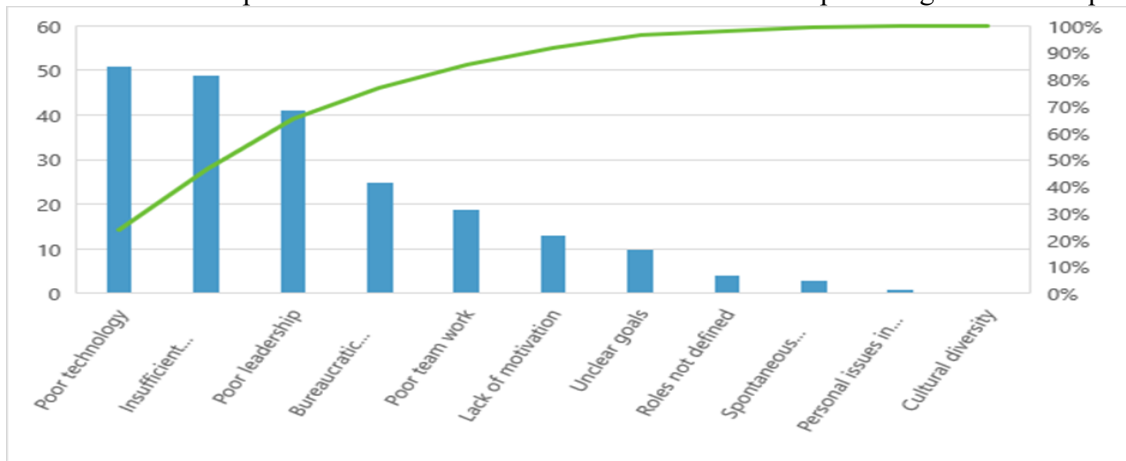

Figure 2. Pareto Chart for lack of communication problem
Source: 'Author's own work

Figure 2 indicated that the poor technology was the most scored cases with 83.3%, the insufficient equipment causes 81.6% and poor leadership causes 68.33%, while the Bureaucratic structure cause got 41.6% and the remaining causes were less than 30%. This concludes that an average of 27.2% of the causes which are poor technology, insufficient equipment, and poor leadership has a major effect on the problem of Lack of Communication. While the other causes the Bureaucratic structure, poor teamwork, lack of motivation, unclear goals, roles not defined, spontaneous meetings, personal issues, and cultural diversity with an average of 72.8% contribute as a minor cause. That leads us to focus on finding the solution for the major problem causes.

Tools and Methods towards Development

SMART Method analysis to achieve goals. Goals must be SMART which refers to Specific, Measurable, Attainable, Relevant, and Timely (Bovend'Eerdt, Botell, & Wade 2009). For the actual result the measurement scale categorized into four groups as the following: Better result from 80-100%, Good result 70-80%, Satisfactory 50-70%, and Unsatisfactory<50%

Table 2. SMART Methods for the expected result for the company

Desired results	Plan	Actual scale categories	Average value
Improve the marketing methods and technology	Apply new technology such as social media and software	Good result	75.4%

Increase the profit	New technology and machines	Unsatisfactory	46.7%
Decrease the cost for the old marketing methods	Stop using the paper and use the online advertisement	Better result	84.4%
Improve the work efficiency and quality through use new machines	Measure the quality of the new product with the new machines and compare it with the old result	Satisfactory	64.6%
Make the work easier and communicate easily with all employees	Through using digital assistant and Communication system	Better result	88.6%
Save time and efforts	KPI (Key Performance Indicators), QA score	Satisfactory	65.4%
Improve and develop the leadership skills for the management	Survey (questionnaires), test	Better result	91%
Discover the mistake and solve it easily	5S (five step technique that include Sort, Simplify, Shine, Standardize, Sustain) matrix	Satisfactory	61.4%
Clear job description for each employee	Survey (questionnaires), test	Better result	94.2%
Create new marketing strategy	SWAT analyses	Satisfactory	63.4%

Source:'Author's own work

This deduces that the better-expected results were in clarification the job description, develop the leadership skills, improve communication channels, and decrease the cost for the previous marketing methods with a range between 80%-100%. For the good results, this paper shows improvement in marketing methods and technology with a range between 70%-80%. The satisfactory results include improvement of the work efficiency and quality, save time and efforts, discover the mistake, and solve it easily and generate a new marketing strategy with a range between 50% -70%. As well as the unsatisfactory expected result represent the increase of profit that was less than 50%. The firm applied scoring systems and like Scorebuddy, tests, QA scores, and questionnaires which supported the quality assurance department to monitor and evaluate the result regularly. Besides, they used Excel to sort the data received from the scoring system and convert it to the average result as shown in table number 2. This concludes that the most effective results are making clear job descriptions for the employees with an average result of 94.2%. Also, Improvement of leadership skills with an average result of 91%. And 88.6% improvement in communication channels. For marketing development methods with an average result of 84.4%. However, the most challenging part was to increase the profit with an average result of 46.7%. In addition, discover the mistakes and challenges with an average result of 61.4%, while the other results were between the average 63.4% - 65.4%. Accordingly, through utilizing modern technology applications, and tools such as Scorebuddy software, KPIs, QA scores, digital assistant and social media application like Skype, Facebook, Twitter, and Instagram. Subsequently, the company has experienced a relatively successful development.

5. Conclusion

The aim of this research is to investigate the impact of implementing modern technologies on companies' overall development and on productivity. In this regard, a research strategy was used to address the study goals, starting with data collecting which supports discovering the challenges and gaps in the company and investigated the reason behind that. Further, based on the previous analysis results, suitable technology and software have been conducted to support firm needs. Moreover, the

case study investigates the impact of the applied technology on the companies' productivity. The research provides a clear understanding and incorporation of the managers and employees who participated in this investigation directly as key stakeholders. As well as this research played an important role in developing a Jordanian company by developing new marketing strategies, improve communication between employees and leaders, therefore improve overall productivity.

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