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Discovering Thoughts, Inventing Future

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Social Processes of Knowledge of Technological Capabilities and Intellectual Capital on New Technology-Based Firms

By Mónica Longo-Somoza, Eduardo Bueno & Julio César Acosta-Prado

Abstract- This paper proposes that social processes of knowledge developed by innovative firms are core factors of Technological Capability and Technological Capital, they are the same processes and they are also a critical key to get competitive sustainable advantages. From the Resource-Based View approach, the Dynamics Capabilities approach and the Knowledge-Based Theory of the firm, the importance of knowledge as a key ingredient of technology must be emphasized and its importance to find the way back to the economic growth. We investigate that when the members of an innovative firmcreate and develop their firm's Technological Capabilities, using social processes of knowledge, they are also creating and exploiting the firm's IntellectualCapital.

Keywords: intellectual capital, new-technology-based firms, social processes of konowledge, technological capital, technological capability.

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Social Processes of Knowledge of Technological Capabilities and Intellectual Capital on New Technology-Based Firms

Mónica Longo-Somoza [α], Eduardo Bueno [σ] & Julio César Acosta-Prado [ρ]

Abstract- This paper proposes that social processes of knowledge developed by innovative firms are core factors of Technological Capability and Technological Capital, they are the same processes and they are also a critical key to get competitive sustainable advantages. From the Resource-Based View approach, the Dynamics Capabilities approach and the Knowledge-Based Theory of the firm, the importance of knowledge as a key ingredient of technology must be emphasized and its importance to find the way back to the economic growth. We investigate that when the members of an innovative firmcreate and develop their firm's Technological Capabilities, using social processes of knowledge, they are also creating and exploiting the firm's IntellectualCapital.This proposition is grounded in the theoretical proposal of a definition and classification of Technological Capabilities, anda proposal about the relationship betweenTechnological Capabilitiesand Intellectual Capital, specifically the Technological Capital. We also propose that the social processes of knowledge are the core of thisrelationship.The empirical study was conductedusing a multiple-case study methodology in 35 New-Technology-Based Firms (NTBFs) of the Madrid Scientific Park (PCM) and the Leganés Science Park (LEGATEC), in the Community of Madrid, Spain.

Keywords: intellectual capital, new-technology-based firms, social processes of konowledge, technological capital, technological capability.

I. Introduction

Nowadays the processes of creating and exploiting knowledge in the firmsare a key source of Intellectual Capital and Technological Capability as factor of getting competitive sustainable advantages (Conner and Prahalad, 1996; Drucker, 2001; Grant, 1996; Hayek, 1945; Kogut and Zander, 1996; Spender, 1996; Teece *et al.*, 1997).This paper researches the social processes of knowledge on innovative firms proposing that when the members of these firms create an exploit their firm's Technological Capabilities, using social processes of knowledge, at the same time, they are constructing and developingthe firm's Thecnological Capital, which lead them to get higher incomes (Acosta-Prado and Longo-Somoza, 2013; Acosta-Prado, Bueno & Longo-Somoza, 2014).

In the current economy, knowledge has become a key factor for firms. The competitive organizational environment changes rapidly and transforms knowledge into a critical asset for the adaption process, which firms shouldn't avoididentifying and managing (Bueno, Salmador and Longo-Somoza, 2014, Conner and Prahalad 1996; Grant 1996; Spender 1996). Also, Knowledge is a key ingredient of technology because it plays a crucial role in those processes of creation of technological basis value (Nelson, 1991; Nonaka and Takeuchi, 1995; Prahalad and Hamel, 1990; Sánchez and Mahoney, 1996). Therefore, stimulating and managing knowledge processes is of high importance for firms, and even for countries that want to find the way back to the economic growth in the actual crisis context (Krugman, 2012; Pikkety, 2013; Stiglitz, 2010), because the result is innovation and competitiveness (European Commission, 2003; Hill and Jones, 2010; Schumpeter, 1939).

Several are the strategic approaches of the firms that framework,theoretically and empirically,the research of knowledge processes and Technological Capabilities as critical factors for business success such as 'Resource-Based View of the firm' (Wernerfelt, 1984; Barney, 1991; Grant, 1991),'Dynamics Capabilities' (Eisenhardt and Martin, 2000; McGrath et al., 1995; Teece, 2009; Teece and Pisano, 1994;Teece *et al.*, 1997) and 'Knowledge-Based Theory' (Grant, 1996; Kogut and Zander, 1992; Nonaka, 1994; Nonaka and Takeuchi, 1995;Spender, 1996; Spender and Grant, 1996; Zander and Kogut, 1995). These lenses, together with Industrial Economy (Porter, 1980), show we must look for those factors that better explain the end results of the firms at the very heart of the organizations. Consequently, we made our analysis looking for these factors from two points of view: 1) on the analysis of the characteristics of the different resources that are considered a source of competitive advantages (Amit and Schoemaker, 1993; Barney, 1991; Grant, 1991; Hall, 1992; Peteraf, 1993; Wernerfelt, 1984); 2)on the analysis of theprocesses and organizational routines that make

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possible to accumulate and exploit the new resources and relevant Technological Capability needed to face all the menaces and opportunities from a dynamic environment (Acosta-Prado et al., 2013; Cool *et al.*, 2002; Grant, 2002;; Teece *et al.*, 1997). From these point of views, the firm is an entity of learning, which sustained success depends on its capability for speeding up and effectively renew its knowledge stock (Nelson and Winter, 1982).

The empirical case study analysis was conducted in 35 new technology-based firms (Butchart, 1987; European Commission in 2003; Sherman and Burrell, 1988)that participated in a research titled "Intellectual Capital Reports on New-Technology-Based Firms: A Strategic diagnostics on intangible assets" funded by the '*Instituto Madrileño de Desarrollo'* (IMADE) and conducted by the *Universidad Autónoma de Madrid*, Spain, since 2009. The sample were composed by firms created at the Madrid Science Park and the Leganés Science Park in Madrid, Spain. They were small and micro firms (European Commission, 2003) in a process of development. We choose these firms because of their recent foundation and because they asked for technical assistance in order to understand "how to innovate". Moreover, they also asked for help to develop successful ways of work in their critical first years, therefore, they collaborated intensely in the research. In addition, these firms were knowledge-intensive, based on the exploitation of an invention or technological innovation, and employed a high proportion of qualified employees, therefore, the paly a relevant role as innovative organizations that create and exploit Technological Capabilities. So, they were suitable in order to study the knowledge processes and Technological Capabilities developed by knowledge-intensive firms.

The paper contribution is both theoretical and practical. On the one hand, we propose a theoretical relationship between Technological Capabilities and Intellectual Capital, specifically the Technological Capital. Also, we propose a conceptual definition and classification of Technological Capability, and moreover, we treat two relevant elements that have rarely been investigated together before in organizational literature such as Technological Capabilities and Intellectual Capital. Despite all the multiple references in literature about the specific qualities of the strategic resources or about the processes needed for the efficient development of the Technological Capabilities (Kristandl and Bont is, 2008), there is no a consensus. With our analysis we try to move forward in the study of these subjects and, specifically, analyze the processes through which the different organizations can improve the management and renewal of their Technological Capability(Acosta-Prado, Bueno & Longo-Somoza, 2014).On the other hand, the contribution is also practical because the findings of the empirical analysis can help innovation firms' stakeholders to understand the social processes of creating and exploiting knowledge, in firms where knowledgeis the critical source of Technological Capability and Technological Capital. Therefore, the finds will help to make decisions accordingly in order to get sustainable competitive advantages and, so, success and higher incomes in a quickly changeable environment.

As we mentioned, this paper researches the social processes of knowledge of operation and exploitation ofTechnological Capabilities on innovative firms that also create and exploit their Technological Capital, which is an element of their Intellectual Capital(Acosta-Prado and Longo-Somoza, 2013, Buenoet al., 2010a; Buenoet al., 2010b; Bueno, Salmad or and Longo-Somoza, 2014). To get this goal we begin with the 'Theoretical Background' section, where, first of all, we characterize, classify and propose a definition of the Technological Capabilities, then, we disclose a conceptual analysis of the Intellectual Capital focusing on Technological Capital and its measurement in the Intellect us Model, a model of identification and measurement of Intellectual Capital (Bueno and CIC-IADE, 2003, 2012), and latter, we propose a theoretical relationship between Technological Capital and Technological Capability through the social processes of knowledge, which create and develop these two elements. Following, the second section 'Empirical Research and Methods' describes the research issue, research context, case study methodology, the sources of data collection and the data analysis procedure. Later the findings are presented. Then, we discuss the conclusions and implications of the research. Finally, the limitations and future research directions are shown.

II. Theoretical Background

a) Technological Capability

In the eighties decade of the last century, the traditional notion about how to achieve a competitive advantage was initially questioned. Until that moment it was understood that a firm could corner an appealing market by following three generic strategies as leadership in costs, differentiation and segmentation, which would give it a competitive advantage (Porter, 1980). However, then it was reintroduced the strategic approach based on the existence of distinctive competences (Selznick, 1957; Penrose, 1959, Ans off, 1965), it came up the perspective of a firm based on the resources and capabilities over which competitive advantage can be built (Wernerfelt, 1984; Barney, 1991; Grant, 1991; Amit and Schoemaker, 1993).This approach implies that a firm must try to "know itself", through a deep understanding of its own strategic resources, in order to be able to formulate a strategy for exploiting them and also developing those resources needed for the future.

The approach on dynamic capabilities has to be added to the perspective of the firm based on the resources and capabilities. The dynamic capabilities approach assumes the dynamic character of the environment and the need to adapt to it through the permanent development of new resources and Technological Capabilities (Trece et al., 1997; Eisenhardt and Martín, 2000).In view of turbulent environments, with high doses of uncertainty and complexity, global competition, shortening of the products' life cycle and sudden changes on the likes and needs of the consumers, the firm has indeed problems to decide which needs want to satisfy. However this doesn't mean the firm cannot ask itself – alternatively- which of those needs can be satisfied. In this case, external orientation cannot be the only foundation for business strategy, but also an internal analysis of the available resources and capabilities in order to set up a strategy. This dynamic conception of the theory of resources and capabilities attaches great importance to innovation in business. Within this approach, Technological Capabilities remain one of the most effective instruments in neutralizing the threats and exploiting opportunities offered by the environment, as shown by numerous empirical works (DeCarolis and Deeds, 1999; Balconi, 2002; Figuereido, 2002; Zahra and Nielsen, 2002; De Carolis, 2003; Nicholls-Nixon and Woo, 2003; Douglas and Ryman, 2003; García and Navas, 2007; Martin-Rojas et al., 2011; Trillo-Holgado, and Fernández-Esquinas, 2013; Ruiz-Jiménez and Fuentes-Fuentes, 2013).

Following the conceptual distinction between resource and capability (Grant, 1991), Technological Capability is defined as any general power of the firm, knowledge-intensive, to jointly mobilize different scientific resources and individual technicians, which allows the development of products and/or innovative and successful production processes, serving the implementation of competitive strategies that create value in view of certain environmental conditions (Garcia and Navas, 2007).This definition suggests that the Technological Capability means the ability to develop and refine the routines that facilitate combining existing knowledge and to disseminate new knowledge gained through the organization and incorporate it into new products, services and/or production processes (Nonaka and Takeuchi, 1995; Grant, 1996, Winter, 2003).

We propose the following definition of Technological Capability, basing our proposal on the above considerations: A Technological Capability involves all of the generic powers of a knowledge-intensive firm to mobilize individual technoscience resources that successfully foster improvement or creation of new products and innovative production processes. The objective is the implementation of competitive strategies that create value under certain environmental conditions (Acosta, 2009; 2010; Acosta-Prado and Longo-Somoza, 2013).

From the general definition of Technological Capability, as mentioned above, we also provide a Technological Capability classification because it does not always affect in the same way the innovative processes. Therefore, we propose a classification of Technological Capabilities that goes beyond the scope of what is conceptual in terms of academic and managerial implications. Among other proposals in the literature, from the input of March (1991) and Levinthal and March (1993), we have chosen to classify Technological Capabilities based on the nature of knowledge flows, distinguishing between operating and exploring, according to the degree of novelty of the innovation developed, the risk assumed in such processes and the possible and more or less immediate application in the markets for these technological advances (García and Navas, 2007).

More specifically, Levinthal and March (1993) define Technological Capabilities as a strategic exploration of knowledge-intensive systems responsible for the collection of radical innovations, which become technological designs with a dominant position for a certain period of time. On the other side, the Technological Capabilities of strategic operation are responsible for obtaining successive incremental innovations that improve some of its attributes, until there occurs a shift towards a new technological regime. Exploration involves the search for knowledge of facts that can be known and the innovation, novelty seeking and risk taking, and performing all those activities geared towards the discovery of new opportunities. For its part, operation refers to the use and development of facts already known and also in involves the upgrading of the available technology, the "learning by doing", the improvement in the division of labor and all the activities associated with the pursuit of efficiency.

Although these two activities, exploration and operation, are essential for organizations, it is also true they compete for scarce resources. Therefore, certain practices associated with the exploration and operation of knowledge can sometimes be incompatible. As a result, organizations must make explicit and implicit choices between both options (March 1991). Avoiding areas of conflict will require a compromise solution or incorporating a combination of both, that might even be used simultaneously in different parts of the organization. For this reason, maintaining a balance between exploration and operation is a key factor for survival and competitive success (Levinthal and March, 1993; Zack, 1999; Grant, 2002; Ichijo, 2002).

Summarizing briefly what we have looked at until now, the exploration and operation of technological knowledge are the result of an exchange process between the environment incentives, the existing knowledge in the organization and the actions of its members, and such knowledge and actions are *input* and *output* in the conversion flows and change in the knowledge stocks. These considerations lead us to a new perspective on Technological Capabilities and to understand the dynamic potential of creation, assimilation, dissemination and use of knowledge by means of flows that make possible the training and assessment of stocks of knowledge, training the organization and the people, flows which are made up of to act in changing environments (March, 1991). Undoubtedly, the stocks of knowledge affect the perception and understanding of reality, but if reality changes then it will be necessary to renew the firm's knowledge base to suit the new conditions of the environment, through flows of knowledge. Thus, the knowledge flows incorporating both cognitive and behavior changes and providing the means to understand how the body of knowledge in the organization evolves through time, increasing its range and adaptability (Von Krogh and Vicari, 1993; Carmeli, and Azeroual, 2009; Ruiz-Jiménez and Fuentes-Fuentes, 2013).

The proposed classification made of Technological Capabilities of exploration and operation is important due to that the uneven nature of the knowledge which flows in each case will require different decisions, regarding the disposition and use of resources and capabilities of the business and market opportunities. For this reason, the innovative firms develop Technological Capabilities of exploration and operation through the mobilization of resources technoscience for the improvement or creation of new products and successful innovative production processes. The processes involved in this development are knowledge processes that make possible to accumulate and exploit the new resources and relevant Technological Capability needed to face all the menaces and opportunities from a dynamic environment (Teece et al., 1997; Cool et al., 2002; Grant, 2002; Bueno et al., 2010a; Acosta-Prado and Longo-Somoza, 2013). The Technological Capabilities developed can be classified as follows (Acosta, 2010; Bueno et al., 2010a; Acosta-Prado et al., 2013)

Particularly, we suggest that the knowledge processes that make possible the accumulation and exploitation of the new resources and relevant Technological Capability are: Investments to acquire knowledge used to develop very specific activities; Use of knowledge derived from database, patents, etc, used to develop technologically improved or new products and services and which requires the utilization of different technologies; Easy storage of technological knowledge in soft, hardware or documents; Acquisition of knowledge through the hiring of qualified staff, through the relations with other firms and which involves a high degree of novelty and it is easily codified.

b) The Technological Capital in the Intellectus Model

It was Marshall who introduced the study of knowledge as a source of wealth creation in Economy in the 19th century (Bueno, 2002). He stated 'Knowledge is our most powerful engine of production' (Marshall, 1890). Along the last century the study of knowledge as firms' critical factor was developed by researchers such as Knight (1921), Hayek (1945), Drucker (1965) and Machlup (1980). People working in organizations commit themselves and contribute with their knowledge. Thus, firms acquire this knowledge which can become technology if it is developed and transmitted. Therefore, individual knowledge can be transformed into social or collective knowledge and shared by the members of an organization when transferred through oral or written language, that is, through knowledge processes (Acosta-Prado and Longo-Somoza, 2013; Argyris and Schön, 1978; Quinn, 1992; Von Krogh and Roos, 1995; Spender, 1996; De Geus, 1997; Cook and Brown, 1999; Bueno, 2005; Bueno et al., 2010b).

In organizations knowledge circulates in many ways. It circulates through articles or written procedures, and also through unwritten artefacts such as stories, specialized language, and common wisdom about cause-effect relationships. People observe and discuss, for example informal work routines, and, doing so, they exchange their experience, make sense of the information and also share and use their knowledge. Levering and managing knowledge involves getting people together in order they share insights they do not know they have. Through this social process of interaction and communication, members creates and expands knowledge (Nonaka, 1994; Nonaka and Takeuchi, 1995; Polanyi, 1969). In innovative firms, these social processes of knowledge construct and develop their Intellectual Capital or intangible assets (Acosta-Prado, Bueno and Longo-Somoza, 2014; Acosta-Prado and Longo-Somoza, 2013, Bueno et al, 2010a; Bueno et al., 2010b).

In spite of the relevance of knowledge processes in firms, it wasn't until the last decade of the 20th century when a great interest in knowledge management emerged as a way of levering the strategically relevant knowledge for the organization (Teece, 2000). Currently, traditional tangible assets are still important for firms but knowledge has become a key asset to manage in order to gain wealth creation and sustainable competitive advantages in a quick changeable environment (Boulton *et al.*, 2000;Lev, 2001; Low, 2000).These intangible assets based on knowledge have been recognized by the market and have generated the concept of Intellectual Capital (IC), which was proposed in 1990s (Edvinsson and Malone, 1997; Roos *et al.*,1997; Stewart, 1997; Sveiby, 1997).IC is generally defined as the intellectual material that can be put to use to create wealth. It includes organization's processes, technologies, patents, employees' skills and information about customers, suppliers and stakeholders (Stewart, 1997). Internationally they areaccepted three basic dimensions, they are Human Capital, Relational Capital and Structural Capital (Bueno, Salmador and Longo-Somoza, 2014).

Human Capital is concerned with the accumulated value or wealth generated by the values, knowledge and abilities of people (Human Intelligence) and it represents the stock of knowledge within an organization rather than in the minds of individual employees (Bontis *et al.*, 2002).

Structural Capital expresses the accumulated value or wealth generated by the value of the existing knowledge, which is property of the organization that generates its knowledge base. This knowledge is the combination of shared values, culture, routines, protocols, procedures, systems, technological developments and intellectual property of an organization which make up the collective know how and which remain in the entity whether people leave (Organizational Intelligence). The Structural Capital is divided in Organizational Capital and Technological Capital. The Organizational Capital is a combination of intangibles that structure and develop the organizational activity. That is, The Technological Capital is a combination of intangibles directly linked to the development of activities and functions of the technical system of the organization's operations which is responsible for obtaining products, developing efficient production processes and advancing the knowledge base necessary for future innovations in products and processes.

Relational Capital expresses the accumulated value or wealth generated by the value of the knowledge which comes to the organization through the relationships and actions shared with external or social agents (Social and Competitive Intelligence) and it refers to customers, social capital, and stakeholders (Bukh, 2003; Johanson *et al.*, 2001; Stewart, 1997; Ordoñez, 2003). The Relational Capital it is segmented in Business Capital and Social Capital. The former is directly related to the agents linked to the business process, and the latter is connected with the remaining agents (Bueno, 2002; Coleman, 1988; McElroy, 2001; Nahapiet and Goshal, 1998).

The Intellectus Model (Bueno and CIC-IADE, 2003, 2012) identifies and measures Intellectual Capital. It was designed in 2003 and revised in 2012 for the measurement and management of the intangible assets which compose the concept of Intellectual Capital. It was the result of the participation and consensus of public and private agents in the 'Knowledge and Innovation Intellectus Forum' as a reflection and transfer platform conducted by IADE, the University Research Institute in Business Administration of the *Universidad Autónoma de Madrid*. It shapes a tree which clarifies the interrelations between the firm's intangible assets through the identification of four levels of aggregation: components, elements, variables and indicators (Figure 1). The ability of the Intellectus Model to assess and measure Intellectual Capital resides in its capacity to adapt to the needs of each firm, because of it is systemic, open, dynamic, flexible, adaptive and innovative.

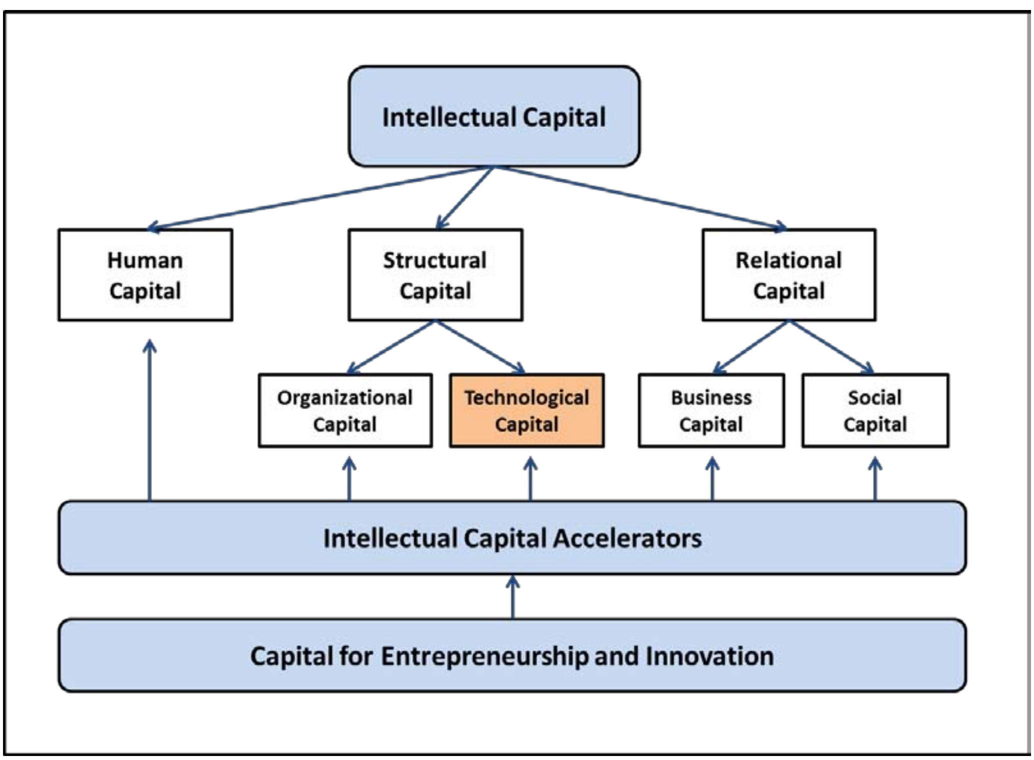


Figure 1 : Intellectus Model

Source: Bueno and CIC-IADE (2012)

To the purposes of this paper we have to focus on the Technological Capital. The Intellectus Model discloses the groups or elements of intangible assets in order to measure and manage the social processes of knowledge that compose the Technological Capital: Effort in Research and Development and Innovation (R&D&I); Technology Infrastructure; Intellectual and Industrial Property; and Technological Surveillance (Bueno and CIC-IADE, 2012).

These elements gather intangible assets with homogenous characteristics. Thus: Effort in R & D & Irefers to the efforts made in technological innovation processes; Technological Infrastructure is a Combination of knowledge, methods and techniques which the Organization incorporates into its processes so that they are more efficient and effective. They are accumulated through external sources; Intellectual and Industrial Property represents the legally protected knowledge which grants the firm which created it the exclusive right to its exploitation in a predetermined time and area; and Technological Surveillance is a set of tools and techniques to capture technological information outside the organization that expresses the ability to analyze it and convert into knowledge for decision-making to facilitate anticipate change and sustain competitive advantage. It is also known as competitive intelligence or organizational intelligence processes to cope with change, turbulence and uncertainty of the environment.

c) Relationship between Technological Capability and Technological Capital

The elements that relate the Technological Capability and the Technological Capital are the social processes of knowledge developed by an organization. They include a broad range of firm's activities, which help to generate new knowledge or improve the existing one(Acosta-Prado and Longo-Somoza, 2013, Bueno et al., 2010a; Bueno et al., 2010b). This knowledge is applied to the procurement of new goods and services and new forms of production (López*et al.*, 2004). As noted before, this is determined by the relationship between organizational characteristics and their outcomes and by the identification and sustainability of the organizational change, as well as the adaptation of the conditions, context and resources that make more efficient and faster the production of innovations facilitating the resolution of problems, fostering personal engagement and approaching these actions towards the creation of competitive advantage.

There are several the researchers who have related Technological Capability and Technological Capital through the knowledge processes generated by a firm. On the one hand Rogers (1996) relates the development of Technological Capability and Technological Capital, through the concept of *innovation of knowledge*, understanding that innovation is an informational process in which knowledge is acquired, processed and transferred (Escorsa and Maspons, 2001). Thus, the organization must recognize and seize new opportunities through the creation and use of the knowledge needed to develop Technological Capability and split the existing ones (Hamel and Prahalad, 1993; Woolley, 2010).

On the other hand, Aragon-Correa*et al.* (2005) suggest this relationship comes after the use of a specific technology, as a means to introduce a change in the firm, and they call this link innovation. This approach highlights the importance of linking technology to the organization both through its implementation, design and development, as well as through the underlying philosophy or culture of innovation (Orengo et al., 2001).Therefore, technological innovation is a process through which the firm may involve deeper changes in scientific and technological advances (Benavides, 1998), incorporated into new products and/or production processes carried out in order to adapt to the environment and create sustainable competitive advantages (Lopez et al., 2004).

Moreover, understanding technological innovation has led some authors to describe the phenomenon as a technological change, referred to the provision and use of technologies and the allocation of areas such as dynamism, specificity, interaction and social aspects to human action in the organizational context (Friedman, 1994). We would like to note that the coexistence of the terms used in the present, technological innovation and technological change, does not mean confrontation between them. Thus, West and Farr (1990) suggest that certainly any kind of innovation, in terms of organization, is a change, although not every change is innovation. Thus, technological innovation is a dimension of organizational change that reflects the intent of obtains a benefit, based on the development and operation of strategic technological intangibles which determine the innovating outcome (Cohen and Walsh, 2000; Cohen *et al.*, 2002; Woolley, 2010; Ruiz-Jiménez and Fuentes-Fuentes, 2013; Bueno, 2013).

For all the reasons stated, it can be said that the development of Technological Capability is the result of some processes of knowledge. Some other authors can also be named who study this aspect of the Technological Capabilities. Cohen and Levinthal (1990) propose they are the result of a lengthy process and of the accumulation of knowledge within the firm, which may be affected by facilitating factors or inhibitors of these capabilities (Cohen and Levinthal, 1990), process which involves both the effects of appropriation and obtaining knowledge (Cohen and Levinthal, 1990; Nieto and Quevedo, 2005) and the protection of competitive results (Cassiman and Veugelers, 2002). Therefore, it is necessary to develop a strategy in order to promote the proper exploration and operation of the Technological Capability that lead to new and innovative forms of competitive advantage, given a specific temporal dependence and a market position (Leonard-Barton, 1993).

The social aspect of Technological Capability and Technological Capital is also studied in the organizational literature. For example, Dawson (2000) states that development of Technological Capability of a firm principally depend of four aspects: the individual technology, organizational technology, behaviors and skills of individuals and organizational skills and behaviors. In this particular, Meso and Smith (2000) propose two points of view -technical and sociotechnical- in order to understand both the emergence of strategic assets and the knowledge transfer between employees and the firm and vice versa. The technical perspective is associated with the use of information technologies to support knowledge creation in the firm (e.g., databases, documentation systems, search and data mining systems, teams' decisions support systems, corporate portals, etc.). The sociotechnical perspective recognizes that the interdependent and complementary nature of knowledge should enable the firm assess the strategic relevance of its knowledge assets, and be able to establish the strategy that, in its business environment, leads to the formation of the most suitable knowledge base for achieving sustainable competitive advantages. Finally, they conclude that firms that only operate the tangible aspects of knowledge do not have a competitive advantage.

In addition, De Carolis and Deeds (1999) examine the relationship between knowledge and performance in the biotechnology industry. The accumulation of knowledge is the result not only of the internal developments but also the assimilation of external knowledge. While making operational the knowledge flow, they took into account three variables: location, alliances and R & D spending. Regarding inventories of organizational flows, they took the following variables: products in stage of development, firms' patents and researches. They concluded that the management of stocks and flows of knowledge seems to be something special to succeed. In any case, additional empirical investigations are needed to improve understanding between knowledge-intensive Technological Capabilities and business performance.

Another group authors such as Acosta-Prado and Longo-Somoza (2013), Acosta-Prado, Bueno and Longo-Somoza (2014), Bueno et al.(2010a),Bueno et al.(2010b) and Bueno (2013) state that there is a relation between the social processes of interaction developed by NTBFs to create and develop the Intellectual Capital and the ones focus on creating and developing the Technological Capabilities, and that they are processes of knowledge. Intensive knowledge firms hire a high proportion of qualified employees and researchers who think the best way to operate and exploit an invention and technological innovation is to develop actions of cooperating and working in group, and exchanging and sharing knowledge between all members through conversations. To facilitate these processes, they promote informal relations and design formal channels of communication, besides they construct and develop their Intellectual Capital and Technological Capability at the same time.

In conclusion we have made a literature review taking the strategic approaches of the firm as Resource-Based View (Wernerfelt, 1984; Barney, 1991; Grant, 1991) Dynamics Capabilities (Teece and Pisano, 1994; Teece et al., 1997; Eisenhardt and Martin, 2000; Teece, 2009) and knowledge-Based Theory (Kogut and Zander, 1992; Nonaka, 1994; Nonaka and Takeuchi, 1995; Zander and Kogut, 1995; Grant, 1996; Spender, 1996; Spender and Grant, 1996). This literature review leads us to propose that there is a relationship between the Technological Capability and the Technological Capital in the innovative firms. The reason is that both of them are created and developed by the same kind of social processes of knowledge. Moreover these social processes of knowledge involve the accumulation of knowledge within the firm, the assimilation of external knowledge, the individual technology, the organizational technology, the behaviors and skills of individuals and organizational skills and behaviors.

III. Empirical Research and Methods

a) *Research issue*

The theoretical background suggest the social processes of knowledge developed by innovative firms are core factors of Technological Capability and Technological Capital, they are the same processes and they are also a critical key to get competitive sustainable advantages. Therefore, grounded in this theoretical relationship, we empirically investigate what these social processes are and what Technological Capabilities and Technological Capital are constructed and developed by them in innovative firms. This relationship has been understudied in the organizational literature, however to innovative firms it is interesting to know in order to help organizations to understand "How they innovate" and, therefore, define their strategy and set the base of their success.

b) *Research context*

The empirical analysis was conducted in 35 New-Technology-Based Firms (NTBFs) of the Madrid Scientific Park (PCM) and the Leganés Science Park (LEGATEC), in the Community of Madrid, Spain. As NTBFs, they focused on sectors which had higher than average expenditures on R&D as a proportion of sales or they employed proportionately more qualified scientists and engineers than other sectors; also, they were independently owned business and based on the exploitation of an invention or technological innovation which implies substantial technological risks (Butchart, 1987; Little, 1977; Shearman and Burrell, 1988). Moreover, they were micro a small firms.A small firm is defined as an enterprise which employs fewer than 50 persons and whose annual turnover and/or annual balance sheet total does not exceed EUR 10 million. A micro firm is defined as an enterprise which employs less than 10 people and whose annual turnover and/or annual balance sheet total does not exceed EUR 2 million (European Commission, 2003).For all of these reasons, the firms of the sample can be qualified as innovative firms and suitable to test the research issue. Although the sample was not random, it reflected a representative selection of NTBF's established at the Science Madrid Park and Leganés Science Park.

Space prevents us from providing "thick descriptions" of each case (McClintock et al., 1979), however, Table 1 makes a brief description of the firms at the time of our analysis. The technical file of the empirical study showing the period and average durations of the interviews, the legal entity of the firms, their activity sector, the number of employees and informants or information source. The table discloses that the firms that took part in the study were micro and small firms as they have from 4 to 19 employees. Also, they were innovative firms established between 2000 and 2007 as Limited Companies and belong to activity sectors based on the exploitation of an invention or technological innovation. These sectors are: Information, Technology and Communications, Biotechnology and Agro-food and Environment and Renewable Energies. They employed qualified people with a PhD, Master or Bachelor Degree. The data-collection process took place in the period 2008-2009.

Table 1 : Technical File

Country-Region	Spain-Madrid
Activity sector	Information, Technology and Communications, Biotechnology, Agro-food, Environment, Renewable
	Energies
Samplingunit	NTBFs
Sample	35 NBTFs of the Madrid Science Park (PCM) and of the Leganés Science Park (LEGATE C)
Date of establishment	2000-2007
Employees	4-19
Informationsource	Promoter-Founder and/or CEO and one or two employees
Legal entity	LimitedCompany
Averagelength of interview	60 minutes
Date of collection	2008-2009

Source: Own elaboration

The criteria for selecting these firms were the following: 1)they had been recently founded and they asked for technical assistance in order to understand "how to innovate" as well as to develop successful ways of work in their critical first years, for that, they collaborated intensely in the research; 2) They carried out the identification and measurement of their Intellectual Capital using the Intellectus Model; 3) They were knowledge-intensive, based on the exploitation of an invention or technological innovation, employed a high proportion of qualified employees and skilled in highly specialized fields; 4) They belonged to different industries, and this allowed us to treat this element as a ceteris paribus variable and to focus on Technological Capabilities and Technological Capital shared by them. So, as mentioned, these firms were suitable to study the social processes of knowledge that constructed and developed Technological Capabilities and Technological Capital.

c) *Case study methodology*

The empirical study was conducted using a multiple-case study methodology suitable for answering "how" and "why" questions (Yin, 2014) and that also enables to use "controlled opportunism" to respond flexibly to new discoveries made while collecting new data (Eisenhardt, 1989). The comparison of case studies within the same context (NBTFs of the Madrid Science Park and of the Leganés Science Park) enables the "analytic generalization" through the replication of results, either literally (when similar responses emerged) or theoretically (when contrary results emerge for predictable reasons) (Yin, 2014). Thus we ensure that the evidence in one well-described setting is not wholly idiosyncratic (Miles and Huberman, 1984). Furthermore, the case study methodology provided a real-time study of this paper research issue in the natural field setting by investigating the 35 new technology-based firms of the sample. In addition, with this methodology we ensured that the data collection and the analysis met the tests of construct validity, reliability, and internal and external validity by carefully considering Yin's tactics (2014).

Construct validity was enhanced by establishing a chain of evidence when we concluded the interviews and by using the multiple sources of evidence such as interviews, observations and secondary data sources. The underlying rationale was "triangulation", which it is possible by using multiple data sources providing stronger substantiation of constructs and propositions (Webb et al., 1996). Reliability was promoted by: (a) Using a case-study protocol in which all firms and all informants were subjects to the same entry and exit procedures and interview questions; (b) using a pilot study was carried out to refine our data-collection plan with respect to both the content of the data and the procedures followed; (c) by creating similarly organized case data bases for each firm we visited. External validity was assured by the multiple-case research design itself, whereby all cases were NTBFs of Madrid Science Park and Leganés Science Park. Finally, we addressed internal validity by the pattern-matching data-analysis method described in "Data Analysis Procedure" section.

d) *Interviews*

The primary source of initial data collection came from semi-structured interviews with fifty two informants which lasted sixty minutes on average per case. We needed to obtain various points of view and to avoid slants so these interviews were conducted with several informants in each firm: the Promoter-Founder and/or CEO and one or two employees, all of them qualified people with a PhD, Master or Bachelor Degree. In order to obtain data about the social processes of knowledge, the Technological Capability and the Technological Capital, we divided the interviews in two stages. In the first stage, we asked the respondents global aspects of the firm such as: to describe his/her job in the firm, open questions about the history of the firm, activity sector, structure, core characteristics, strengths, customers, relations with the Scientific Park and other firms. In the second stage, we focused on areas such as the feeling of being a community, ways of share, storage and protect knowledge, climate between members, business philosophy, share values, the communications ways between them, departments or formal functions, infrastructures and financial support.

e) *Observations and Secondary Sources*

We used secondary sources and data to supplement the data obtained from the interviews and to collect background information about the 35 NTBFs. The secondary sources were annual reports, internal documents provided by the interviewees, meeting agendas, minutes, internal newsletters and intranets, industry reports, websites, and articles in magazines and newspapers about the situation and evolution of the industry and of the 35 NTBFs in particular. Additionally, we reviewed the firms' reports about the identification and measurement of their Technological Capital using the Intellectus Model. We also kept a record of the impressions and observations we made when we participated in firms' activities such as coffee breaks and lunches. Whenever possible, we attended meetings as passive note-takers. These observations provided real-time data. The impressions and observations were related with the social processes of knowledge and their results.

f) *Data Analysis Procedure*

The final explanation of the research issue of this multiple-case research has been the result of: (1) the theoretical propositions initially established about Technological Capital and Technological Capability; (2) an iterative process of comparisons between these propositions and the findings; (3) a continuous revision of the propositions. Specifically, toanalyze the collected data we set the general analytic strategy called "relying on theoretical propositions" (Yin, 2014). To follow this strategy first we described the theoretical propositions about the concepts of Technological Capital and Technological Capability in section 'Theoretical Background'. Second, these theoretical propositions will be the guide to analysis the empirical evidence (see 'Findings' section) to answer the research question stated in the 'Research Issue' section. Also, we have followed the explanation-building data-analysis method, which is a special type of pattern-matching method. We have chosen this method to analyze data because it is a relevant procedure for explanatory case studies where casual links are in narrative form (Yin, 2014).

Tables has been used as techniques of data-analysis. They have helped us to put in order the data, to make comparisons between the empirical evidence, and to present the relations between the data and the theoretical propositions (Miles and Huberman, 1984).

IV. Findings

The analysis of the collected data provided a preliminary understanding and description of the social processes of knowledge that construct and develop Technological Capability and Technological Capital in NTBFs. To do it we have identified their entire set of elements of tangible or intangible nature and the social processes of knowledge related with them.

Guided by the Theoretical Background section we started the analysis of the data searching bythe employees' interactions that help to generate new knowledge or improve the existing one. In other words, we looked for the actions of cooperating and working in group, and exchanging and sharing knowledge between all members through conversations. By doing this, we found the relevant social processes of knowledge, which contribute at the same time to the construction of the investigated firms' Technological Capability and Technological Capital. These processes are disclosed in the first column of Table 2. Also, in the second column we specified the activities involved in the processes, which are associated with science parks and influence in the construction of Technological Capability and Technological Capital.

Table 2 : Social Processes of Knowledge in NTBFs which influence their Technological Capability and Technological Capital

Social Processes of Knowledge	Activities involved in the Social Processes of Knowledge
Processes of intrinsic nature of innovative firms	Technological surveillance and adaptation at changing environment
	R&D&I expenses (total sales and total production)
	Specialization of personnel in R&D&I
	Projects in R&D&I
	Purchase of technology
	Infrastructure of production technology
	Infrastructure of information and communication technologies
Processes of external nature of innovative firms	Relevant customer base
	Generation of Cooperation Networks
	Permanent Updating
	Knowledge of competitors
	Relationships with suppliers
	Relationships with public administration
	Relationships with institutions and investors
Processes of intrinsic nature of innovative firms associated with science parks	Learning environment
	Capture and transmission of knowledge
	Creation and development of knowledge
	Strategic Alliances
	Intellectual and industrial property
Processes of external nature of innovative firms associated with science parks	Support for internationalization
	Access to new financial instruments

Source: Own elaboration

The analysis of the data also provided the relevant Technological Capabilities developed by the NTFBs of the sample. These capabilities are:

1. Investments to acquire knowledge used to develop very specific activities.
2. Use of knowledge derived from database, patents, technical reports, etc.
3. Acquisition of knowledge that involves a high degree of novelty.
4. Use of the technology which requires the utilization of a combination of different technologies.
5. Acquisition of knowledge through the hiring of qualified staff.
6. Use of knowledge to develop technologically improved products and services.
7. Use of knowledge to develop technologically new products and services.
8. Easy storage of technological knowledge in soft, hardware or documents.

The data also revealed the Technological Capital of the NTBFs. The analysis showed that the firms of the sample have a strong Technological Capital to ensure their growth and survival. They refers to a set of intangibles associated with the development of activities and functions of the technical system of the firm, responsible both for the delivery of outputs (goods and services) with a set of specific attributes and the development of efficient production processes and for the progress on the knowledge base needed to develop future innovations in products and services. We matched the Technological Capital addressing during the interviews with the nomenclature in the Intellectus Model, moreover we classified the Technological Capital in strengths and areas for improvement. The results are showed in Table 3. Data analysis also allow us to ensure that only those NTBFs able to efficiently manage their technological knowledge may alter their resource base and routines based on the strategic requirements of their environment.

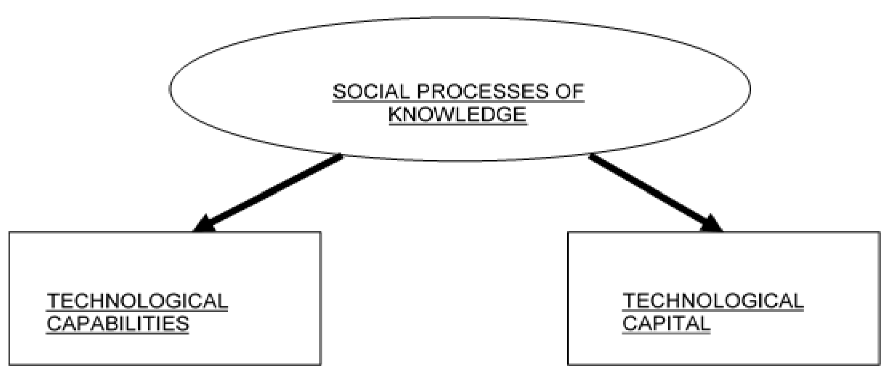
Table 3 : Technological Capital in NTBFs

	Nomenclature in the Intellectus Model	Concepts address during the interviews
Strengths	Effort in R&D&I	Guidance to R&D
	Intellectual and industrial property	Differentiation of the offer
	Technological infrastructure	Specialized know-how
	Intellectual and industrial property	Sensibility and development of the intellectual property
Areas for improvement	Technological Surveillance System	Technological surveillance
	Networking of international R&D	Effort in R&D&I
	Advantages of the offer	Intellectual and industrial property

Source: Own elaboration

Summarizing, the data analysis corroborates the research issue, which asserts the social processes of knowledge developed by innovative firms are core factors of Technological Capability and Technological Capital. This processes describes how NTBFs innovate to achieve success. Specifically, when innovative firms develop their Technological Capability through of the mobilization of resources technoscience for the improvement or creation of new products and innovative production processes successfully, at the same time, they are also constructing the elements of their Technological Capital. The model shows in Figure 2 summarises the findings showing the knowledge process which contribute at the same time to the construction and development of Technological Capability and the Technological Capital.

Figure 2 : Knowledge processes, Technological Capabilities and Technological Capital in NTBFs



Source: Own elaboration

V. Conclusions and Managerial Implications

In this paper we have studied the relationship between the Technological Capability and the Intellectual Capital in innovation firms. After a review of the literature about this two concepts, we have proposed that the social processes of knowledge developed by innovative firms are core factors of Technological Capability and Technological Capital.

Specifically, we proposed that When the members of innovative firms interact to mobilize knowledge, they create and develop the firm's Technological Capability and, at the same time, the Technological Capital. The organizational literature has already studied how Technological Capital and Technological Capability are key elements in the processes of strategic change and in situations of external context changes. However, past studies have not explored in depth the relationship between Technological Capability and Technological Capital in new organizations.

The model in Figure 2 summarises the findings showing the social process of knowledge that contribute to the construction and development of Technological Capability and the Technological Capital at the same time.The processes involve the accumulation of knowledge within the firm, the assimilation of external knowledge, the individual technology, the organizational technology, the behaviors and skills of individuals and organizational skills and behaviors. The result are Technological Capabilities and Technological Capital which are critical factors for achieving competitive sustainable advantages. Fromthe Resource-Based View strategic approach, the Dynamics Capabilities approach and the Knowledge-Based Theory, we cannot avoid emphasizing the importance of knowledge for firms and countries to find the way back to growth hence the importance of studying its processes and results.

We framed the paper by making a theoretical review of the Technological Capital in the Intellectus Model, as a model of measurement of Intellectual Capital, and by discussing the main approaches in the field of the Technological Capability. We have concluded that the more adequate approach to develop our research was the Intellectual Capital and the Resource-Based View, Dynamics Capabilities and knowledge-Based Theory. To test the research issue, we have selected a case study methodology and we have used as primary data collection instrument semi-structured interviews, and as secondary data collection instruments observation and secondary resources. Tus, we conducted a multiple-case study to analyze the relationship between the construction and development of Technological Capability and Technological Capital in 35 new technology-based firms created at the Madrid Science Park and the Leganés Science Park, which are innovative firms.

The objective of the interviews was understand how the NTBFs construct their Technological Capability to answer the question "How do they innovate?" Doing this we have found (Figure2): (1) the social processes of knowledge that contribute to the construction and development of the Technological Capability and the Technological Capital at the same time; (2) the Technology Capabilities develop in NTBFs; (3) the variables of the Technological Capital that were also constructed. These findings allow us to conclude that during the processes of construction of Technological Capability the 35 new technology-based firms of the study also constructed their Technological Capital. Following Intellectus Model, we have identified the elements of Technological Capital and the strengths and areas of improvement in these firms (Table 3): Effort in R & D & I; Technological infrastructure; Intellectual and industrial property; Technological surveillance.

Therefore, in the 35 NTBFs analyzed the data corroborates the research issue, that is, the social processes of knowledge developed by innovative firms are critical factors of Technological Capital and Technological Capability. The NTBFs of the sample were small and micro innovative firms with a high proportion of employees and researchers qualified who develop social processes of knowledge in order to develop the best way to explore and exploit an invention and technological innovation through working in group, exchanging and sharing knowledge between all the members through conversations, infrastructure of information and communication technologies and infrastructure of production technologies.

The contribution of our analysis is both theoretical and practical. On one hand, from a theoretical point of view, we have proposed: (1) a definition of Technological Capability; (2) a classification of Technological Capabilities; (3) and a theoretical relationship between Technological Capabilities and Intellectual Capital, specifically the Technological Capital, through social processes of knowledge. Furthermore, we have treated two outstanding concepts in organizational literature that have hardly been investigated empirically together which are: Technological Capabilities and Intellectual Capital. On the other hand, from a practical point of view, the findings of our empirical analysis will help innovation firms' members, and stakeholders (investors, government, etc.)in general to make suitable strategic and tactic decisions in order to get sustainable competitive advantages and, therefore, success in a quickly changeable environment by managing: (1) the social processes of knowledge which construct and develop Technological Capability and Technological Capital; (2) the specific Technological Capabilities and elements of Technological Capital constructed and developed; (3) and the strengths and areas for improvement in the Technological Capital.

It can be concluded that, the congruence between the Technological Capability and Intellectual Capital development promotes the adaptability of NTBFs to the environment and the absorption of information and generation of useful knowledge by carrying out actions that impact the outcome of the NTBF such as profitability, sales or profit growth and productivity at work. Also, Technological Capabilities and Technological Capital play an important role because, through its dynamic function, they are responsible for a support activity, and give the firm appropriate resources and routines, needed to create value both directly and indirectly. Directly in primary activities and indirectly, ensuring the quality, reliability, profitability and competitiveness of technological knowledge, and supporting activities whose outcome can serve to improve the knowledge base and the relationship between the firm and its customers, the quality of its products and services, but also the level of employee satisfaction, among others. All of this, through the social processes of acquisition, development and dissemination of knowledge to generate competitive advantage and create value for the firm.

VI. Limitations and Future Research

As every empirical research ours is not free of limitations, which serve as guidelines for future studies in the field of Social Processes of Knowledge, Technological Capability and its relationship with the Intellectual Capital. We want to address them through alternative analysis in future researches.

The research issue was tested using a multiple-case methodology in 35 NTBFs created at the Madrid Science Park and Leganés Science Park so the findings cannot be generalized. However, these findings can serve as a starting point for future research to make generalizations in the context of NTBFs and in the context of other sciences parks and even in other kind of new organizations different from NTBFs. Moreover, we have focused our efforts in studying the relationship between the construction of Technological Capability and the Technological Capital of 35 NTBFs. However, we have not analyzed the relation of these concepts to the success of these firms.

Finally, in the 'Theoretical Background' section we have made a literature review to support our proposal that the social processes of knowledge developed by innovative firms are critical factors of Technological Capital and Technological Capability. Accordingly, we have applied a case study methodology to identify these processes and identify the Technological Capital and the Technological Capabilities they develop. However, it would be very interesting to study these processes characteristics, their potential to strengthen the resources base and capabilities of the firms and how, when they are accumulated and levered together, lead to the emergence of Technological Capabilities and Technological Capital.

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Impact of Working Environment on Less Productivity in RMG Industries: a Study on Bangladesh RMG Sector

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Abstract- The readymade garments industry (RMG) sector acts as the backbone of Bangladesh economy and is considered as a catalyst for the development of the country. Despite having epic growth of the RMG sector, and its bright prospects, challenges are still there. One of the biggest challenges currently faced by RMG industries of Bangladesh is to ensure better working conditions for the millions of garment workers which might have salient impacts in accelerating productivity to compete in global export market.

Keywords: working environment, less productivity, rmg sector, multiple regression, anova, hypothesis.

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Strictly as per the compliance and regulations of:

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Prosanjit Saha [α] & Sumon Mazumder [σ]

Abstract- The readymade garments industry (RMG) sector acts as the backbone of Bangladesh economy and is considered as a catalyst for the development of the country. Despite having epic growth of the RMG sector, and its bright prospects, challenges are still there. One of the biggest challenges currently faced by RMG industries of Bangladesh is to ensure better working conditions for the millions of garment workers which might have salient impacts in accelerating productivity to compete in global export market. So, it was imperative to observe the significance of working conditions on the productivity of RMG sector. By the research work different parameters of working environment leading to less productivity of RMG industries are identified and examined through the application of some important statistical tools like descriptive analysis, analysis of variance (ANOVA) and hypothesis test. Based on empirical analysis crucial environmental factors are underscored to improve the productivity of those industries.

Keywords: working environment, less productivity, rmg sector, multiple regression, anova, hypothesis.

I. Introduction

The Readymade Garments (RMG) industry plays a vital role in economic growth of Bangladesh which contributes to 76% of national exports and 90% of manufacturing goods exports (Export Promotion Bureau of BD, 2011). The garment industry is highly labor-intensive and employs approximately two million workers, out of which 90 per cent are women (UNIDO, 2011). Despite having the magnificent growth, RMG sector is facing some challenges now-a-days. One of the biggest challenges currently faced by RMG industry of Bangladesh is to ensure workplace safety and better working conditions for the millions of garment workers. Two major accidents, the Tazreen fire and the Rana Plaza collapse, have brought the issue of workplace safety to the fore and led all stakeholders to act accordingly. The government, the International Labor Organization (ILO) and the buyers have been working together to improve working conditions in garment factories and the discontent of workers over wages has also subsided to a great extent with the implementation of the new wage board award. Bangladesh is now improving its competitiveness in this major manufacturing industry by reducing total production and distribution time, which will improve surface-level competitiveness by improving total productivity. Simply stated when people produce something with least amounts of resource being used then it can be called as productivity. It has been further explained that productivity is the ratio how well an organization converts input resources into goods and services [1]. The level of productivity surely depends on workers performance but there is a single most influential factor that can affect the performance of workers during production and that is the working environment. The quality of comfort derivable from work environment determines the level of satisfaction and productivity of workers. If the working environment is not conducive then the productivity of the workers cannot be optimized.

Plummeting productivity in the RMG sector of Bangladesh is a prime concern that can compromise the level of output and ultimately hurt the overall economy of Bangladesh. That is why workforce productivity remains a primary element for success in most organizations especially in the manufacturing industry like the RMG sector. Productivity is defined as a measure of quantifying the output against the amount of input. It expresses the relationship between the quantity of goods and services produced (output) and the quantity of labor, capital, land, energy, and other resources to produce it (input) [2]. It has been shown in different studies that the condition of the work environment and the productivity is inextricably linked [3-7]. The work environment is a composite of three major sub environments viz: the technical environment, the human environment and the organizational environment [7]. The work environment has effect on the performance of employees. The type of work environment in which employees operate determines the way in which such enterprises prosper. The physical layouts along with the effective and efficient management processes are playing an important role in enhancing employees' productivity and organizational performance [1]. Work environment as "an entirely" which comprises the totality of forces, actions and other influential factors that are currently and, or potentially contending with the employee's activities and performance [3]. Work environment is the sum of the

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interrelationship that exists within the employees and between the employees and the environment in which the employees work [4].

It is quite evident now that there can be lots of influential work environment factors that can inhibit the performance of the workers and the result will be low productivity. So to have a deep understanding it is an essential prerequisite to examine the work environment factors that is responsible for less productivity. It is the number of management functions: provision of adequate fringe benefits, supervision, work method and organization, in the work environment which appear to have been the key factor inhibiting higher productivity [8]. It has also been identified supervision, subordinates, co-workers inefficiency as the major variables that influence productivity [9]. The empowerment of employees and the flexibility of the working environment are covered by three key productivity factors: “inadequate supervision and employee involvement in decision-making, too much work, and insufficient rewards and chances to advance” [10]. Inefficient planning of work and organizational structure by management followed by poor management leadership in demonstrating and leading change are the two greatest obstacles to productivity [11]. In a survey it was reported that nine out of ten workers believed that a workspace quality affects the attitude of employees and increases their productivity [12]. It has been confirmed in another research work that unsafe and unhealthy workplace environment in terms of poor ventilation, inappropriate lighting, excessive noise etc. affect workers productivity and health [13].

However, the manufacturing sector especially the apparel industry in many countries is in a state of transition. Owing to the intense competition faced by the labour intensive, low cost and wage economies manufacturing giant like China, India, the established players prefer to move up the manufacturing value chain to compete on technology and innovation. As a result manufacturing companies try to redefine, redesign and improve their production systems to meet the competitiveness demanded by the challenges of present markets [14-15]. However in this prevailing situation, the Bangladesh’s RMG sector has not yet achieved its full potential. Considering this situation, this study will examine the major working environmental factors causing low productivity in RMG sectors of Bangladesh. There are a lot of studies on the RMG sectors of Bangladesh but few literatures have been found scrutinizing the working environmental factors responsible for low productivity.

II. Methodology

The study had been carried out in four RMG industries (appendix-A) of Bangladesh having variation in its production capacity and product category (woven or knit). The objectives of this study were to identify and examine the working environment factors causing low productivity in RMG sectors of Bangladesh, to what extent are factors in the work environment perceived as having adverse effects on productivity?, how important are some specifically named facilities in the work environment to enhancing workers’ productivity? And to obtain different aspects relating to the working environment and productivity in the garments sector that improves the understanding about the concepts.

The survey instrument is considered in three parts. In the first section demographic data was collected, the second section was on the rating of different independent variables to see their impact upon less productivity and in the section three several questions were asked to the respondents to state their agreement of each of the statement on a five point rating scale (1-Strongly Disagree, 2-Disagree, 3-Neutral, 4-Agree, 5-Strongly Agree). We have used multiple regression for our data analysis. The purpose of this mechanism is to measure the relative influence of each independent variable (insufficient and ineffective co-workers, inadequate monetary and non monetary rewards, political chaos in the country, outdated system, ineffective management, discrimination and biasness inside the organization, unsafe and unfavourable working condition in the workplace) on the dependent variable (less productivity in the RMG sector). Thus following model is developed to test the significance of stated relationship. The regression used in a model is given below:

$$Y_{(\text{Less Productivity in RMG sector})} = b_0+b_1x_1+b_2x_2+b_3x_3+b_4x_4+b_5x_5+b_6x_6+b_7x_7+e_i$$

Where, b_0 = Constant

X_1 = Ineffective Management

X_2 = Outdated system

X_3 = Inadequate monetary and non monetary rewards

X_4 = Unsafe and unfavourable working condition in the workplace

X_5 = Insufficient and ineffective co-workers

X_6 = Political chaos in the country

X_7 = Discrimination and biasness inside the organization

e_i = Error term

The relative significance of each of the independent variable on the dependent variable can be measured from the associated coefficient. We also will test the hypothesis based on the significance level below 0.05 where H_0 is the null hypothesis and H_1 is the alternative hypothesis, the hypothesis breakdown is given below:

H_0 : H_1, H_2, H_3, H_4, H_5, H_6 and H_7 do not have any impact on less productivity in the RMG sector

H_1 : Ineffective Management has a strong impact on less productivity in the RMG sector

H_2 : Outdated system has a strong impact on less productivity in the RMG sector

H_3 : Inadequate monetary and nonmonetary rewards have a strong impact on less productivity in the RMG sector

H_4 : Unsafe and unfavourable working conditions have a strong impact on less productivity in the RMG sector

H_5 : Insufficient and ineffective co-workers has a strong impact on less productivity in the RMG sector

H_6 : Political chaos has a strong impact on less productivity in the RMG sector

H_7 : Discrimination and biasness in the workplace has a strong impact on less productivity in the RMG sector

III. Data Analysis and Findings

In order to analyze the results of our collected data we firstly described the descriptive statistics, then the model summary with the significance level of the data after that we moved to the analysis of variance (ANOVA) to see the F statistic and finally we described parameters with Beta co-efficient to see what is the level of influence of predictors on the low productivity in the RMG sectors.

a) Descriptive Analysis of the Sample

The questionnaire was completed using face to face interviews, for 15 days in 4 different garment factories in Dhaka and nearby locations namely, Style Garden Ltd., Fakir Apparels Ltd., AJI Apparels Industry Ltd. and MIM dresses Ltd. We completed around 112 questionnaires but after eliminations of those containing errors, we finally retained 100 where the skilled workers (65%) were the most, the rest dominant respondents were the semiskilled (24%) workers. The sample was unbalanced in terms of male-female ratio (Male was 32% and the Female 68%) and most of the respondents ages was between 20-25 (78%) where, ages more than 25 was about 18%. Since the low productivity is a negative issue and the size of our questionnaire was quite elaborative, we conduct the interviews considering the respondent's convenient time to give them enough time to deduce the unbiased and logical responses.

Table 1 : Descriptive Statistics

Working Environmental Factors	Mean	Std. Deviation	N
Ineffective Management	4.41	0.647	100
Discrimination and biasness inside the organization	2.99	1.040	100
Outdated system	4.38	0.774	100
Inadequate monetary and non monetary rewards	4.20	0.829	100
Political chaos in the country	2.90	1.000	100
Unsafe and unfavourable working condition in the workplace	4.17	0.682	100
Insufficient and ineffective co-workers	4.08	0.761	100

It is quite evident from the table 1, that the mean response was highest in the ineffective management (m=4.41) variable that means most respondents agree that there is a positive influence of this factor on the less productivity and the outdated system (m=4.38), rewards (m=4.20), unsafe environment (m=4.17), ineffective co-workers (m=4.08) in the descending order of importance have also positive responses on less productivity from the respondents of the RMG sector. But it is found that the political chaos (m=2.90) and discrimination in the workplace (m=2.99) are the two variables that concede neutral or negative responses from the respondents.

Table 2 : Mo del Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	0.811[a]	0.658	0.602	0.255	0.658	11.569	7	42	0.000	0.380

In table 2, we found a strong correlation (R= 0.81 or 81%) between the predictors or independent variables and the less productivity in the RMG sectors. The R2= 0.658 that means predictors can explain 65% of the variation in low productivity that seems very good. The most important thing in this table is adjusted R2(0.602) that suggests adding each of the independent variables after the first independent variable, makes a 60% contribution in explaining the variation in the less productivity in RMG sector and the significance F change (0.000) is significant at 99% that is very satisfactory to prove the model is very fit and the Durbin-Watson residual factor is 0.380 that is quite close to 0 denotes the study has been done in an exhaustive way leaving very few responses been examined.

b) Analysis of Variance (ANOVA)

Table 3 : Analysis of Variance (ANOVA)

Model		Sum of Squares	Df	Mean Square	F	Significance
1	Regression	5.268	7	0.753	11.569	0.000[a]
	Residual	2.732	42	0.065		
	Total	8.000	49			

Here “a” indicate predictors (Constant): Insufficient and ineffective co-workers, Political chaos in the country, Discrimination and biasness inside the organization, Inadequate monetary and non monetary rewards, Ineffective Management, Unsafety and unfavourable working condition in the workplace, Outdated system.

In table 3 we analyzed the variance of the variables loaded in the model to examine if there is any relationship exists between the dependent variable less productivity and the independent variables. The significance level of the F value determines the goodness of fit of the model. Typically, if significance is greater than 0.05, we conclude that our model could not fit the data. If significance < 0.01, then the model is significant at 99%; In this study, we can see that significant is 0.000 that is < 0.01; so we can conclude that the model is significant at 99% and we can accept the model.

Table 4 : Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Significance
		B	Std. Error	Beta		
1	(Constant)	1.195	0.268		2.317	0.003
	Ineffective Management	0.789	0.032	0.318	3.707	0.000
	Discrimination and biasness inside the organization	0.049	0.072	0.326	0.991	0.241
	Outdated system	0.510	0.030	-0.189	2.667	0.002
	Inadequate monetary and non monetary rewards	0.474	0.032	0.638	2.044	0.001
	Political chaos in the country	-0.038	0.031	0.046	0.115	0.910
	Unsafe and unfavourable working condition in the workplace	0.422	0.052	0.034	0.109	0.000
	Insufficient and ineffective co-workers	0.313	0.076	0.316	1.131	0.004

Analysis of coefficient provides us which independent variables have significant relationship with the dependent variables and provides us the importance of each independent variable independently. Here, Beta (B) depicts that every unit change in the independent variable can cause a certain portion impact on the dependent variable. To clarify the coefficient the following regression model is formulated:

Less Productivity in RMG Sector (Y) = 1.195 + 0.789*Ineffective Management + 0.049*Discrimination in the workplace + 0.51*Outdated system + 0.474*Inadequate monetary and monetary rewards - 0.038*Political Chaos + 0.422*Unsafe working condition + 0.313*insufficient and ineffective co-workers

The relative coefficient of independent variables describes the relative importance to contribute the less productivity in RMG sector.

c) Testing of hypothesis

Here, we see that the Ineffective Management (0.000), outdated system (0.002), inadequate monetary and monetary rewards (0.001), unsafe working condition (0.000), insufficient and ineffective co-workers (0.004) have a strong [Significance at 0.05 levels] impact on the less productivity in the RMG sector of Bangladesh. From these results we can validate the following hypothesis:

H_1: Ineffective Management has a strong impact on less productivity in the RMG sector

H_2: Outdated system has a strong impact on less productivity in the RMG sector

H_3: Inadequate Monetary and nonmonetary rewards have a strong impact on less productivity in the RMG sector

H_4: Unsafe and unfavourable working condition has a strong impact on less productivity in the RMG sector

H_5: Insufficient and ineffective co-workers has a strong impact on less productivity in the RMG sector

The following two hypotheses are rejected completely because in both cases the significance level was above 0.05:

H_6: Political chaos (0.910) has a strong impact on less productivity in the RMG sector

H_7: Discrimination and biasness in the workplace (0.241) has a strong impact on less productivity in the RMG sector

Thus, we can conclude that the less productivity in the RMG sector caused mostly by the ineffective management, outdated system of the factory, Inadequate Monetary and Non-monetary rewards, Unsafe and unfavourable working environment and the Insufficient and ineffective co-workers. Ineffective management is the most significant factor (Every unit of ineffective management can cause 0.789 unit of less productivity) that have strong impact a on the less productivity followed by Outdated system, Inadequate Monetary and non Monetary rewards, Unsafe working conditions and the insufficient and ineffective co-workers. The Discrimination and biasness in the workplace does not seem to have a strong impact (can cause only 0.049 unit of less productivity) upon less productivity. The Political chaos in the country is the only factor which is not considered as the criteria that can have some impact on less productivity.

IV. Conclusions

One of the main reasons why the developing country like Bangladesh cannot burgeon rapidly is underutilizing the resources available. The RMG sector in Bangladesh is now prospering in a brisk manner that can be an opportunity for Bangladesh to familiarize it as an industrialized country but the problem is it barely capitalizes its human and other resources that can give it a much needed competitive advantage than that of other countries. To be so, it should boost up the productivity of this industry in the highest level and reconcile all the negative issues that can have even a slim negative impact on this mammoth sector.

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Appendix-A

RMG Industry Profile

Name of the Industry:

Style Garden Ltd.	
Location	: Mirpur-12, Dhaka-1216.
Type	: Only garment making
Nature	: Supporting industry
IE activities	: None
Certification	: None
Clients	: Exposures Ltd.
Production lines	: 01
Production capacity/day	: 550 pieces
Workforce	: 150
Type of products manufactured	: Ski Jacket and Long Pant
Fakir Apparels Ltd.	
Location	: BSCIC, Hosiery Industrial Estate, Narayangonj.
Type	: Composite (Knitting, Dyeing, Printing & Garment)
Nature	: 100% export oriented industry
IE activities	: Yes
Certification	: Oeko-Tex and WRAP
Clients	: H & M, Gap, Levi's, Esprit, S.Oliver, Tesco etc.
Production lines	: 90
Production capacity/day	: 1, 40, 000 pieces
Workforce	: 7,500
Type of products manufactured	: T-Shirt, Polo Shirt, Tank Top, Mens Shorts etc.
AJI Apparels Industry Ltd.	
Location	: 226, Singair Road, Hemayetpur, Savar, Dhaka.
Type	: Composite (Knitting, Dyeing, Printing & Garment)
Nature	: 100% export oriented industry
IE activities	: Yes
Certification	: ISO
Clients	: Carrefour, Tesco, Wal-Mart, Sears, K mart etc.
Production lines	: 44
Production capacity/day	: 48, 600 pieces
Workforce	: 2, 200
Type of products manufactured	: Mens Polo Shirt

MIM Dresses Ltd.	
Location	: Baishaki Super Market (2nd Floor), Mirpur-1, Dhaka.
Type	: Only garment making
Nature	: Sub-contract industry
IE activities	: None
Certification	: None
Clients	: New Yorker
Production lines	: 02
Production capacity/day	: 2, 400 pieces
Workforce	: 200
Type of products manufactured	: Mens Half Shirt and Ladies Skirt

Appendix-B

(Questionnaire for Impact of Working Environment on Less Productivity in RMG Industries)

Section 1: Demographic Data

The following questions are related to demographic information. For each question, please choose one answer that is the most appropriate for you.

1. What is your Gender? ☐ Male ☐ Female	
2. What is your Age? ☐ 15-24 ☐ 25-34 ☐ 35-44 ☐ 45-54 ☐ 55 and above	
3. What is your monthly income in BDT? ☐ Less than Tk. 2000 ☐ Tk. 2000-3000 ☐ Tk.3000-4000 ☐ Tk.4000-5000 ☐ More than 5000	
4. What is your Level of Education? ☐ No education ☐ Primary ☐ Secondary ☐ Diploma ☐ Higher secondary or Higher	
5. What is the working duration of you in this company in Years? ☐ 1-2 ☐ 3-4 ☐ 5-6 ☐ 7-8 ☐ Over 8	
6. What is your skill level? ☐ Unskilled ☐ Novice ☐ Semi skilled ☐ Skilled ☐ Expert	

Section 2: Rating the factors responsible for low productivity in your garments industry

Dear respondent, Please rate the following factors regarding the reasons of less productivity in your organization:

Factors responsible for low productivity	1 (lowest)	2	3	4	5 (highest)
1. Ineffective Management (uneducated and inexperienced management body)					
2. Discrimination					
3. Outdated System					
4. Inadequate monetary and non-monetary rewards					
5. Political Chaos					
6.Unsafe and risky environment					
7. Insufficient and ineffective co-workers					
8. For others, please specify:					

Section 3: Questionnaire regarding workplace environmental factors responsible for low productivity in RMG industries

The workplace environment is highly accountable for the efficiency of the workers; workers usually respond and do better in the favourable working environment. So, the negative environmental factors those are responsible for less productivity needs to be identified. Please indicate how you strongly agree or disagree to the following statements and just stipulate the tick (√) marks in the box:

1. Strongly disagree 2.Disagree 3.Neutral
4. Agree 5. Strongly agree

Sl. No.	Statement	1	2	3	4	5
1.	Positive philosophy/culture of management body enthuse me to work productively					
	Inefficient planning of work and the organizational structure imposed by management affects the working environment that leads to low productivity					
	Strict supervision affects the concentration of doing my job properly					
	Because of inadequate and inexperienced supervision there is a limited chance to advance					
	The team leaders rude behaviour affects the performance of my job					
	The autocratic and non-participative leadership of superiors hampers my productivity					
2.	The overall sophisticated operational system and the technologies helps me to give my best outcome					
	Insufficient equipment and outdated system of resource processing lowers the productivity of work					
3.	The recognition of my performance motivates me to work hard					
	Regular payment of salary and wage encourages me to give the organization my favour in return					
4.	The proper lighting, ventilation, available space to move on assists me to foster my ability to take workload					
	The suffocated atmosphere, the physical layout inside the workplace vacillate my productivity					
5.	Presence of safety equipment and hazard prevention facilities increases my productivity					
	I always become tensed about the safety and health hazard issues that lowers my productivity					
6.	Inefficient co-workers linger the process that lowers my productivity					
	I feel my performance usually boosts up when I work with the likewise skilled person					
7.	The biasness and discrimination in the workplace affect my working ability					
	The political instability prevailing in the country affects my performance					

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The Role of Environmental Uncertainty in the Link between Accounting Information System and Performance Small and Medium Enterprises in Iraq

By Emad Harash

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Abstract- This article is useful to small and medium enterprises (SMEs) managers in their decisions on the adoption of accounting information system (AIS) that should fit the environmental uncertainty of SMEs, which will help them to attain competitive advantages as well as better performance. The article examines the impact of environmental uncertainty as moderating on the relationship between AIS and performance SMEs Iraq. The empirical studies investigating a direct relationship between AIS and performance SMEs have attracted criticisms, including the use of a bivariate methodology.

Keywords: Performance SMEs, Accounting information system (AIS), Environmental uncertainty.

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THEROLEOFENVIRONMENTALUNCERTAINTYINTHELINKBETWEENACCOUNTINGINFORMATIONSYSTEMANDPERFORMANCESMALLANDMEDIUMENTERPRISESINIRAQ

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Abstract- This article is useful to small and medium enterprises (SMEs) managers in their decisions on the adoption of accounting information system (AIS) that should fit the environmental uncertainty of SMEs, which will help them to attain competitive advantages as well as better performance. The article examines the impact of environmental uncertainty as moderating on the relationship between AIS and performance SMEs Iraq. The empirical studies investigating a direct relationship between AIS and performance SMEs have attracted criticisms, including the use of a bivariate methodology. While this relationship is critical to organizations using AIS, the critics suggest that other factors will effect on the relationship between AIS and performance SMEs. In this article, the authors propose that dimensions of environmental uncertainty are important moderators on relationship between AIS and performance SMEs.

Keywords: Performance SMEs, Accounting information system (AIS), Environmental uncertainty.

I. Introduction

Small and medium enterprises (SMEs) outnumber large companies by a wide margin and play an important economic role in many countries. SMEs particularly have a vital role to play in the development of Iraq. For example the available data from the Central Organization for Statistics (COS) indicates that private sector in Iraq consists primarily of SMEs (Harash et al. 2013a,b,c). But despite their significance, SMEs are faced with the threat of failure with past statistics indicating that three out five fail within the first few months. In the previous literature the use AIS can play a dominant role in assisting SMEs to performance small and medium enterprises better and stronger. Where, that many researchers are of the opinion that the role of AIS is important to enable SMEs to develop performance there. To achieve this goal, SMEs need to be responsive to the changes in the environments, in particular to the information technology revolution. Nowadays, information technology is a must in many SMEs. It is difficult to gain competitive advantage and survive without some adoption or implementation of this advancement in technological products. Studies has shown that the most widely use information system is accounting information system, specifically in financial reporting aspects (Marriot and Marriot, 2000; Riemenschneider and Mykytyn Jr, 2000; and Ismail, 2007).

II. Performance SMEs

SMEs performance in today's economic environment is a critical issue for academic scholars and practicing managers. In general, performance is defined as the operational ability to satisfy the desires of the company's major shareholders (Smith & Reece, 1999). Performance is referred to as being about doing the work, as well as being about the results achieved. Performance is a multidimensional construct, the measurement of which varies, depending on a variety of factors that comprise it (Mwita, 2000). Performance management is a systematic process by which an organization involves its employees, as individuals or teams, in improving organizational effectiveness in the accomplishment of mission and goals.

Performance and success have been defined in various ways in the literature, and in any business, the related parties always want to see good performance in their business (Islam et al. 2011). In general, performance management includes activities to ensure that goals are consistently being met in an effective and efficient manner. Performance management can focus on performance of the organization, a department, processes to build a product or service, employees, etc. The performance is the result of strategies the company employs to achieve market-oriented and financial goals (Harash et al. 2014b,c,d,e).

In short, financial performance SMEs depends on the success of companies in the market, both locally and internationally (Harash et al. 2013a,b,c). For each individual, success may be dependent on his/her own target or desire to achieve certain outcomes (Davis & Cobb, 2010; Islam et al. 2011). The level of success of a company within the SMEs sector is measured through its performance based on a selected period of time.

In business studies, the concept of success is sometimes used to refer to a company's financial

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performance (Islam et al. 2011). Given that SMEs often play a significant role in improving the economy of a country and leads to economy development globally, this puts performance as one of the key issues for SMEs where management is concerned. Usually a company's performance is seen from the extent it manages to achieve its purposes and goals (Harash et al. 2013a,b,c; Harash et al. 2014b,c,d,e).Various scholars have attempted to provide a clear definition of performance, but they had yet to come to an agreement over a common definition, particularly regarding some aspects of terminology issues, analytical levels, and the conceptual basis for assessment. Performance of a company can be defined in various ways depending on the questions in mind when we inquire about a company's performance (Davis & Cobb, 2010; Islam et al. 2011).

The findings of many studies have not managed to provide a common definition to indicate or ascertain performance (Hagedoorn & Cloodt, 2003). Regardless of the differences among researchers on what the definition of performance is, they agree that it is generally associated with expectations for success (Noori et al. 2009). Performance can be measured using proxies like profitability, return on equity, liquidity, solvency, and sales growth and all these can be extracted from the financial statements and/or reports. Information on performance is useful in predicting the capacity of the enterprise hence analyzing how well or poorly an enterprise is doing against its set objectives (Harash et al. 2013a,b,c).

Information on performance is useful in predicting the capacity of the enterprise hence analyzing how well or poorly an enterprise is doing against its set objectives (Levasseur, 2002). Profitability is a key component of performance. From the management's point of view, profitability reflects the effectiveness with which management has employed both the total assets and the net assets that are recorded on the balance sheet. Effectiveness is assessed by relating net profit to the assets utilized in the generation of the profit.

From the owners' viewpoint of view (the shareholders in the case of a company), profitability means the returns achieved, by the efforts of management, on the funds invested by the owners (Harash et al. 2013). Iraq as the one of the less developed country, witnessed many changes during the last three decades, such as, the chaos of political and economic transformations that followed the invasion by the U.S. In addition, the recent unprecedented changes have affected the country significantly in all segments of Iraqi society (Sana & Abbas, 2005) and sector of SMEs in particular. These events changed the basic features of sector of SMEs and the instability and constants changes have become a dominant feature of the sector of SMEs in the Iraqi environment as reflected in the use AIS which affected the performance of SMEs in the Iraq.

III. Accounting Information System (AIS)

Accounting, as a system is the collection of procedures, methods, techniques, legal regulations, rules and experts and its renaissance is in line with technological changes and globalization and that keeps track of a company's financial transactions. Using standardized guidelines, the transactions are recorded, summarized, and presented in a financial report or financial statement such as an income statement or a balance sheet. Here, accounting information systems are viewed as a system that helps management in planning and controlling processes by providing relevant and reliable information for decision making. It suggests that accounting information system functions are not solely for the purpose of producing financial reports. It role goes beyond this traditional perspective.

Generally literature on accounting in the AIS shows that several scholars have investigated the adoption of the system among large firms only. Very little knowledge is known about the evolution of computing in SMEs (Urquía Grande et al. 2011). Accounting information system define is 'a system that processes data and transactions to provide users with information they need to plan, control and operate their businesses (Saira et al. 2010). One of the bigger problems faced by SMEs in Iraq is technical difficulties (Arokiasamy & Ismail, 2009). This is mostly due to poor experience how to administer and information system. Prior researches have shown that information system adoption did increase firms' performances and operations efficiency especially in big organization (Saira et al. 2010). AIS are a tool which, when incorporated into the field of Information and Technology systems (IT), were designed to help in the management and control of topics related to firms' economic-financial area. AIS also provide information on both actual and budget data which would help firm to establish, plan, and control operation (Urquía Grande et al. 2011). Good management of resources and better control of expenditure, budgeting and forecasting enhance the wellbeing of firm (Saira et al. 2010).

AIS refer to collection, storage and processing of financial and accounting data to help managers to make planning, controlling and evaluating (Emeka-Nwokeji, 2012; Saira et al. 2010). AIS also refers to perceiving of user information satisfaction to decision making and monitoring when organization has coordination and control with information that is produced from AIS (Islam et al. 2011). AIS are one of an important component of modern information system (IS) (Abdallah, 2014). The AIS is certainly played an important role that contributes to firm's value added by providing internally generated input i.e. financial statements, such into should help firm made better strategic plan (Hussein, 2011; Sori, 2009).

Developments in the areas of accounting, and IS over the last decades of twentieth century have widened the range and roles of AIS (Hussein, 2011).

IV. Environmental Uncertainty

Environmental uncertainty represent one of the major contingencies faced by a company. The contingency theory (Galbraith, 1973, 1974, 1977, 2002) one of the major strands of thinking about organizations is contingency theory, which defines uncertainty as the variable which makes the organization contingent upon the environment (Nobre et al. 2010). Contingency theory emphasizes the significance of the situational influence on accounting information system and the performance of companies (Harash et al. 2014a). The outstanding definition by Galbraith denotes the relationship between information and uncertainty. He defined uncertainty as the difference between the total amount of information that the organization needs to have in order to accomplish the tasks, and the amount of information in possession of the organization (Galbrairth, 1973). Millike (1987) defined uncertainty as unpredictability of the state of the environment, inability to predict the impact of environmental change, and inability to foresee the consequences of a response choice (Sung et al., 2010).

Some researchers in their studies have explained by defining the concept of uncertainty which originate from three sources as in; (1) the external environment, (2) organizational interdependence or the internal environment and (3) task characteristics (Al-Temimi Suhail et al. 2012; Harash et al. 2014a; Sicotte & Bourgault, 2008). That means that uncertainty represents the dimension to measure environment and have multi effect on other factors. Donaldson (2001) refers to the following: The Contingency Theory of organization is a major theoretical lens used to view organizations. He supported the notion of the theoretical and practical use of the Contingency Theory to explain the behavior of organization and study the designing and measuring the performance of these organizations according to relationship with environment (Al-Temimi Suhail et al. 2012; Donaldson, 2001; Emmanuel et al. 1990; Harash et al. 2014a).

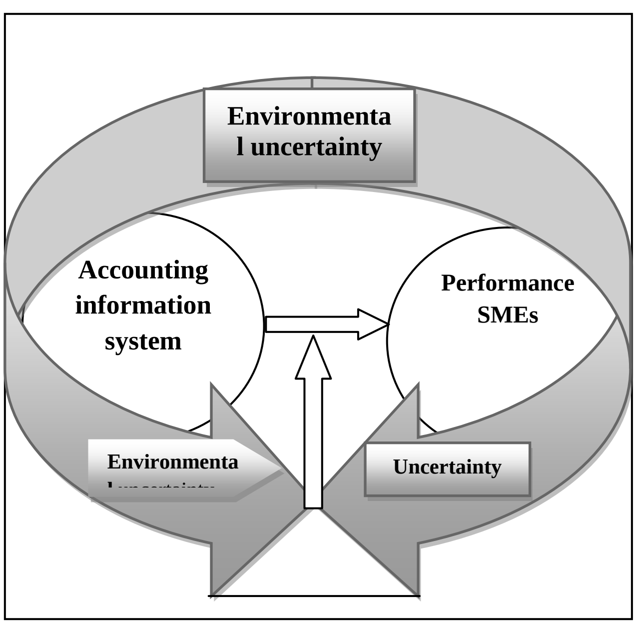
In this context, Contingency Theory play vital role to study the organizations and their performance and contains much of importance in the history of organizational science (Harash et al. 2014a). The research in Contingency Theory is a basis of much that is taught today. In addition, scholars actively pursue contingency research in the contemporary era and it is being projected into the future in a series of exciting theoretical and empirical developments (Al-Temimi Suhail et al. 2012; Harash et al. 2014a).

V. Contingency Framework

The Conceptual Framework below shows the relationship between the variables under study. The independent variable is the Accounting information system, moderator variable are the Environmental uncertainty and the dependent variable is the performance SMEs.

The model describes the influencing mechanism of AIS on financial performance SMEs and considers the role of Environmental uncertainty in the mechanism. It shows how the dimensions of AIS impact the aspects of performance SMEs, and how the Environmental uncertainty moderator these relationships. Based on their underlying rationale, the following sections present the detailed hypotheses related to these relationships.

Figure1 : Proposed theoretical framework



In order to exam the proposed relationships between AIS and performance SMEs. There is a proposition developed as a basis to examine the relationships between performance of SMEs and AIS for the research. Additionally, a proposition second was also developed to test the proposed moderating effects of Environmental uncertainty on the relationship between AIS and performance SMEs. Current study developed the following proposition:

1: There is a positive relationship between Accounting information system (AIS) and the performance of SMEs in Iraq.

2: Environmental uncertainty moderator the relationship between Accounting information system (AIS) and the performance of small and medium enterprises (SMEs).

VI. Conclusion

This study confirm that environmental uncertainty does act as a full moderating variable in the performance of SMEs in Iraq. Most previous studies on the environmental uncertainty, Accounting information system and performance use data on large, companies. Our study is one of the few that shed light on how corporate environmental uncertainty as moderating impact the relationship between Accounting information system and performance Small and medium enterprises. Conceptually, the study indicate the performance of SME vary with the choice of the AIS they adopted. This is significant for at least three parties, i.e. customers, companies and the relevant authorities' bodies, to strategize on containing the existence of the effect in SMEs by accordingly controlling the selected factors.

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Justicia Organizacional Y Su Relación Con El Personal Docente De Una Institución De Educación Superior

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Abstract- La justicia organizacional es un concepto común y de mucho interés entre los educadores superiores, ya que denota la igualdad de oportunidades y resultados para todas las personas. La presente investigación tiene como objetivo el poder determinar el efecto significativo entre las variables clasificatorias de los académicos y las variables de justicia organizacional. La población estuvo compuesta por 334 docentes y se utilizó el instrumento de Justicia Organizacional de Moorman (1991). Los principales resultados obtenidos denotan que los académicos que se encuentran en el rango de edad de 40 a 49 años perciben una mejor distribución en las cargas de trabajo y esto podría explicarse porque son académicos que ya cuentan con mayor antigüedad en la institución.

Palabras clave: justicia organizacional, distributiva, interaccional y de procedimientos.

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Strictly as per the compliance and regulations of:

Justicia Organizacional Y Su Relación Con El Personal Docente De Una Institución De Educación Superior

Tirso Javier Hernández Gracia [α], Edgar Martínez Torres [σ], Enrique Martínez Muñoz [ρ], Fernando Castillo Gallegos [ω] & Alejandra Corichi García[¥]

Resumen- La justicia organizacional es un concepto común y de mucho interés entre los educadores superiores, ya que denota la igualdad de oportunidades y resultados para todas las personas. La presente investigación tiene como objetivo el poder determinar el efecto significativo entre las variables clasificatorias de los académicos y las variables de justicia organizacional. La población estuvo compuesta por 334 docentes y se utilizó el instrumento de Justicia Organizacional de Moorman (1991). Los principales resultados obtenidos denotan que los académicos que se encuentran en el rango de edad de 40 a 49 años perciben una mejor distribución en las cargas de trabajo y esto podría explicarse porque son académicos que ya cuentan con mayor antigüedad en la institución

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Revisión a la literatura

I. Introducción

La justicia organizacional es definida por Omar (2006) citado por Patlán et. al (2014) como las percepciones que los trabajadores tienen sobre lo que es justo y lo que es injusto dentro de las organizaciones a las que pertenecen. En esencia, la presuposición de la que parten los investigadores que sustentan el valor de la justicia organizacional es que si los empleados creen que están siendo justamente tratados propiciaran que mantengan actitudes positivas hacia el trabajo, hacia los jefes y supervisores y hacia la misma organización; en cambio, si consideran que están siendo injustamente tratados, tal percepción terminará generando tensiones, sentimientos de insatisfacción y desmotivación (De Boer, *et. al*, 2002), que se traducirán en falta de productividad, disminución de la calidad del trabajo y ausentismo (Wayne, *et al*, 2002).

Greenberg (1993) propuso una taxonomía bidimensional, en la que en la primera dimensión define las categorías de justicia distributiva y procedimental y la segunda dimensión por los componentes sociales asociados con las distribuciones y los procedimientos. De esta forma, la justicia interaccional quedo dividida en justicia interpersonal (referida al tratamiento entre los que toman las decisiones distributivas y los destinatarios de las mismas) y justicia informacional (referida al grado en que las personas perciben que están recibiendo la adecuada y necesaria información para la realización eficiente de sus tareas).

En opinión de Moorman (1991) la justicia organizacional consiste en la percepción que tienen los trabajadores respecto lo que es o no justo en la organización, la cual incluye tres aspectos: distributiva, de procedimientos e interaccional.

- *Justicia distributiva*

Greenberg (1993) define la justicia distributiva como la percepción de justicia sobre los recursos recibidos en las organizaciones, así las personas que trabajan pueden experimentar una sensación de injusticia cuando sienten que no son tratados con equidad.

Para Moorman (1991) la justicia distributiva es percibida respecto a diferentes aspectos del trabajo: nivel de salario, horario de trabajo, carga de trabajo y asignación de responsabilidades.

En opinión deMessick y Cook (1983) citado por Arboleda (2009) la justicia distributiva se relaciona con la percepción de un resultado justo teniendo en cuenta la inversión inicial. El concepto surge en la década de los cincuentas cuando los empleados manifestaron su preocupación por la distribución salarial y se define como costo y esfuerzo que toma solucionar un problema o como el cálculo de los beneficios recibidos dado el costo del servicio/producto ó como el trato igualitario a los consumidores(Maxham y Netemeyer, 2002, McCollough, 2000).

- *Justicia de procedimientos o procedimental*

Greenberg (1993) define la justicia procedimental como la imparcialidad de los medios por los cuales se toma una decisión de asignación de recursos. De acuerdo con Leventhal,Karuza y Fry(1980) los procedimientos son susceptibles de ser

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considerados justos si se ajustan a seis elementos: deben ser coherentes, libres de prejuicios, precisos, corregibles, deben representar a todos los problemas y deben prevalecer sobre la base de las normas éticas.

Para Moorman (1991) la justicia procedimental es definida como el grado en el cual se toman las decisiones en el trabajo e incluyen mecanismos que aseguren la obtención adecuada de información, la posibilidad de expresión del trabajador y la existencia de procesos de retroalimentación.

Leventhalet. al. (1980) determina que para que en una organización los procedimientos sean percibidos como justos se deben tomar en cuenta los siguientes criterios:

- Han de aplicarse en las mismas condiciones a todas las personas y en cualquier momento;
- Deben estar libres de sesgos;
- La información que se utiliza en la adopción de las decisiones ha de ser válida y confiable;
- Han de existir procedimientos para detectar y corregir actuaciones sesgadas;
- Deben ajustarse a los estándares de ética y moralidad que prevalecen en el la organización.
- Se deben tomar en consideración las opiniones de los grupos que pudieran resultar afectados por las decisiones.

De acuerdo con Arboleda (2009) la percepción de justicia que los individuos tienen acerca de las políticas y procedimientos que los empleados siguen durante la prestación de un servicio se conoce como justicia procedimental. Así los procesos son justos cuando se definen de manera imparcial y consistente, comunicando además que la organización tiene procesos estandarizados para destinar recursos y salarios a los empleados. Por lo que es un concepto complementario a la justicia distributiva.

- *Justicia interaccional*

La justicia interaccional se ha encontrado para ser una variable importante en la comprensión de una variedad de actitudes de los trabajadores y los comportamientos en respuesta a los despidos, las decisiones presupuestarias, las decisiones de compra, las tácticas de negociación, las prácticas empresariales de contratación (Bies yMoag 1986), las prácticas de servicio al cliente, las prácticas de explotación de mercado. Además, la justicia interaccional ha sido una variable importante para la comprensión del comportamiento organizacional (Moorman, 1991), la confianza en la gestión y el compromiso organizacional y el comportamiento del consumidor.

Bies y Moag (1986) denominan justicia interaccional cuando los procedimientos son implementados y se producen con diferentes niveles de calidad, que se refleja en el grado en que las personas reciben un trato amable, digno y respetuoso por parte de los directivos de la organización.

Moorman (1991) define la justicia interaccional como el grado en el cual los empleados sienten que sus necesidades son consideradas y que existen explicaciones adecuadas para la toma de decisiones.

La percepción de ser tratado en la organización por los directivos de forma justa genera en los trabajadores formas de comportamiento que favorecen o limitan su interés a aportar un mayor o menor esfuerzo, a sentirse satisfechos o insatisfechos, a valorar positiva o negativamente a sus directivos, a alcanzar mayor o menor compromiso organizacional o a ser más o menos vulnerables al estrés Greenberg (1993).

En opinión de Arboleda (2009) la justicia interaccional inicialmente fue parte de la justicia procedimental al evaluar si las personas tenían un trato amigable, pero en los años ochenta el concepto recibió más atención al medir la calidad de la relación interpersonal y la define como la intención de ayudar, comunicar lo que es apropiado y esforzarse por resolver problemas.

- *Justicia organizacional en el ámbito académico*

Moorman (1991) sugiere que el estudio de la justicia organizacional en una institución de educación se inicia al conocer las percepciones de los académicos desde los siguientes enfoques:

- *Justicia distributiva*. Definida como la equidad con la que la organización mediante sus directivos distribuyen los beneficios de incentivos, puestos de trabajos y promociones
- *Justicia procedimental*. Definida como equidad de los procedimientos a través de los cuales la organización adopta las decisiones para distribuir los beneficios.

Moorman (1991) comprueba la importancia de la percepción de justicia organizacional por parte de los empleados de una organización educativa como modificador de las actitudes y comportamientos laborales por lo que se tiene lo siguiente:

- La relación entre participación y satisfacción laboral está influenciada de forma significativa por la percepción que tienen las personas de estar recibiendo un trato equitativo en el proceso de toma de decisiones y esto es definido como justicia distributiva, dándose además la circunstancia de que los sistemas participativos hacen más crítica la importancia de la percepción de justicia distributiva.
- La percepción de justicia distributiva incide en la satisfacción y en la percepción que tiene el trabajador de que los incentivos guardan relación con el esfuerzo laboral.

La percepción de justicia organizacional tiene efectos que van más allá de las actitudes y conducta del trabajador como es el compromiso organizacional y el esfuerzo, ya que, a través de ellas, se puede ejercer influencia en los clientes de los servicios educativos como pueden ser los estudiantes, quienes responden a la valoración que hacen de la equidad con la que son tratados con respuestas afectivas positivas (o negativas) tanto respecto de los académicos como de la organización educativa tal como señala Moorman (1991) en un estudio hecho sobre muestra de alumnos vistos como clientes y profesores de una universidad.

La percepciónsobre justicia organizacionalejerce, así mismo un importante efecto en la conducta docente al prevenir la aparición de síntomas de estrés, patologías con efectos negativos que contribuyen en los académicos a la eficiencia organizacional.

II. Planteamiento Del Problema

Con la finalidad de realizar un análisis de la justicia organizacional en una muestra de académicos de una institución de educación superior pública se planteó el siguiente objetivo: "*Determinar el efecto significativo entre las variables clasificatorias de los académicos y las variables de justicia organizacional*". Las hipótesis planteadas en la investigación son las siguientes:

$H1_0$ No existe relación estadísticamente significativa entre las variables de justicia organizacional percibida por los académicos con las variables clasificatorias en una universidad.

$H1_A$ Existe relación estadísticamente significativa entre las variables de justicia organizacional percibida por los académicos con las variables clasificatorias en una universidad.

III. Metodología

Para responder al planteamiento del problema se llevó a cabo la recolección y análisis de datos mediante la estadísticas descriptiva y la inferencias lo cual corresponde a un enfoque cuantitativo de diseño no experimental transversal.

La investigación se llevó a cabo en una muestra de 334 docentes académicos a los que se les aplicó el instrumento de Justicia Organizacional de Moorman (1991), el cual está constituido por tres dimensiones e incluye 20 reactivos en una escala Likert de cinco puntos.

Se llevó a cabo la validez del instrumento y el resultado obtenido en el análisis de factores realizado con el método de componentes principales y rotación Quartimax arrojo la confirmación del constructo en donde se obtuvieron tres factores: el Factor 1 Justicia distributiva que consta de cinco reactivos, el Factor 2 Justicia procedimental que consta de seis reactivos y el Factor 3 Justicia interaccional que consta de nueve reactivos, de esta forma se confirmó la validez de constructo como se puede observar en la tabla uno.

Tabla 1 : Validez de constructo de la escala de Justicia organizacional

Reactivos de la escala de Justicia organizacional	Factores			Comunalidades
	F1. Justicia Distributiva	F2. Justicia Procedimental	F3. Justicia Interaccional	
1	.846			.798
2	.643			.627
3	.578			.678
4	.680			.720
5	.506			.484
6		.702		.505
7		.904		.819
8		.839		.718
9		.917		.845
10		.764		.615
11		.796		.647
12			.848	.719
13			.882	.787
14			.833	.701
15			.879	.772
16			.901	.829
17			.835	.709
18			.849	.732
19			.924	.856
20			.839	.732
Porcentaje de varianza explicada.	58.29%	7.74%	5.43%	
Porcentaje de varianza explicada acumulada.	58.29%	66.03%	71.47%	

Nota: Método de extracción: Análisis de componentes principales con rotación Quartimax.

Fuente: Elaboración propia con base en la corrida estadística.

En el resultado de la confiabilidad del instrumento Justicia Organizacional de Moorman (1991), la puntuación para las tres dimensiones fue de la siguiente manera: para el Factor 1 Justicia distributiva fue un0.730, para el Factor 2 Justicia procedimental un 0.921 y para el Factor 3 Justicia interaccional un 0.961, como se puede observar en la tabla dos.

Tabla 2 : Confiabilidad de la escala de Justicia Organizacional deMoorman (1991)

Factores	Alpha de Cronbach
F1. Justicia Distributiva	.730
F2. Justicia Procedimental	.921
F3. Justicia Interaccional	.961

Fuente: Elaboración propia con base en la corrida estadística.

IV. Resultados

Las hipótesis planteadas en la presente investigación fueron probadas mediante el Análisis de Varianza (One-Way ANOVA), en donde se encontraron relaciones estadísticamente significativas entre los factores de la variable justicia organizacional percibida por los académicos con las variables clasificatorias, con estos resultados se prueba la hipótesis $H1_A$ en donde las variables de justicia organizacional percibida por los académicos tienen relación estadísticamente significativa con las variables clasificatorias.

Con base en los resultados del Análisis de Varianza (One-Way ANOVA), el factor justicia distributiva de la variable justicia organizacional percibida una muestra de académicos, tiene una relación estadísticamente significativa con las variables clasificatorias: edad, escolaridad de los académicos y programas educativos en los que imparte clases.

- Como se observa en la tabla 3 las puntuación media más alta del factor justicia distributiva y la variable edad se encuentra en los académicos del rango de edad de 40 a 49 años (media=3.29) y la más baja en aquellos del rango de edad de 30 a 39 años (media=2.96).
- Respecto a la variable escolaridad de los académicos la media más alta del factor justicia

distributiva se encuentra en los profesores que cuentan con estudios de especialidad (media=3.45) y la más baja en aquellos que cuentan con estudios de Doctorado (media=2.81).

- De acuerdo a la variable programas en los que imparte clases, la media más alta del factor justicia distributiva se encuentra en los académicos que imparten clases en la licenciatura (media=3.17) y la más baja en aquellos que imparten clases en el posgrado (media=2.79).

No se identificaron diferencias significativas entre las variables de: estado civil, género, categoría, instituto en el que imparte clases, horas que trabaja al día y la antigüedad de los académicos con el factor justicia distributiva percibida por los profesores.

Tabla 3 : Puntuaciones medias de la dimensión justicia distributivade acuerdo con las variables clasificatorias.

Variable	N	Media	F	p
Estado Civil:			.181	.671
Soltero	89	3.16		
Casado	137	3.12		
Género:				
Masculino	137	3.16		
Femenino	89	3.09		
Edad:			3.727	*.012*
Hasta 29 años	22	3.26		
De 30 a 39	103	2.96		
De 40 a 49	65	3.29		
50 años o más	36	3.26		
Escolaridad:			5.951	*.001*
Licenciatura	70	3.28		
Especialidad	24	3.45		
Maestría	92	3.08		
Doctorado	40	2.81		
Categoría:			2.705	.101
Profesor por asignatura	88	3.23		
Profesor de tiempo completo	138	3.07		
Instituto en el que imparte clases:			1.526	.183
ICAP	31	3.17		
ICEA	54	3.09		
ICBI	39	3.30		
IA	38	3.10		
ICSHu	34	2.90		
ICSa	30	3.28		
Programas en los que imparte			6.214	.013
clases:	203	3.17		
Licenciatura	23	2.79		
Posgrado				
Horas que trabaja al día:			1.089	.338
Hasta 5 horas	35	3.26		
De 6 a 8	184	3.10		
Más de 8	7	3.37		
Antigüedad:			1.682	.126
Hasta 5 años	85	3.09		
De 6 a 10	81	3.09		
De 11 a 15	20	3.20		
De 16 a 20	14	3.38		
De 21 a 25	11	3.47		
De 26 a 30	9	2.73		
Más de 30 años	6	3.56		

Fuente: Elaboración propia con base en la corrida estadística.

Con respecto al factor justicia procedimental de la variable justicia organizacional percibida por una muestra de académicos, existe una relación estadísticamente significativa con las variables: instituto en el que imparten clases, y antigüedad de los académicos.

Como se observa en la tabla 4, las puntuaciones medias más altas del factor justicia distributiva y la variable instituto en el que imparten clases se encuentra en los académicos que imparten clases en el ICAP (media=3.45) y la más baja en aquellos que imparten clases en el ICEA (media=2.75)

Respecto a la variable antigüedad, la media más alta del factor justicia procedimental se encuentra en los académicos con antigüedad de Más de 30 años (media=3.72) y la más baja en aquellos con antigüedades de 26 a 30 años (media=1.81).

No se identificaron diferencias significativas entre las variables de: el estado civil, el género, la edad, la escolaridad de los académicos, la categoría, los programas en los que imparten clases y las horas que trabaja al día con el factor justicia procedimental percibida por los académicos.

Tabla 4 : Puntuaciones medias entre la dimensión justicia procedimentalde acuerdo con las variables clasificatorias.

Variable	N	Media	F	p
Estado Civil:			3.010	.084
Soltero	89	3.23		
Casado	137	3.00		
Género:			.149	.700
Masculino	137	3.11		
Femenino	89	3.06		
Edad:			.055	.983
Hasta 29 años	22	3.13		
De 30 a 39	103	3.07		
De 40 a 49	65	3.12		
50 años o más	36	3.06		
Escolaridad:			.769	.512
Licenciatura	70	3.19		
Especialidad	24	3.21		
Maestría	92	2.97		
Doctorado	40	3.12		
Categoría:			.006	.939
Profesor por asignatura	88	3.10		
Profesor de tiempo completo	138	3.09		
Instituto en el que imparte clases:			3.396	.006
ICAP	31	3.45		
ICEA	54	2.75		
ICBI	39	3.35		
IA	38	3.19		
ICSHu	34	2.81		
ICSa	30	3.19		
Programas en los que imparte clases:			.019	.891
Licenciatura	203	3.09		
Posgrado	23	3.12		
Horas que trabaja al día:			1.21	.300
Hasta 5 horas	35	2.88		
De 6 a 8	184	3.12		
Más de 8	7			
Antigüedad:			3.264	.004
Hasta 5 años	85	3.19		
De 6 a 10	81	3.04		
De 11 a 15	20	3.14		
De 16 a 20	14	3.30		
De 21 a 25	11	3.06		
De 26 a 30	9	1.81		
Más de 30 años	6	3.72		

Fuente: Elaboración propia con base en la corrida estadística.

El factor justicia interaccional de la variable justicia percibida por los académicos tiene una relación estadísticamente significativa con las variables de: el estado civil, el instituto en el que imparte clases y la antigüedad de los académicos.

Como se observa en la tabal 5, las puntuaciones medias más altas del factor justicia interaccional y la variable estado civil de los académicos se encuentran en los profesores solteros (media=3.34) y las medias más bajas en aquellos que se encuentran casados (media=3.04).

Respecto a la variable instituto en el que imparte clases, la media más alta del factor justicia interaccional se encuentra en los académicos que imparten clases en el ICAP (media=3.49) y la más baja en aquellos que imparten clases en el ICEA (media=2.81).

De acuerdo con la variable antigüedad la media más alta del factor justicia interaccional se encuentra en los profesores con antigüedad de Más de 30 años (media=3.72) y la más baja en aquellos con antigüedad de 26 a 30 años (media=1.76).

No se identificaron diferencias significativas entre las variables de: el género, la edad, la escolaridad, la categoría del académico, los programas en los que imparte clases y las horas que trabaja al día con el factor justicia interaccional de la variable justicia percibida por los académicos.

Tabla 5 : Puntuaciones medias entre la dimensión justicia interaccionalde acuerdo conlas variables clasificatorias

Variable	N	Media	F	p
Estado Civil:			4.670	.032
Soltero	89	3.34		
Casado	137	3.04		
Género:			.024	.876
Masculino	137	3.15		
Femenino	89	3.17		
Edad:			.460	.711
Hasta 29 años	22	3.39		
De 30 a 39	103	3.10		
De 40 a 49	65	3.17		
50 años o más	36	3.14		
Escolaridad:			.623	.601
Licenciatura	70	3.27		
Especialidad	24	3.27		
Maestría	92	3.06		
Doctorado	40	3.11		
Categoría:			.037	.848
Profesor por asignatura	88	3.17		
Profesor de tiempo completo	138	3.15		
Instituto en el que imparte clases:			2.987	.012
ICAP	31	3.49		
ICEA	54	2.81		
ICBI	39	3.42		
IA	38	3.35		
ICSHu	34	2.93		
ICSa	30	3.10		
Programas en los que imparte clases:			1.548	.215
Licenciatura	203	3.19		
Posgrado	23	2.90		
Horas que trabaja al día:			1.148	.319
Hasta 5 horas	35	2.93		
De 6 a 8	184	3.19		
Más de 8	7	3.41		
Antigüedad:			3.365	.003
Hasta 5 años	85	3.26		
De 6 a 10	81	3.12		
De 11 a 15	20	3.16		
De 16 a 20	14	3.32		
De 21 a 25	11	3.27		
De 26 a 30	9	1.76		
Más de 30 años	6	3.72		

Fuente: Elaboración propia con base en la corrida estadística.

V. Discusión

En lo que se refiere a la justicia distributiva y de acuerdo con los resultados obtenidos los académicos que se encuentran en el rango de edad de 40 a 49 años perciben una mejor distribución en las cargas de trabajo y esto podría explicarse porque son académicos que ya cuentan con mayor antigüedad en la institución.

Respecto a la variable escolaridad aquellos que cuentan con el nivel de especialidad perciben una justicia distributiva más positiva, esto se puede explicar porque sienten que el nivel de sueldo percibido, la carga horaria y el horario de trabajo son distribuidos con base en nivel de conocimiento con el que cuentan.

Los académicos que perciben una justicia distributiva más equitativa son aquellos que imparten clases en la licenciatura y esto se podrían relacionar con la estructura de los planes y programas de estudio.

En lo que se refiere a la justicia procedimental, los académicos del Instituto de Ciencias Agropecuarias (ICAP), perciben una justicia más positiva y esto podría ser porque el director se asegura que todas las inquietudes de los académicos sean escuchadas antes de que se tomen las decisiones, se les proporciona información adicional cuando es requerida con la finalidad de objetar o apelar las decisiones de trabajo realizadas por el director, quién, cuando toma las decisiones trata al personal académico con bondad y consideración y muestra preocupación por los derechos de los académicos.

La variable antigüedad con relación a la justicia procedimental resulto más positiva en aquellos académicos que cuentan con una antigüedad de 26 a 30 años y esto puede relacionarse con el interés de los académicos por llevar a cabo cada uno de los procedimientos definidos en los planes y programas de estudio para el cumplimiento de los objetivos curriculares.

Finalmente en el resultado para el factor justicia interaccional los académicos que se encuentran solteros perciben una justicia más positiva y esto se debe a que tienen menores limitantes para relacionarse con sus compañeros de trabajo.

En el Instituto de Ciencias Agropecuarias se percibe una justicia procedimental más positiva lo que quiere decir que los académicos han mejorado sus formas para interactuar y relacionarse con los demás compañeros de trabajo.

La antigüedad es un factor importante para la justicia interaccional y de acuerdo a los resultados los académicos de mas de 30 años la perciben más positiva y esto obedece a que ya se cuenta con mayor capacidad de relacionarse con los compañeros de trabajo.

VI. Conclusiones

Se han llevado estudios sobre la justicia organizacional con la finalidad que los trabajadores perciban lo que es justo y lo que es injusto en la organización en la que pertenecen, con base en su percepción, los trabajadores podrían mantener actitudes positivas hacia el trabajo, con los tomadores de decisiones y con la organización por lo que es de vital importancia continuar realizando estudios que expliquen el comportamiento de la justicia organizacional para mejorar la percepción de la justicia distributiva, procedimental e interaccional, así como su análisis con relación a la satisfacción laboral, el clima organizacional así como con la imagen de la organización con el fin de crear y proponer estrategias que mejoren los niveles de percepción.

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Gentle Breeze of Digitalization Blowing in the Urban Lifestyle: A Case Study of Bangladesh

By Mustain Billah
Government of the Peoples Republic of Bangladesh

Abstract- The aim of this study is to observe the current state of ICT (information and communications technology) in the urban areas of Bangladesh as well as make some recommendations for the shortcomings of e service in urban areas in Bangladesh. Data were collected from the various journals of Bangladesh government as well as English newspapers, although the study is mainly descriptive in nature. The study finds that Bangladesh has made progress in the urban lifestyle regarding Computer training, e-Insurance , Banking facilities, Payment of rural electricity bill facility, Health services, Creation of jobs, Union digital center Blog, District e- service center –settlement record, National e-service system (NESS),Life and earning oriented national e-information book having life and earning oriented data, Mobile Key-pad and the opening of SMS in Bangla, My alphabet, National portal framework and website, Multimedia class room and digital summary,E –book ,online application management of non govt.

Keywords: ICT (information and communications technology), union digital center, payment of rural electricity bill facility, district e- service center –settlement record and payment of rural electricity bill facility.

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GENTLEBREEZEOFDIGITALIZATIONBLOWINGINTHEURBANLIFESTYLEACASESTUDYOFBANGLADESH

Strictly as per the compliance and regulations of:

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Keywords: ICT (information and communications technology), union digital center, payment of rural electricity bill facility, district e- service center –settlement record and payment of rural electricity bill facility.

I. Introduction

Digital Bangladesh" is an integral part of the government's *Vision 2021*—which promises a prosperous and equitable middle-income Bangladesh by its golden jubilee (50 years) of independence. The government of Bangladesh has launched a large number of projects relating to digital technologies and a number of these are already underway. National ICT Policy-2009 was developed with a view to achieve middle-income status by 2021 and developed status by 2041.

`The Information Technology centered world is going ahead fast. Inevitably, Bangladesh will have to go forward with this pace'- this eternal realization is being felt by all concerned in the field level administration. Keeping the demand of time in view, a master plan was launched half a century ago with a view to building digital Bangladesh. Now, both the administration and civil society have been enlightened with the outcome of that plan. Administration is working for the purpose of bringing the services of digital system to the doorsteps of common people. At the same time, common people have also responded to take utmost services utilizing the privilege. Now, most of the office bearers no longer have to wait physically to get permission to approach the office executive with files of documents bound by red tape. Through the help of information portal as well as e-information services, scanned copies of all files are stored in the online account of the office executive. Even in the daily busy programs, a person sitting in the car or elsewhere, can come to know of the government programs, take decision , express opinion or give direction by sending them to the officials concerned. The office can notice constantly how many files are not processed on time by the officials. In between other activities one can observe the daily progress of public services performed by field level administration.

This change is not merely confined to the office executive as well as internal officials. Its scope extends from the head of the government to the fields of farmers living in remote villages. And the only medium of building linkage of this extensive flow of services is Union Digital Centre, which was launched in the name of Union Information and Service Center-UISC.

Union Digital Centre is a joint project of the local government department of the people's republic of Bangladesh and access 2 information (A 2I). It is constantly monitored by district and upazila administration. On 11 November 2010, the honorable prime minister of the people's republic of the government of Bangladesh, Sheikh Hasina and UNDP's executive Miss Helen Clark inaugurated the Union information and service Centers through a video conference. The main objective of Union Digital Centre is to promote union parishad council to a strong institution in order that this institution, within the year

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2021 can play a positive role in establishing information and knowledge based country. At the same time, this center can play a far-reaching role in bringing government, nongovernment information and services to the common people in eliminating technological disparity and linking all the citizen with the modern system of information flow.

As a result of the establishment of Union Digital Centre (UDC), the common citizens are now getting 60 types of public and private services easily, cheaply, and uninterruptedly. Since the establishment of UDC, about 11 crore services have been provided and the organizers have earned about 5 crore taka in a month by giving these services. Through the establishment of union information and service centre (UISC), the management of getting information and services for common people of the country's 4 thousand 5 hundred 16 villages has been already been ensured. From the service centers of the villages, at present, on an average, 45 lac People can get variety of information and service every month.

From union digital centers (UDC), the people of the union concerned are easily getting the following public information services: Government forms, notice , passport , visa related information, national e-information, law related information, job news, citizen certificates, results of public examinations, land settlement record, repayment of electricity bill, university online admission, online birth and death registration, VGF , VGD list, common citizen application, agriculture information , health counseling, mobile banking , computer training , taking photos, internet browsing, email job information compose .British council English learning , application for visas and tracking , video conferencing , printing , scanning photo copies laminating and so on .

Apart from traditional services, at present prayers from union digital centers for mobile banking, life insurance, soil test and recommendation for manure and prayers from the Deputy Commissioner's office to get settlement record are available. Now through mobile banking everyday on an average, transaction of more than 15 crore taka is being done from 2 thousand seven hundred 73 centers.

In most cases, money is going from towns to villages through it. The money flows from abroad to towns and towns to remote villages. Trades and business and also financial system are being strengthened. 2363 union digital center's insurance benefits of Life Insurance Corporation have been introduced so far. Some days back, online registration of 14 lac agricultural laborers intending to go to Malaysia was completed.

The role of union digital center in eliminating poverty is indispensible. Union digital center is playing an important role in reflecting the good effects of 89 social security network programs taken with a view to saving people of all ages, either children or old from the grip of poverty in the life style of citizens.

It is to be mentioned that in the statistics of the year 2014, the poverty rate of the whole country was 25.6%, and of them the extreme poor people were 12.4% with the gap of the last two decades, in spite of the decrease compared with the percentage, yet 4 crore people are regarded as poor in consideration of their number. In order to reduce poverty the government has started various social security programs such as, VGD, FGF, EGPP. However, distinguished people think that lack of coordination is a barrier to the complete success of these programs. To remove them they have suggested further emphasizing planning of middle life standard for common people and establishing good governance including stopping misuse.

II. Objectives of the Study

The objectives of this study are as follows:

1. To observe the current ICT (information and communications technology) status in urban area of Bangladesh.
2. To show the sector wise achievements of Union Digital Centre in urban area.
3. To find out the problems by the digital system as well as give some recommendations.

III. Literature Review

A very few literatures have been found that directly and comprehensively cover *Gentle Breeze of digitalization blowing in the urban lifestyle: a case study of Bangladesh.*

A study conducted by World Bank (1996) shows that access to mobile and internet service at a reasonable price creates employment, increases productivity and increases exports. Bouman (1989) described the rural finance policy, main features of informal rural economy as well as its problems and weakness etc.

Aman Ullah (1998) shows that how Information technology makes socio-economic development as well as and cultural development which brings social change. Journal of Dhaka University on June (2000) demonstrates that how digital system that is internet plays a vital role in the market system.

Annual journal of BARD December (2007) explains the necessity of digital communication (community radio) which helps to make radical dynamic change in the economy of Bangladesh.

There is an article published in The Daily Star *(10-03-15)* named as "Digital Bangladesh: Dreams and reality "which shows the status of ICT ranking among the world as well as achievements of digital Bangladesh.

IV. Methodology of the Study

This paper is based on secondary data which were collected from the various reports such as draft of 7th Five Year Plan (7FYP), Finance Division, Ministry of Finance (*Journey towards a Digital Bangladesh*) and journals as well as practical experience of descriptive and graphical analysis were done with the collected data to achieve the objectives of the study. Microsoft Office and Microsoft Excel package have been used in graphical representation of data.

V. Sector wise Achievements of Union Digital Centre

Bangladesh has made progress in the area of Computer training, e-Insurance , Banking facilities, Payment of rural electricity bill facility, Health services, Creation of jobs, Union digital center Blog, District e-service center –settlement record, National e-service system (NESS),Life and earning oriented national e-information book having life and earning oriented data, Mobile Key-pad and the opening of SMS in Bangla, My alphabet, National portal framework and website, Multimedia class room and digital summary,E –book ,online application management of non govt. teacher's employee's welfare trust and retirement benefits,e-purgi, Learning and earning, online tax calculator and online tax returns preparation, Electronic money order and postal cash card, services on mobile phone , digital innovation fairs and WSIS awards etc. which are described as follows:

a) Computer training

Offering computer training is one of the important services of union digital center. With a view to building a technology based society this endeavor is essential. At present, three thousand seven hundred seventy three union digital centers are giving computer training at low cost using multimedia projectors. From November 2010 to December 2014, almost 52 thousand students and youths have got computer training.

b) Insurance

In order to send insurance benefits to rural people, government life insurance corporation has started life insurance policy in the country's 2 thousand seven hundred 68 union digital centers. Through it, about 60 thousand citizens have got benefits so far.

c) Banking facilities

In order to send banking facilities to the deprived grassroots people , four banks (Dutch Bangla , Trust Bank, One Bank, and BIKASH) have launched mobile banking programs at the country's 2 thousand 3 hundred 63 union digital centers .

d) Payment of rural electricity bill facility

To provide services to the doorsteps of mass people, Bangladesh Rural Power Development Board

d) Payment of rural electricity bill facility

To provide services to the doorsteps of mass people, Bangladesh Rural Power Development Board
(REB) has managed the system so that marginalized people can submit rural electricity bill through 727 UDCs till now.

e) Health services

For the purpose of giving health care to these rural people deprived of health care, with the support of health directorate, at present 3 UDCs tele- medicine centers have been started. In addition, health camps have been started at about more than 500 union digital centers. Within a short time, telemedicine service will be opened in the rest of the UDCs.

f) Creation of jobs

The union digital centers organizers have made the UDCs effective. Two organizers work at each UDC, one of them is male and the other is female. As there is a female organizer, women's easy access to the center has increased. At the union digital center, the organizers are not employees but investors. The organizers live on the income earned through giving services to common people. In other words, at 4 thousand 5 hundred 47 centers, total 9 thousand 94 young ICT organizers have got the opportunity to be self employed which has also ensured women's empowerment.

g) Union digital center Blog

Digital Blog has been started so that the UDCs organizers of all unions can share the invention, opinion, problems and their solutions. By this time, the blog has earned a lot of prize from home and abroad. At present, there are 13 thousand 5 hundred members at this UDC blog including organizer, field level administrative officers, public representatives, secretary and ministers. At the blog, the number of total posts is more than 1 lac 20 thousand.

h) District e- service center

On 14 November, the honorable Prime Minister Sheikh Hasina and UN secretary general Ban ki Mun jointly and friendly inaugurated e- service center program in all the districts of the country. Through district e -service center, people can apply for services directly by post or online process. As a result, apart from improved services, services are given and taken at any time and place. If applied, the applicant is given a receipt. So in terms of giving services, accountability has been ensured. According to project authority, all the transaction of any district administration are being done through online system till now. More than 9 lac citizens' applications have been settled through online system. So the district e- service center being opened, harassment of people has been stopped and time, labour and money are being saved. Besides transparency, dynamism and accountability are noticed in the activities of officers, employees of administration.

i) E –settlement record

Through this process and easy online application, duplicate copies of different records of land (CS, SA, BRS) settlement record, ledger book, and certified copies are being provided from the record room of DC office. Therefore, people are getting rapid services without any harassment. On the other hand, supplied records are being digitalized automatically. Until now, 14 lac 50 thousand records have been given through online process and 2 lac 50 thousand records have been given through UDC.

j) National e-service system (NESS)

With a view to transforming the services provided from Bangladesh's all directorates, districts, upazilla level government office into e- service, nationally a unilateral co-ordinated e- service platform has been made. It is known as national e-service system (NES). Through using this platform all the institutions concerned will be able to supervise immediately various stages of giving services to citizens could progress. Of the e-service system, the remarkable tasks are e-filing, e- form, e- communication, e- service management, govt. : directory, access services , e-directory, national e–service portal, citizen web account, e-notification and NES web service. There is a plan to open e- service system in the country's 16 thousand government offices by turns. About 16 thousand officials, employees will use it there. With the support of this system, more than 4 hundred services will be transformed into e- service.

k) Life and earning oriented national e-information book having life and earning oriented data

To find out life and earning oriented information easily in a place, a national e information dictionary, the biggest information kosh in Bengali, has been opened (www.infokosh.gov.bd). In national e information kosh , information in Bengali is written regarding agriculture , education, health, law and human rights , travelling , employment , citizens services , non agricultural endeavor , environment and disaster management , trade and industry , science and communication technology and so on. \

This information is available as text, animation, picture, audio and video. In the national e- information kosh there is one lac page of information on 10 thousand topics now. Three hundred 50 government and non government organizations are working in a body to compile and develop the national e information kosh. Until January 2013, 10 and half lac people took different data from the national e- information kosh.

l) Mobile Key-pad and the opening of SMS in Bangla

In order to ensure facilities through information technology for the larger population, the importance of using information technology in Bengali is very essential. For this reasons, Bengali keypad, suitable for the use in mobile phone, has been provided so that common users of mobile phone can easily send and read SMS in Bengali from their phone sets of different brands. Besides, since 31 January 2012, import of any type of mobile phone except Bengali key pad has been banned. At present, introducing Bengali key pad suitable for smart phone is going on.

m) My alphabet

Keeping common people's demand in view, measures have been taken to prepare Unicode facilities- My Alphabet and it will be open to all. Now a days, despite having more than one font to practice online Bengali in the country that has been prepared without direct or indirect approval of Bangla Academy.

n) National portal framework and website

The work of making of about 23 thousand portals has been ended for the country's unions, upazilas , districts , division, directorates , ministries and other offices. The making of website of 24 thousand government offices has been completed. In the March 2013, it was completely opened. As a result, by introducing portal at any office, people will easily get information and services.

o) Multimedia class room and digital summary

'No learning information technology , rather information technology in education- keeping this guiding principle in view , two models , named making multimedia class room' for teachers and learners and making digital content by teachers have been invented . Many developing countries have expressed their willingness to follow these models of Bangladesh, Making contents suitable for learners, trained teachers are using them in the class rooms. These contents made by teachers have been stored in a blog named www. Ictinedubd.ning.com. Other teachers are using them when required and are playing a role developing its qualitative standard. Now under this project, the works of setting up multimedia class rooms in 20 thousand 5 hundred secondary and higher secondary institutions of Bangladesh will have been set up. If the class rooms were conducted by multimedia class rooms, our new generation would get quality education. As a result, they will be able to make themselves prepared to face global challenges. According to A2I authority, almost 70 lac learners are supposed to be directly benefited by this.

p) E –book

With a view to making text books interesting , attractive , effective and suitable for modern times, 3 hundred 25 text books of primary , secondary , madrasha and technical education boards and more than one hundred reference books have been transformed into e –books . On 24 April 2011, the honorable Prime Minister Sheikh Hasina formally inaugurated e-books . These books can be read, downloaded and printed from the website www.ebook.gov.bd . The use of e book and publications is highly flourishing as the computer, mobile phone, e book, I pad and cds are easily readable to the readers. Till now, 11 lac have been using e-book site.

q) *Online application management of non govt. teachers employees welfare trust and retirement benefits*

For the purpose of ensuring trouble free retirement benefits of non government teachers and employees, online application system has been introduced in non government education trust and retirement benefits board. In the 6 March 2013, the honorable Prime Minister inaugurated online application system of non government institution teachers, employees welfare trust and retirement facilities. Using this service, 6 lac teachers and employees of non government institution can apply for retirement benefits.

r) *E- purgi*

All the sugarcane growers of 15 sugar mills of Bangladesh are now getting information through SMS. As a result, long time harassment of the growers has come to an end. Side by side, sugarcanes are being supplied at the mill gate in time. Consequently, the production of sugar mills has increased. As a result, of the introduction of e–purgi, every year, more than 2 lac laborers are being directly benefited. So far, more than 20 lac purgi information have been issued by online system .On December 12, 2010, the honorable Prime Minister Sheikh Hasina formally inaugurated e-purgi system. In 2009, with the efforts of A2I program , e-purgi was introduced , on test basis in the sugar mill of Faridpur and Jhinaidah .

s) *Learning and earning*

At present, through the use of the information technology. Online outsourcing is playing a significant role in creating employment. A group of youths of the whole country, having been linked without sourcing work, are earning foreign currency. Based on this reality, under access to program and in the principles of government and non government partnership, learning and earning programs have been taken up. Through this program, the learners of schools, colleges and universities are being made capable of earning by giving them training on outsourcing. Mean while, 2 thousand learners of 15 districts including Dhaka have been trained in this regard.

t) *Online tax calculator and online tax returns preparation*

Through this system, it is possible to bring out the accounts of income tax and prepare income tax returns. Until now, more than 2 lac 23 thousand tax payers have prepared income tax returns with the help of this system. In addition, from this year onwards , taxes are being given through online service too. So far, 1 thousand 9 hundred citizens have paid taxes amounting to more than 1 crore taka through online service.

u) *Electronic money order and postal cash card*

Bangladesh postal department has launched electronic money order from their 2 thousand 7 hundred 50 post offices. With the help of this postal service and mobile phones, money can be sent and received within highest 1 minute from these post offices. Previously, it took 3-7 days to send a money order. In the last 3 years, almost 94 lac clients have got this service. Within this time limit, transaction of a total of 4 thousand 3 hundred 98 crore taka have been done. The postal department has earned 54 crore 78 lac taka fiscal income by giving this service.

Postal Cash card is a kind of debit card conducted by Bangladesh postal department. With the help of this card, clients can deposit money into his account, draw it on requirement and send it to other card bearers and shop from a definite outlet. If an account is opened by giving taka 45, there will be 10 taka balance into the clients account. Prime Minister Sheikh, on 26 March 2010, formally inaugurated this program. Now a days, this service is opened in 8 thousand 38 post offices of the country. With the support of this card, apart from giving social allowance of 6 crore taka, transaction of more than 26 crore taka has been done.

v) *Services on mobile phone*

Tele density is one of the indexes of a country's development. Now in Bangladesh, there are almost more than 9 crore mobile users. This rapidly growing technology is now in the hands of the poor village farmers. Mobile phone is not only a device for talking but it is able to give variety of information and services. Keeping it in reality, measures have already been taken up to give services to government and non government levels through it. In the matters of introducing this service, 'access to information' (A2I) project is giving technical support. Some facilities earned by this service are as follows:

Mobile phone is sufficient enough to pay various urban services including electricity , water , gas and so on .So far , more than 2 crore citizens have paid the bills of these services through mobile phone .

Now railway ticket can be bought by mobile phone and online service. Till now, through mobile phone, 5 lac 13 thousand and through online service 1 lac 42 thousand tickets have been sold .

Through it and online services, the results of public examinations are being published. From the year 2010 till now, 6 crore students have got their results from online service and 3 and half crore students have got their results from mobile phone.

Programs for registration for admission test of public and private universities have been introduced through mobile phones. Now, 32 public universities, 4 hundred colleges, and 70 medical colleges (public and private) have introduced this service. In the last 3 years, almost 27 lac students applied for university admission through mobile phones.

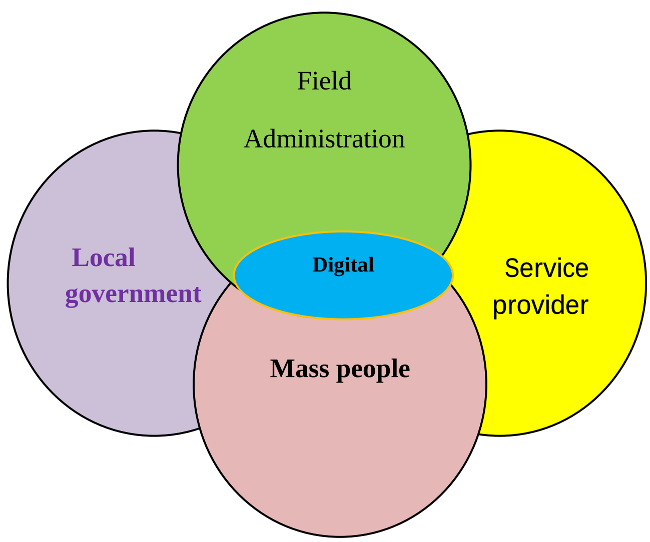
w) Digital innovation fairs

In order to give conception about e-services and information to mass people where and how these can be achieved, meanwhile, digital innovation fairs have been organized in all the divisions and districts on national levels. These fairs are the best medium of creating linkage between the service providers and receivers and of introducing people with various digital services. From these fairs common people have awareness about present services as well as about future e–services.

x) WSIS awards

Bangladesh has been awarded world famous honor because of bringing the government and non government services to the doorsteps of common people through online system and union digital centers. Keeping 150 projects behind, the access to information (A2I) project of the office of the Prime Minister of the government of Bangladesh has got the most prestigious recognition 'World Summit on the Information Society' (WSIS) award, 2014 on ICT sector. This award was given on the category of services to the doorsteps of mass people.

The achievement, mentioned above is the successful outcome of a small word 'digital'. Changing the traditional services of urban services , the dream of building digital Bangladesh has become able to play a positive role in entering the services to the doorsteps of common people cheaply , easily , rapidly and in a transparent and trouble free manner. Not only in unions, but also in upazilas, districts , divisions , ministries everywhere co-ordinated e- service framework is getting stronger gradually .



The digital component has established a strong linkage between the field level administration, service providing institutions, local govt. and mass people. Consequently, the government and the administration are working simultaneously with mutual trust belief and reliability.

VI. Conclusions and Recommendations

Bangladesh is facing a lot of challenges to work on implementing E-governance system. This article has identified a number of challenges faced at both government and citizen. This study envisages that the proper implementation of e-governance is a complex and lengthy task that may proceed well beyond the government's target of 2021. From a citizen's perspective, social issues such as lack of awareness, IT literacy, language barriers, and lack of access to the Internet etc. will hinder citizens from using E-government services, while from the government's viewpoint financial and political constraints are the key challenges for implementing E-governance that must be overcome. This paper mainly suggests that government need to establish national broadband network as well as increase IT literacy and internet awareness for the well being of the Bangladesh although the government is trying best to do so.

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Impact of the Integration of Text-Messaging in Mathematics Teaching-Learning Process

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Abstract- This research study established the impact of the integration of text-messaging in Mathematics teaching-learning process. This one shot design study employed the Pre-Post Test method of investigation. After the students took the Pre-Test, the integration of text-messaging in the teaching-learning process was done for two weeks. At the end of the two-week allotment of the lesson, the students took the Post-Test and were surveyed on their attitude towards the integration of text-messaging. It was found out that the Post-Test result is higher than the Pre-Test result (Alpha 0.05). Furthermore, the students "agreed" on the integration of text-messaging in the teaching-learning process.

Keywords: text-messaging, mathematics teaching-learning process, university of san carlos, impact study, mobile gadget.

GJMBR - G Classification : JEL Code : A19, B23

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I. Introduction

Since the start of the new millennium, experience and expertise in the development and delivery of mobile learning have blossomed [17]. Mobile learning through the use of wireless mobile technology allows anyone to access information and learning materials from anywhere and anytime (Ally, 2009). With this, the learners can opt to learn anytime and anywhere message service) for text-messaging, electronic mail, packet switching to access to internet, MMS (multimedia messaging service) for sending and receiving messages, rich text, photos and videos and EMS (enhanced messaging service) which allows users to integrate text, audio, pictures, video and animation [16].

Estimate 83 percent of 17 years olds across the country have a mobile phone today [15]. Since it is affordable, handy, and user friendly, several efforts have sprouted in integrating mobile phones in education [12]. Teachers remain the gatekeepers for student's access to educational opportunities afforded by technologies, then technologies cannot and should not be ignored [8]. Most teachers want to incorporate more technology in their classroom [8]. However, they may need more support and instruction to learn how to use them effectively.

Since most students are very familiar with mobile phone, this technology can be utilized to benefit learning and to help motivate students [13]. Mr Tamariki can send lessons to the phones and students can let him know how they are going by either texting or file sharing [7]. Schools in New Zealand and a they

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want, since mobile technology can be utilized to transport knowledge to the learners.

Mobile phone is one of the mobile technologies surpassed in the market nowadays. Mobile phones are affordable and are cheaper than PC's [7]. More than 90 per cent of the world's population now has access to mobile network [7]. Growth has been strongest in the developing countries [7]. For children and young people in particular, the mobile is an indispensable item to be carried at all times, and one which performs many more functions besides making calls and sending text-messages [5]. Mobiles are also used to listen to music and the radio, to play games, to take and exchange photographs and video, and surf the net [5]. Philippines mobile phones were preloaded with 387 interactive, educational videos in math, science and English [7].

The mobile phone has become a regular feature of our everyday lives [5]. Basically, a mobile phone is a long-range, portable electronic device for mobile communication [16]. In addition to the standard voice function of a telephone, current mobile phones can support many additional services such as SMS (short

program called WordWall allows students to answer questions asked by the teacher using mobile phones [7].

With all of these, the researcher had decided to conduct a research on the impact of the integration of text-messaging in his mathematics class. This study implemented text-messaging in mathematics teaching-learning process, and thus, will establish its impact on the implementation.

II. Objectives

This study aimed to establish the impact of the integration of text-messaging in Mathematics teaching-learning process. Specifically, this study aimed:

a) To reveal the Pre-Test and Post Test results of the students before and after integrating the text-messaging in mathematics teaching-learning process, respectively;
b) To establish the difference in the Pre-Test and the Post-Test results;
c) Find out the students' attitude towards the integration of text-messaging in mathematics teaching-learning process;
d) To establish the relationship between the students' attitude towards the integration of text-messaging in

mathematics teaching-learning process and the result of the Pre-test and the Post-Test;

e) To establish the difference in the students' attitude towards the integration of text-messaging in mathematics teaching-learning process according to:

i. gender;
ii. age; and
iii. the number of times a student has an airtime load?

III. Methodology

This methodology employed of this research study is discussed in the subsections below:

a) Research Design

This study utilized the one shot study design employing the pre-test and post-test investigation to establish the impact on the integration of text-messaging in mathematics teaching-learning process.

A quantitative approach was employed from a descriptive perspective with the demographic profile of the student-respondents. This study was conducted using survey methodology. Questionnaires and surveys are often used in educational research for collecting information that is not always directly observable [10]. A survey on the student profile on the use of text messaging, and the student-respondents' perception and attitude on the utilization of the said technologies in mathematics teaching-learning process was conducted.

A correlational approach was also employed to establish relationship between the Pre-Test and Post-Test results and the students' attitude towards the integration of text-messaging in mathematics teaching-learning process.

b) Sample and Settings

This study was conducted at University of San Carlos, during the second semester of the school year 2012 – 2013. There were three sets of respondents in this research study. The first set of respondents were the professors of the said University handling statistics in the previous semesters. They evaluated the content of the Pre-Test whether the items met the specific objectives of the lessons. The professors made specific revisions on the test by citing the Bloom's Taxonomy in creating the table of specifications. The second set was students in a statistics class. They established the readability of the test. The revisions were made based on the questions raised by the students during the dry run. The third set of respondents is subject of this research study, the student-respondents of the researcher during the second semester of the school year 2012 – 2013.

c) Measures

There were two sets of researcher-made instruments. The first set was a survey questionnaire which established the demographic profile of the student-respondents and their attitude towards the integration of text-messaging in mathematics teaching-learning process. The second set was the researcher-made validated Pre-Test an Post-test which established the impact of the integration of text-messaging in mathematics teaching-learning process.

d) Data-Gathering Procedure

This research study underwent the following data-gathering procedures:

1. Validation of the Research Instrument – The researcher-made Pre-Test was referred to two professors handling statistics for at least two (2) semesters. They validated the content of the Pre-Test to find out if the content met the objectives of the lesson. The professors made suggestions on the revisions of the test paper by citing the Blooms Taxonomy on the table of specifications.
2. Dry-Run of the Pre-Test – the validated test was administered to a statistics class to test the readability of the test. Then, the test was revised based on the questions raised by the questions during the dry-run.
3. Administration of the Pre-Test – The Pre-Test was administered to the student-respondents before the topic Normal Distribution was discussed to the students. After the Pre-Test, the teacher-researcher started discussing the lesson on Normal Distribution.
4. Integration of Text Messaging in Mathematics Teaching-Learning Process – During the two-week allotted time or six contact hours (inclusive of the administration of the Pre-Test and Post-Test, and orientation of the integration of text-messaging in the teaching learning process) to discuss the topic Normal Distribution, the teacher-researcher sent the following to the student-respondents: 1) updates on scores in the previous quizzes, attendance, and behavior; 2) short concepts to highlight the day's lesson on Normal Distribution; 3) open-ended questions related to the day's topic; 3) short report assignment in which a student is tasked to explain the following day the answer of a certain item in the assignment; and, 4) pop-quizzes with the same questions but different values every group. Every meeting, the teacher-researcher and/or assigned students discussed the answers in the pop-quizzes.
5. Administration of the Post-Test – After the last bit of the discussion on Normal Distribution, the teacher-researcher administered the Post-Test as an evaluation on the students' learning on Normal Distribution.
6. Administration of the survey on the Students' Attitude Towards the Integration of Text-

Messaging in Mathematics Teaching-Learning Process – After the Post-Test, the students were asked to answer the survey questionnaire which established the students' attitude towards the integration of text-messaging in mathematics teaching learning process.

7. Analyzing the Data– The researcher quantified the students' responses on the survey questionnaire. The researcher got the percentages/frequencies of responses and was subjected to tabulation and analysis with the Pre-test and the Post-Test.

IV. Results and Discussions

The following findings were based on the result of the statistical and analytical analysis of various data:

a) Demographic Profile

1. All the respondents are second year students which are new takers of the statistics course offered on the semester of the school year 2012 – 2013.
2. Almost all of the respondents' study in University of San Carlos is supported by their parents – with a percentage of 97.67% (42 out of 43). There is only one (1) respondent whose is supported by the guardian.
3. All of the respondents have cellphone during the time when the research study was conducted, which supports that Philippines is the texting capital [14].
4. The percentage of the respondents who have load everyday is 67.44% (29 out of 43). Others are once a week (11.63%), once a month (6.98%), when needed only (6.98%), thrice a week (2.33%), and twice a week (2.33%).
5. All of the respondents were not exposed to the integration of text-messaging in their previous math teaching-learning process.

b) Difference in the Pre-Test and the Post-test Results

Table 1 : Paired Sample Statistics on the Pre-Test and Post-Test

Test	Mean	N	Std. Deviation	Paired Samples Statistics					
				Mean	Std. Deviation	df	Computed value	Tabular value	Difference
Pre-Test	7.35	40	2.30	3..87	2.70	39	9.07	1.6849	Significant
Post-Test	11.22	40	2.21						

At 5% level of significance, 39 degree of freedom

Table 1 shows the average score of the students in the Pre-Test is 7.35 while their average score in the Post-Test is 11.22. As shown in the table, the computed t-value (9.392) is greater than the tabular t-value (1.6827) which leads to the rejection of the null hypothesis. This means that there is a significant difference between the average score in the Pre-Test (7.38) and Post-Test (11.29). Furthermore, through the one shot design of this study, this shows that the Post-Test result is higher than the Pre-Test result, which implies further that the integration of text-messaging in the teaching-learning process of the topic Normal Distribution turned out to be effective.

c) Students' Attitude on the Integration of Text-Messaging in Mathematics Teaching-Learning Process

Table 2 : Attitude on the Integration of Text Messaging in the Teaching-Learning Process

Statements	SD	D	U	A	SA	Wx	Verbal Description
1	0	2	6	26	9	3.98	Agree
2	0	1	7	28	7	3.95	Agree
3	1	2	15	18	6	3.53	Agree
4	1	3	19	10	9	3.47	Agree
5	2	2	6	24	9	3.84	Agree
6	0	2	9	26	6	3.84	Agree
7	3	2	8	23	7	3.67	Agree
8	1	2	1	29	10	4.05	Agree
9	1	0	8	24	10	3.98	Agree
10	0	3	6	22	11	3.88	Agree
11	0	2	9	23	9	3.91	Agree
TOTAL	9	21	94	253	93	3.85	Agree

Legend: SD – Strongly Disagree; D – Disagree; U – Undecided; A – Agree; SA – Strongly Agree; Wx – Weighted Mean

Table 2 shows that the respondents "agreed" on the eleven statements, asking their attitude, in the survey questionnaire. As shown in the table, the over-all weighted mean is 3.85, which means that the students "agreed" on the integration of text-messaging in mathematics teaching learning process. This supports the educational research and theory which suggested that students learn better when they are actively engaged in learning rather than passive recipients of the information [12]. Through exchange of text-messaging with their professors, the students had independently interacted with the professor about the lesson. Through this text-messaging, the student became interactive on the lessons and, thus agreed the integration of text-messaging in mathematics teaching learning process.

In addition, these findings served as the platform of a study who quoted that mobile learning can provide good support to micro-learning, a new and effective way of learning [11]. Also, it revealed that people can learn more effectively if "information" is broken down into smaller, more easy-to-comprehend units [11]. There they suggested that mobile learning is an ideal medium simply because it supports this "new way" of learning via the use of SMS (short messaging service).

d) Correlation Between the Pre-Test, Post-Test and the Students' Attitude Towards the Integration of Text-Messaging in Mathematics Teaching Learning Process

Table 3 : Correlation Between the Pre-Test, Post-Test, and the Students' Attitude

		N	Correlation
Pair 1	Pre-Test and Attitude	40	-0.048
Pair 2	Post-test and Attitude	40	-0.061

Table 3 shows the correlation between the Pre-Test, Post-Test, and the Students' Attitude Towards the Integration of Text-Messaging in Mathematics Teaching-Learning Process. As shown in the table, the Pair 1 (Pre-Test and Attitude) has a correlation value of -0.048, while the Pair 2 (Post-Test and Attitude) has a correlation value of -0.061. This means that both the Pre-Test and the Post-Test results have "no correlation" in the Students' Attitude Towards the Integration of Text-Messaging on Mathematics Teaching-Learning Process. This implies that the Pre-Test/Post-Test results and the Students' Attitude Towards the Integration of Text-Messaging on Mathematics Teaching-Learning Process are "independent" from each other.

e) Difference in the Students' Attitude Towards the Integration of Text-Messaging in Mathematics Teaching-Learning Process, According to Gender

Table 4 : Difference Between the Attitude of the Male and the Female students

Gender	SD	D	U	A	SA	Total	Wx	x^2 Computed Value	x^2 Tabular Value	Difference
Male	9	9	63	157	57	295	3.83	6.579	9.488	Not Significant
Female	1	10	25	78	29	143	3.87			
TOTAL	10	19	88	235	86	438	3.84			

At 5% level of significance, 4 degrees of freedom

Table 4 shows the attitude of the male and the female students on the integration of text-messaging in mathematics teaching-learning process. As reflected in the table, both the male (with a weighted mean of 3.83) and the female (with a weighted mean of 3.87) students "agreed" on the integration of text-messaging in mathematics teaching-learning process. Using the chi-square to test its difference, the computed value (6.579) is less than the tabular value (9.488), which leads to the acceptance of the null hypothesis. This means that the attitude of the male and the female students are "the same".

These findings have a bearing to the study which revealed that 23.57% students strongly agree that mobile learning can be an effective method of learning as it can give immediate support [11]. Then, 39.2% of the students felt that mobile learning will be more flexible method of learning as it can be done anytime anywhere. Likewise, a study revealed that majority of the students supported the idea that the wireless networks increase flexibility of access to resources of learning independently in any place [1]. Therefore, students can save their time, effort and even money. Other researchers found out this finding in their studies: "students favoured using mobile devices in the process of learning". With this, it was recommended to extensively study methods and techniques of providing knowledge via modern technological tools [3].

f) Difference in the Students' Attitude Towards the Integration of Text-Messaging in Mathematics Teaching-Learning Process, According to Age

Table 5 : Difference in the Attitude of the 16, 17 and 18 – 20 years old

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	Computed	Tabular	Difference
Between	0.4156	2	0.2078	0.0275	3.24	Not Significant
Within	279.4821	37	7.5536			
Total	279.0664	39				

At 5% level of significance, 4 degrees of freedom

Table 5 shows the attitude of the students which are grouped according to age: a) sixteen (16) years old; b) seventeen (17) years old; and c) eighteen to twenty years old. As shown in this ANOVA table, the computed value (0.0275) is less than the tabular value (3.24). This leads to the acceptance of the null hypothesis. It implies that the attitude of the three groups of students according to age is "the same".

Along these findings is the study who made a conclusion that SMS text-messaging provided the most appropriate technology to address issues to support students in distant displacements and reduce the feeling of isolation while on practice [18]. In line with this, a study focused on using SMS for answering "short words-answers types of questions and evaluating them using simple matching process, providing enough feedback. The results proved that SMS can be used as an aid for answering short-answered type of questions [3].

g) Difference in the Students' Attitude Towards the Integration of Text-Messaging in Mathematics Teaching-Learning Process, According to the Number of Times a Student has an Airtime Load

Table 5 : Difference in the Attitude of the Students who have Airtime Load Everyday, Once/Twice/Thrice a Week, and Once-a-month/If Needed

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	Computed	Tabular	Difference
Between	0.1641	2	0.08206	0.2106	3.24	Not Significant
Within	14.4207	37	0.3897			
Total	14.5848	39				

At 5% level of significance, 4 degrees of freedom

Table 5 shows the attitude of the students which are grouped according to the number of times they have airtime load: a) everyday; b) once/twice/thrice a week; and c) once a month or if needed. As shown in this ANOVA table, the computed value (0.2106) is less than the tabular value (3.24). This leads to the acceptance of the null hypothesis. It implies that the attitude of the three groups of students according to the number of times they have airtime load is "the same".

These findings sustain the study which aimed at evaluating the effectiveness of text messaging in an online environment, they found out that students enjoyed using text-messaging in the learning process [9]. It quoted the following statements of the students who experienced text-messaging in the learning process: interesting, cool, nice, exciting, fun, and challenging .

V. Conclusions

Based on the findings of this study, the following conclusions are derived:

1. All respondents of this research study are adolescents aging 16 – 20 years old. During the duration of this study, all of them have airtime load. The percentage of the respondents who have load everyday is 67.44% (29 out of 43), once a week (11.63%), once a month (6.98%), when needed only (6.98%), thrice a week (2.33%), and twice a week (2.33%). In addition, all of them were not exposed to the integration of text-messaging in mathematics-teaching learning process.
2. Using the one shot study design employing the Pre-Test and Post-Test investigation, the paired-sample test revealed that there is a significant difference between the average score of the scores in the Pre-Test and the Post-Test. This implies that the students performed better in the Post-Test.
3. The students agreed the integration of text-messaging, since they remain updated of the classroom activities even though they are already off-campus. They also learned additional inputs and are helped in highlighting important concepts of the lesson through the text-messages received from

their professor. Through the weighted mean of 3.85, it is concluded students "agreed" on the integration of the text-messaging in mathematics teaching-learning process.

4. The pearson product moment coefficient of correlation revealed "no correlation between the Pre-Test/Post-Test results and the Students' Attitude on the Integration of Text-Messaging in Mathematics Teaching-Learning Process. This implies that the Pre-Test/Post-Test results and Students' Attitude on the Integration of Text-Messaging in Mathematics Teaching-Learning Process don't affect in any way with each other.
5. Both male and female students agreed on the integration of the text-messaging in mathematics teaching-learning process. The degree of agreement of the male is just equivalent to the female.
6. The degree of agreement to on the integration of the text-messaging in mathematics teaching-learning process is the same across ages of the students. This implies that whatever is the age of the students, they agree to the on the integration of the text-messaging in mathematics teaching-learning process.
7. The students agreed on the integration of the text-messaging in mathematics teaching-learning process regardless on the number of times they have airtime load. The degree of agreement of the students with airtime load everyday is just the same as those students who have airtime load once a week, because the lessons that they learned inside the school are strengthened due to the text-messages sent by their professor.

VI. Recommendations

With reference to the findings on the attitude of the students towards the integration of text-messaging in mathematics teaching-learning process, the vast literature on the use of mobile gadget in the teaching-learning process, findings and conclusions, the researcher provides the following recommendations.

a) To the Mathematics Teachers

1. Integrate text-messaging in mathematics teaching-learning process.
2. Use text messaging as an "enrichment" tool only in the learning process of the students. Thus, depending too much on text messaging has to be avoided.
3. Through text messaging, send the students the following:
   a. updates on exam schedules and results;
   b. updates on class standing;
   c. concepts that need to be super-emphasized because of constant use;
   d. enrichment items especially those who performed low in the quiz and those who are shy during seat work;
   e. congratulatory remarks to those who scored high in the exams and those who did a nice participation in the discussion;
   f. follow-ups on projects that are not yet submitted;
   g. updates on new topics;
   h. critical thinking problems related to the day's discussion which will be voluntarily shown by the students during the next meeting;
   i. "catch-up" items for students who will be absent; and
   j. advance organizers for the new topics, like set of examples, and concepts.
4. Allot few minutes before the days lessons in explaining the answers to text messages where many students failed to arrive the correct answer.
5. Encourage active participation in text messaging by replying boost-enhancing statements to the students
6. Keep updated with the students if they receive the text-messages.

b) To the School Administrators and/or Curriculum Planners

1. Create a strategic plan for mathematics instruction where text-messaging is integrated in the teaching-learning process.
2. Include the following goals in developing the strategic plan:
   a. Program Development Plan
   b. Governance Strengthening Plan
   c. Subscription and Development Program
   d. Physical Development Plan

c) To the Book Authors and/or Publishing Companies

1. Integrate text-messaging in designing the contents of the book.
2. Create link with the cellphone network stakeholders for the integration of text-messaging in textbook production.

d) To the Cellphone Network Stakeholders

1. Create links with publishing companies where text-messaging can be integrated in textbook production.
2. Develop a text promotion where mathematics learning of the students will be enhanced.

e) To the Researchers

1. Replicate this research study using a control group to compare the experimental group.
2. Develop a research study that covers the impact of on the integration of text-messaging in the classroom teaching-learning process.

3. Create a strategic plan for research purpose that will serve as a springboard of the school administrators in their implementation of the integration of text-messaging in mathematics teaching-learning process.

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FARSB accrediting is an honor. It authenticates your research activities. After recognition as FARSB, you can add 'FARSB' title with your name as you use this recognition as additional suffix to your status. This will definitely enhance and add more value and repute to your name. You may use it on your professional Counseling Materials such as CV, Resume, and Visiting Card etc.

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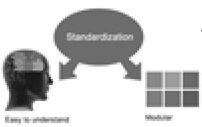
As FARSB, you will be given a renowned, secure and free professional email address with 100 GB of space e.g. johnhall@globaljournals.org. This will include Webmail, Spam Assassin, Email Forwarders,Auto-Responders, Email Delivery Route tracing, etc.



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MARSB accrediting is an honor. It authenticates your research activities. After becoming MARSB, you can add 'MARSB' title with your name as you use this recognition as additional suffix to your status. This will definitely enhance and add more value and repute to your name. You may use it on your professional Counseling Materials such as CV, Resume, Visiting Card and Name Plate etc.

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The MARSB member can apply for approval, grading and certification of standards of their educational and Institutional Degrees to Open Association of Research, Society U.S.A.

Once you are designated as MARSB, you may send us a scanned copy of all of your credentials. OARS will verify, grade and certify them. This will be based on your academic records, quality of research papers published by you, and some more criteria.

It is mandatory to read all terms and conditions carefully.

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Institutional Fellow of Open Association of Research Society (USA)-OARS (USA)

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The IFOARS institution is entitled to form a Board comprised of one Chairperson and three to five board members preferably from different streams. The Board will be recognized as "Institutional Board of Open Association of Research Society"-(IBOARS).

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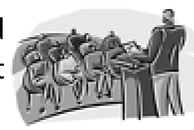
The author fees of such paper may be waived off up to 40%.



The Global Journals Incorporation (USA) at its discretion can also refer double blind peer reviewed paper at their end to the board for the verification and to get recommendation for final stage of acceptance of publication.

The IBOARS can organize symposium/seminar/conference in their country on behalf of Global Journals Incorporation (USA)-OARS (USA). The terms and conditions can be discussed separately.

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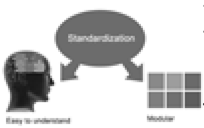
We shall provide you intimation regarding launching of e-version of journal of your stream time to time. This may be utilized in your library for the enrichment of knowledge of your students as well as it can also be helpful for the concerned faculty members.



After nomination of your institution as "Institutional Fellow" and constantly functioning successfully for one year, we can consider giving recognition to your institute to function as Regional/Zonal office on our behalf.
The board can also take up the additional allied activities for betterment after our consultation.

The following entitlements are applicable to individual Fellows:

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- The Fellow can organize symposium/seminar/conference on behalf of Global Journals Incorporation (USA) and he/she can also attend the same organized by other institutes on behalf of Global Journals.
- The Fellow can become member of Editorial Board Member after completing 3yrs.
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- Fellow can also join as paid peer reviewer and earn 15% remuneration of author charges and can also get an opportunity to join as member of the Editorial Board of Global Journals Incorporation (USA)
- • This individual has learned the basic methods of applying those concepts and techniques to common challenging situations. This individual has further demonstrated an in–depth understanding of the application of suitable techniques to a particular area of research practice.

Note :

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- In future, if the board feels the necessity to change any board member, the same can be done with the consent of the chairperson along with anyone board member without our approval.
- In case, the chairperson needs to be replaced then consent of 2/3rd board members are required and they are also required to jointly pass the resolution copy of which should be sent to us. In such case, it will be compulsory to obtain our approval before replacement.
- In case of "Difference of Opinion [if any]" among the Board members, our decision will be final and binding to everyone. "

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The paper should be in proper format. The format can be downloaded from first page of 'Author Guideline' Menu. The Author is expected to follow the general rules as mentioned in this menu. The paper should be written in MS-Word Format (*.DOC,*.DOCX).

The Author can submit the paper either online or offline. The authors should prefer online submission.Online Submission: There are three ways to submit your paper:

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(II) Choose corresponding Journal.

(III) Click 'Submit Manuscript'. Fill required information and Upload the paper.

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1. General,

2. Ethical Guidelines,

3. Submission of Manuscripts,

4. Manuscript's Category,

5. Structure and Format of Manuscript,

6. After Acceptance.

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Manuscript submission is a systematic procedure and little preparation is required beyond having all parts of your manuscript in a given format and a computer with an Internet connection and a Web browser. Full help and instructions are provided on-screen. As an author, you will be prompted for login and manuscript details as Field of Paper and then to upload your manuscript file(s) according to the instructions.

To avoid postal delays, all transaction is preferred by e-mail. A finished manuscript submission is confirmed by e-mail immediately and your paper enters the editorial process with no postal delays. When a conclusion is made about the publication of your paper by our Editorial Board, revisions can be submitted online with the same procedure, with an occasion to view and respond to all comments.

Complete support for both authors and co-author is provided.

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Based on potential and nature, the manuscript can be categorized under the following heads:

Original research paper: Such papers are reports of high-level significant original research work.

Review papers: These are concise, significant but helpful and decisive topics for young researchers.

Research articles: These are handled with small investigation and applications

Research letters: The letters are small and concise comments on previously published matters.

5.STRUCTURE AND FORMAT OF MANUSCRIPT

The recommended size of original research paper is less than seven thousand words, review papers fewer than seven thousands words also.Preparation of research paper or how to write research paper, are major hurdle, while writing manuscript. The research articles and research letters should be fewer than three thousand words, the structure original research paper; sometime review paper should be as follows:

Papers: These are reports of significant research (typically less than 7000 words equivalent, including tables, figures, references), and comprise:

(a)Title should be relevant and commensurate with the theme of the paper.

(b) A brief Summary, "Abstract" (less than 150 words) containing the major results and conclusions.

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(e) Resources and techniques with sufficient complete experimental details (wherever possible by reference) to permit repetition; sources of information must be given and numerical methods must be specified by reference, unless non-standard.

(f) Results should be presented concisely, by well-designed tables and/or figures; the same data may not be used in both; suitable statistical data should be given. All data must be obtained with attention to numerical detail in the planning stage. As reproduced design has been recognized to be important to experiments for a considerable time, the Editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned un-refereed;

(g) Discussion should cover the implications and consequences, not just recapitulating the results; conclusions should be summarizing.

(h) Brief Acknowledgements.

(i) References in the proper form.

Authors should very cautiously consider the preparation of papers to ensure that they communicate efficiently. Papers are much more likely to be accepted, if they are cautiously designed and laid out, contain few or no errors, are summarizing, and be conventional to the approach and instructions. They will in addition, be published with much less delays than those that require much technical and editorial correction.

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It is vital, that authors take care in submitting a manuscript that is written in simple language and adheres to published guidelines.

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Language: The language of publication is UK English. Authors, for whom English is a second language, must have their manuscript efficiently edited by an English-speaking person before submission to make sure that, the English is of high excellence. It is preferable, that manuscripts should be professionally edited.

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Abbreviations supposed to be used carefully. The abbreviated name or expression is supposed to be cited in full at first usage, followed by the conventional abbreviation in parentheses.

Metric SI units are supposed to generally be used excluding where they conflict with current practice or are confusing. For illustration, 1.4 l rather than 1.4 × 10-3 m3, or 4 mm somewhat than 4 × 10-3 m. Chemical formula and solutions must identify the form used, e.g. anhydrous or hydrated, and the concentration must be in clearly defined units. Common species names should be followed by underlines at the first mention. For following use the generic name should be constricted to a single letter, if it is clear.

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Many researchers searching for information online will use search engines such as Google, Yahoo or similar. By optimizing your paper for search engines, you will amplify the chance of someone finding it. This in turn will make it more likely to be viewed and/or cited in a further work. Global Journals Inc. (US) have compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

Key Words

A major linchpin in research work for the writing research paper is the keyword search, which one will employ to find both library and Internet resources.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy and planning a list of possible keywords and phrases to try.

Search engines for most searches, use Boolean searching, which is somewhat different from Internet searches. The Boolean search uses "operators," words (and, or, not, and near) that enable you to expand or narrow your affords. Tips for research paper while preparing research paper are very helpful guideline of research paper.

Choice of key words is first tool of tips to write research paper. Research paper writing is an art.A few tips for deciding as strategically as possible about keyword search:

- One should start brainstorming lists of possible keywords before even begin searching. Think about the most important concepts related to research work. Ask, "What words would a source have to include to be truly valuable in research paper?" Then consider synonyms for the important words.
- It may take the discovery of only one relevant paper to let steer in the right keyword direction because in most databases, the keywords under which a research paper is abstracted are listed with the paper.
- One should avoid outdated words.

Keywords are the key that opens a door to research work sources. Keyword searching is an art in which researcher's skills are bound to improve with experience and time.

Numerical Methods: Numerical methods used should be clear and, where appropriate, supported by references.

Acknowledgements: Please make these as concise as possible.

References

References follow the Harvard scheme of referencing. References in the text should cite the authors' names followed by the time of their publication, unless there are three or more authors when simply the first author's name is quoted followed by et al. unpublished work has to only be cited where necessary, and only in the text. Copies of references in press in other journals have to be supplied with submitted typescripts. It is necessary that all citations and references be carefully checked before submission, as mistakes or omissions will cause delays.

References to information on the World Wide Web can be given, but only if the information is available without charge to readers on an official site. Wikipedia and Similar websites are not allowed where anyone can change the information. Authors will be asked to make available electronic copies of the cited information for inclusion on the Global Journals Inc. (US) homepage at the judgment of the Editorial Board.

The Editorial Board and Global Journals Inc. (US) recommend that, citation of online-published papers and other material should be done via a DOI (digital object identifier). If an author cites anything, which does not have a DOI, they run the risk of the cited material not being noticeable.

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TECHNIQUES FOR WRITING A GOOD QUALITY RESEARCH PAPER:

1. Choosing the topic: In most cases, the topic is searched by the interest of author but it can be also suggested by the guides. You can have several topics and then you can judge that in which topic or subject you are finding yourself most comfortable. This can be done by asking several questions to yourself, like Will I be able to carry our search in this area? Will I find all necessary recourses to accomplish the search? Will I be able to find all information in this field area? If the answer of these types of questions will be "Yes" then you can choose that topic. In most of the cases, you may have to conduct the surveys and have to visit several places because this field is related to Computer Science and Information Technology. Also, you may have to do a lot of work to find all rise and falls regarding the various data of that subject. Sometimes, detailed information plays a vital role, instead of short information.

2. Evaluators are human: First thing to remember that evaluators are also human being. They are not only meant for rejecting a paper. They are here to evaluate your paper. So, present your Best.

3. Think Like Evaluators: If you are in a confusion or getting demotivated that your paper will be accepted by evaluators or not, then think and try to evaluate your paper like an Evaluator. Try to understand that what an evaluator wants in your research paper and automatically you will have your answer.

4. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

5. Ask your Guides: If you are having any difficulty in your research, then do not hesitate to share your difficulty to your guide (if you have any). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work then ask the supervisor to help you with the alternative. He might also provide you the list of essential readings.

6. Use of computer is recommended: As you are doing research in the field of Computer Science, then this point is quite obvious.

7. Use right software: Always use good quality software packages. If you are not capable to judge good software then you can lose quality of your paper unknowingly. There are various software programs available to help you, which you can get through Internet.

8. Use the Internet for help: An excellent start for your paper can be by using the Google. It is an excellent search engine, where you can have your doubts resolved. You may also read some answers for the frequent question how to write my research paper or find model research paper. From the internet library you can download books. If you have all required books make important reading selecting and analyzing the specified information. Then put together research paper sketch out.

9. Use and get big pictures: Always use encyclopedias, Wikipedia to get pictures so that you can go into the depth.

10. Bookmarks are useful: When you read any book or magazine, you generally use bookmarks, right! It is a good habit, which helps to not to lose your continuity. You should always use bookmarks while searching on Internet also, which will make your search easier.

11. Revise what you wrote: When you write anything, always read it, summarize it and then finalize it.

12. Make all efforts: Make all efforts to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in introduction, that what is the need of a particular research paper. Polish your work by good skill of writing and always give an evaluator, what he wants.

13. Have backups: When you are going to do any important thing like making research paper, you should always have backup copies of it either in your computer or in paper. This will help you to not to lose any of your important.

14. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several and unnecessary diagrams will degrade the quality of your paper by creating "hotchpotch." So always, try to make and include those diagrams, which are made by your own to improve readability and understandability of your paper.

15. Use of direct quotes: When you do research relevant to literature, history or current affairs then use of quotes become essential but if study is relevant to science then use of quotes is not preferable.

16. Use proper verb tense: Use proper verb tenses in your paper. Use past tense, to present those events that happened. Use present tense to indicate events that are going on. Use future tense to indicate future happening events. Use of improper and wrong tenses will confuse the evaluator. Avoid the sentences that are incomplete.

17. Never use online paper: If you are getting any paper on Internet, then never use it as your research paper because it might be possible that evaluator has already seen it or maybe it is outdated version.

18. Pick a good study spot: To do your research studies always try to pick a spot, which is quiet. Every spot is not for studies. Spot that suits you choose it and proceed further.

19. Know what you know: Always try to know, what you know by making objectives. Else, you will be confused and cannot achieve your target.

20. Use good quality grammar: Always use a good quality grammar and use words that will throw positive impact on evaluator. Use of good quality grammar does not mean to use tough words, that for each word the evaluator has to go through dictionary. Do not start sentence with a conjunction. Do not fragment sentences. Eliminate one-word sentences. Ignore passive voice. Do not ever use a big word when a diminutive one would suffice. Verbs have to be in agreement with their subjects. Prepositions are not expressions to finish sentences with. It is incorrect to ever divide an infinitive. Avoid clichés like the disease. Also, always shun irritating alliteration. Use language that is simple and straight forward. put together a neat summary.

21. Arrangement of information: Each section of the main body should start with an opening sentence and there should be a changeover at the end of the section. Give only valid and powerful arguments to your topic. You may also maintain your arguments with records.

22. Never start in last minute: Always start at right time and give enough time to research work. Leaving everything to the last minute will degrade your paper and spoil your work.

23. Multitasking in research is not good: Doing several things at the same time proves bad habit in case of research activity. Research is an area, where everything has a particular time slot. Divide your research work in parts and do particular part in particular time slot.

24. Never copy others' work: Never copy others' work and give it your name because if evaluator has seen it anywhere you will be in trouble.

25. Take proper rest and food: No matter how many hours you spend for your research activity, if you are not taking care of your health then all your efforts will be in vain. For a quality research, study is must, and this can be done by taking proper rest and food.

26. Go for seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

27. Refresh your mind after intervals: Try to give rest to your mind by listening to soft music or by sleeping in intervals. This will also improve your memory.

28. Make colleagues: Always try to make colleagues. No matter how sharper or intelligent you are, if you make colleagues you can have several ideas, which will be helpful for your research.

29. Think technically: Always think technically. If anything happens, then search its reasons, its benefits, and demerits.

30. Think and then print: When you will go to print your paper, notice that tables are not be split, headings are not detached from their descriptions, and page sequence is maintained.

31. Adding unnecessary information: Do not add unnecessary information, like, I have used MS Excel to draw graph. Do not add irrelevant and inappropriate material. These all will create superfluous. Foreign terminology and phrases are not apropos. One should NEVER take a broad view. Analogy in script is like feathers on a snake. Not at all use a large word when a very small one would be sufficient. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Amplification is a billion times of inferior quality than sarcasm.

32. Never oversimplify everything: To add material in your research paper, never go for oversimplification. This will definitely irritate the evaluator. Be more or less specific. Also too, by no means, ever use rhythmic redundancies. Contractions aren't essential and shouldn't be there used. Comparisons are as terrible as clichés. Give up ampersands and abbreviations, and so on. Remove commas, that are, not necessary. Parenthetical words however should be together with this in commas. Understatement is all the time the complete best way to put onward earth-shaking thoughts. Give a detailed literary review.

33. Report concluded results: Use concluded results. From raw data, filter the results and then conclude your studies based on measurements and observations taken. Significant figures and appropriate number of decimal places should be used. Parenthetical remarks are prohibitive. Proofread carefully at final stage. In the end give outline to your arguments. Spot out perspectives of further study of this subject. Justify your conclusion by at the bottom of them with sufficient justifications and examples.

34. After conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print to the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects in your research.

Informal Guidelines of Research Paper Writing

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form, which is presented in the guidelines using the template.
- Please note the criterion for grading the final paper by peer-reviewers.

Final Points:

A purpose of organizing a research paper is to let people to interpret your effort selectively. The journal requires the following sections, submitted in the order listed, each section to start on a new page.

The introduction will be compiled from reference matter and will reflect the design processes or outline of basis that direct you to make study. As you will carry out the process of study, the method and process section will be constructed as like that. The result segment will show related statistics in nearly sequential order and will direct the reviewers next to the similar intellectual paths throughout the data that you took to carry out your study. The discussion section will provide understanding of the data and projections as to the implication of the results. The use of good quality references all through the paper will give the effort trustworthiness by representing an alertness of prior workings.

Writing a research paper is not an easy job no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record keeping are the only means to make straightforward the progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear

· Adhere to recommended page limits

Mistakes to evade

- Insertion a title at the foot of a page with the subsequent text on the next page
- Separating a table/chart or figure - impound each figure/table to a single page
- Submitting a manuscript with pages out of sequence

In every sections of your document

· Use standard writing style including articles ("a", "the," etc.)

· Keep on paying attention on the research topic of the paper

· Use paragraphs to split each significant point (excluding for the abstract)

· Align the primary line of each section

· Present your points in sound order

· Use present tense to report well accepted

· Use past tense to describe specific results

· Shun familiar wording, don't address the reviewer directly, and don't use slang, slang language, or superlatives

· Shun use of extra pictures - include only those figures essential to presenting results

Title Page:

Choose a revealing title. It should be short. It should not have non-standard acronyms or abbreviations. It should not exceed two printed lines. It should include the name(s) and address (es) of all authors.

Abstract:

The summary should be two hundred words or less. It should briefly and clearly explain the key findings reported in the manuscript--must have precise statistics. It should not have abnormal acronyms or abbreviations. It should be logical in itself. Shun citing references at this point.

An abstract is a brief distinct paragraph summary of finished work or work in development. In a minute or less a reviewer can be taught the foundation behind the study, common approach to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Yet, use comprehensive sentences and do not let go readability for briefness. You can maintain it succinct by phrasing sentences so that they provide more than lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study, with the subsequent elements in any summary. Try to maintain the initial two items to no more than one ruling each.

- Reason of the study - theory, overall issue, purpose
- Fundamental goal
- To the point depiction of the research
- Consequences, including definite statistics - if the consequences are quantitative in nature, account quantitative data; results of any numerical analysis should be reported
- Significant conclusions or questions that track from the research(es)

Approach:

- Single section, and succinct
- As a outline of job done, it is always written in past tense
- A conceptual should situate on its own, and not submit to any other part of the paper such as a form or table
- Center on shortening results - bound background information to a verdict or two, if completely necessary
- What you account in an conceptual must be regular with what you reported in the manuscript
- Exact spelling, clearness of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else

Introduction:

The **Introduction** should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable to comprehend and calculate the purpose of your study without having to submit to other works. The basis for the study should be offered. Give most important references but shun difficult to make a comprehensive appraisal of the topic. In the introduction, describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will have no attention in your result. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here. Following approach can create a valuable beginning:

- Explain the value (significance) of the study
- Shield the model - why did you employ this particular system or method? What is its compensation? You strength remark on its appropriateness from a abstract point of vision as well as point out sensible reasons for using it.
- Present a justification. Status your particular theory (es) or aim(s), and describe the logic that led you to choose them.
- Very for a short time explain the tentative propose and how it skilled the declared objectives.

Approach:

- Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done.
- Sort out your thoughts; manufacture one key point with every section. If you make the four points listed above, you will need a least of four paragraphs.

- Present surroundings information only as desirable in order hold up a situation. The reviewer does not desire to read the whole thing you know about a topic.
- Shape the theory/purpose specifically - do not take a broad view.
- As always, give awareness to spelling, simplicity and correctness of sentences and phrases.

Procedures (Methods and Materials):

This part is supposed to be the easiest to carve if you have good skills. A sound written Procedures segment allows a capable scientist to replacement your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt for the least amount of information that would permit another capable scientist to spare your outcome but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section. When a technique is used that has been well described in another object, mention the specific item describing a way but draw the basic principle while stating the situation. The purpose is to text all particular resources and broad procedures, so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step by step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

- Explain materials individually only if the study is so complex that it saves liberty this way.
- Embrace particular materials, and any tools or provisions that are not frequently found in laboratories.
- Do not take in frequently found.
- If use of a definite type of tools.
- Materials may be reported in a part section or else they may be recognized along with your measures.

Methods:

- Report the method (not particulars of each process that engaged the same methodology)
- Describe the method entirely
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures
- Simplify - details how procedures were completed not how they were exclusively performed on a particular day.
- If well known procedures were used, account the procedure by name, possibly with reference, and that's all.

Approach:

- It is embarrassed or not possible to use vigorous voice when documenting methods with no using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result when script up the methods most authors use third person passive voice.
- Use standard style in this and in every other part of the paper - avoid familiar lists, and use full sentences.

What to keep away from

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings - save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part a entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Carry on to be to the point, by means of statistics and tables, if suitable, to present consequences most efficiently.You must obviously differentiate material that would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matter should not be submitted at all except requested by the instructor.

Content

- Sum up your conclusion in text and demonstrate them, if suitable, with figures and tables.
- In manuscript, explain each of your consequences, point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation an exacting study.
- Explain results of control experiments and comprise remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or in manuscript form.

What to stay away from

- Do not discuss or infer your outcome, report surroundings information, or try to explain anything.
- Not at all, take in raw data or intermediate calculations in a research manuscript.
- Do not present the similar data more than once.
- Manuscript should complement any figures or tables, not duplicate the identical information.
- Never confuse figures with tables - there is a difference.

Approach

- As forever, use past tense when you submit to your results, and put the whole thing in a reasonable order.
- Put figures and tables, appropriately numbered, in order at the end of the report
- If you desire, you may place your figures and tables properly within the text of your results part.

Figures and tables

- If you put figures and tables at the end of the details, make certain that they are visibly distinguished from any attach appendix materials, such as raw facts
- Despite of position, each figure must be numbered one after the other and complete with subtitle
- In spite of position, each table must be titled, numbered one after the other and complete with heading
- All figure and table must be adequately complete that it could situate on its own, divide from text

Discussion:

The Discussion is expected the trickiest segment to write and describe. A lot of papers submitted for journal are discarded based on problems with the Discussion. There is no head of state for how long a argument should be. Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implication of the study. The purpose here is to offer an understanding of your results and hold up for all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of result should be visibly described. Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved with prospect, and let it drop at that.

- Make a decision if each premise is supported, discarded, or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."
- Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work
- You may propose future guidelines, such as how the experiment might be personalized to accomplish a new idea.
- Give details all of your remarks as much as possible, focus on mechanisms.
- Make a decision if the tentative design sufficiently addressed the theory, and whether or not it was correctly restricted.
- Try to present substitute explanations if sensible alternatives be present.
- One research will not counter an overall question, so maintain the large picture in mind, where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

- When you refer to information, differentiate data generated by your own studies from available information
- Submit to work done by specific persons (including you) in past tense.
- Submit to generally acknowledged facts and main beliefs in present tense.

Please carefully note down following rules and regulation before submitting your Research Paper to Global Journals Inc. (US):

Segment Draft and Final Research Paper: You have to strictly follow the template of research paper. If it is not done your paper may get rejected.

- The **major constraint** is that you must independently make all content, tables, graphs, and facts that are offered in the paper. You must write each part of the paper wholly on your own. The Peer-reviewers need to identify your own perceptive of the concepts in your own terms. NEVER extract straight from any foundation, and never rephrase someone else's analysis.

- Do not give permission to anyone else to "PROOFREAD" your manuscript.

- Methods to avoid Plagiarism is applied by us on every paper, if found guilty, you will be blacklisted by all of our collaborated research groups, your institution will be informed for this and strict legal actions will be taken immediately.)
- To guard yourself and others from possible illegal use please do not permit anyone right to use to your paper and files.

CRITERION FOR GRADING A RESEARCH PAPER (COMPILATION) BY GLOBAL JOURNALS INC. (US)

Please note that following table is only a Grading of "Paper Compilation" and not on "Performed/Stated Research" whose grading solely depends on Individual Assigned Peer Reviewer and Editorial Board Member. These can be available only on request and after decision of Paper. This report will be the property of Global Journals Inc. (US).

Topics	Grades		
	A-B	**C-D**	**E-F**
Abstract	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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