ASM GROUP OF INSTITUTES
presents

ASM Business Review

(The Bi-annual Refereed Journal)

ISSN No. 0974-9136 | **Volume - 8** | **Number - 1** | **January 2019**

International Conference on 'Ongoing Research in Management & IT'
INCON - XIV
11th- 12th JANUARY 2019
PUNE, INDIA

Business Strategies Practices and Innovations

In Association with

In Association With
Knowledge Partner
WATCH INCON 2019 LIVE TELECAST

ASM GROUP OF INSTITUTES
IBMR | IIBR | IPS | IMCOST | CSIT | GEMS|GJC|EMPROS

Survey No 29/1+2A'C' Wing, Opp. Central Mall,Near PCMC building,
Pune Mumbai Highway, Pimpri, Pune-411019."

Printing by:

Success Publications
Radha Krishna Apartment, 535, Shaniwar Peth,
Opp.Prabhat Theatre, Pune - 411030.
Contact - 9422025610, 8390848833, 020-24433374, 24434662
Email- marketing@sharpmultinational.com
Website- www.sharpmultinational.com

Published by : Audogik Shikshan Mandal

For,
ASM Group of Institutes
Address- Survey No 29/1+2A'C' Wing Opp. Central Mall,
Near PCMC building, Pune Mumbai Highway, Pimpri, Pune-411019.

From the Editor's Desk

This is the sixth issue of "ASM Business Review", the referred research journal of the ASM group of Institutes.

ASM Group of Institutes is committed for qualitative research in academics. And this ASM Business Review is a product of its commitment. Audyogik Shikshan Mandal has been playing a pioneering role in the field of creative education ever since its inception in 1983. With a mission "Excellence in Management Education, Training, Consultancy and Research for success", ASM is marching towards excellence having more than 65,000+ alumni working at all levels of management in all types of industries.

ASM has seven full fledged academic institutions, has earned affiliation to Savitribai Phule Pune University and Mumbai University, Government of India and Government of Maharashtra. ASM has global vision for education and as a part of our academic commitment for excellence; we are in association Savitribai Phule Pune University, CETYS Universidad Mexico, Institute of Computer Science Polish Academy of Sciences (IPI PAN) Poland and City University of Seattle USA and Higher Education Foundation (HEF) and International Society Organisation Development and Change (ISODC) also our academic partners for various activities. ASM is spreading wings across the border for continuous upgrading academic excellence.

The ASM Business Review is a medium created by ASM to demonstrate the research skills of authors. It is a strong communication link between industry and academia and aims to work as a catalyst for knowledge sharing between various sections of society. ASM Business Review provides a platform for academic scholars and champions from industry to come together for common cause of developing innovative solutions to various problems faced by society and business entities. The present review is a medium to faculty members, research students and they like to present their research findings before the wider audience. The opportunity to publish their research results would provide ample motivation to this type of scholars. The previous issue of the Review received encouraging response from the academic and corporate community as well. Research articles accepted and printed herein are subject to objective editorial processing and are peer reviewed.

ASM Business Review looks forward as a strong link and partner for society and industry to develop workable solution for day to day problems. We believe our success is a team work of various contributions to this journal. ASM BUSINESS REVIEW is always committed to excel academic research and consultancy.

Dr. Asha Pachpande
Managing Trustee and Secretary,
Audyogik Shikshan Mandal,
Pune -411019 (India)

EDITORIAL BOARD

CONTENTS

THE INFLUENCE AND BENEFITS OF TECHNOLOGY AS A STRATEGY IN ORGANIZATIONS

José G. Vargas Hernández
University Center for Economic and Managerial Sciences, University of Guadalajara
Periférico Nte.799 Edif G201-7 Núcleo Universitario Los Belenes, Zapopan, Jal. México
jvargas2006@gmail.com

María Teresa Alcántara Salcedo
Doctorado en Ciencias administrativas
Centro Universitario de Ciencias Económico Administrativas, Universidad de Guadalajara
Periférico Nte.799 Núcleo Universitario Los Belenes, Zapopan, Jal. México.
msalcedo@cucea.udg.mx

ABSTRACT

The article presents a description of "The Influence and Benefits of Technology as a Strategy in Organizations." Technology is considered as a competitive advantage, which allows organizations to benefit, this technology means that these companies can maintain themselves and acquire a position interesting within the market, now organizations are interested in the acquisition of technology, this acquisition takes value because of the economic importance that can come from having the best technology within the organization. The document presents information about technology as a key strategy, which can help companies to create a competitive advantage within the market.

Keywords: *Technology; strategy; acquisition of technology, organizations, competitive advantage, knowledge management*

JEL:

Resumen

El artículo presenta una descripción sobre "La Influencia y Beneficios de la Tecnológica como Estrategia en las Organizaciones". La tecnología es considerada como una **ventaja competitiva**, que permite brindar beneficios a las organizaciones, dicha tecnología hace que estas empresas puedan mantenerse y adquieran una posición interesante dentro del mercado, actualmente las

organizaciones se interesan por la adquisición de tecnología, esta adquisición toma valor por la importancia económica que se puede desprender al contar con la mejor tecnología dentro de la organización. El documento presenta información acerca de la tecnología como estrategia clave, que puede ayudar a las empresas a crear una ***ventaja competitiva*** dentro del mercado.

Palabras clave: Tecnología; estrategia; adquisición de tecnología, organizaciones, ventaja competitiva, gestión del conocimiento.

1. Introduction

In the article, on the one hand, it is talked mainly about the Influence and Benefits of Technology as a Strategy in Organizations, and for this, it is necessary to make a small description of where organizations come from. The organizations are born from the need of people to group themselves, these groups, gather certain characteristics such as: individuals with common interests, the same objective, the need for investment together, among other characteristics. The organizations demand an order that allows to reach their objectives. This order is related to the structure, administrative processes, and the constant technological updating within the organization. On the other hand, the article presents a description of the main characteristics to consider for the acquisition and integration of new technology.

One of the strategies of companies is to constantly seek ways to remain within the market, so it is necessary to perform different processes such as, the update of human resources with which the organization has and the acquisition of technology. The combination of these two it can result in the creation of a competitive advantage. As Porter (2009) says, today organizations of all kinds are forced to compete to provide value, understood as the ability to meet or exceed the needs of customers effectively, any organization needs a strategy to offer superior value to its customers.It is said that only organizations that are competitive are those that survive in the market.

This document is structured as follows. In the first place: there is the approach to the problem, which is what gives direction to the investigation. Second, the justification is located, which is what gives reason to the investigation. Third, there is the objective, the question and the hypothesis, these give meaning to the research process. Fourth, Structure, which allows to show information about the influence and benefits of technology as a strategy in organizations. In fifth place, is the theoretical Framework, which contains the review of the theorists that support the

concept of research. In sixth place is the methodology used to obtain the information. In eighth place the results are presented, to reach the conclusions, and possible lines of future research.

The document is presented as follows, in a first part the problem statement, with the justification of the study, objectives, questions and hypotheses. In a second part, the structure of the document with its theoretical framework and methodology. To finish in the third part, with the results and conclusions.

2. Statement of the problem

It is said that the adoption and use of technology influence a key element within organizations. This contributes to a competitive advantage strategy that allows companies to be placed in some position within the market. In order to achieve this competitive advantage, it is necessary to have a well-prepared and competent team in the use and management of the technology, as well as in the process of updating the necessary processes. To achieve the above, it is necessary to plan different strategies, that allow to create awareness and to create in the personnel a positive attitude with respect to the adoption and updating of the technology, within their daily activity.

According to Stern, (2002) technologies are a tool that allows different strategies to be developed within organizations, with the aim of making the organization more competitive.

3. Justification of the study

Currently, technologies are part of the daily life of most individuals and organizations (businesses, schools, churches, among others), are seen as necessary for the case of companies, the stay and permanence within the market. Therefore, organizations must include constant training and the acquisition of technologies that allow them to be more competitive. The acquisition and use of technologies, is favorable to organizations, can reduce the possibility of being out of the market, increases the possibility of being more competitive.

The adoption of the use of technology, leads to the change within the organization. It is necessary to have sufficient trained personnel in the new practices of the company with respect to the adoption of technology, with the sole objective of being more competitive within the market. The use of technology increases the possibility of being able to carry out new business, optimize processes and then increase the economic growth of the organization. Hence the need to investigate the influence and benefits of technology as a strategy in organizations.

4. Study objective

The objective of this article is to identify, through documentary information, the influence and benefits of technology as a strategy in organizations. This can be a support for the companies, because it can allow them to establish the relationship between the influence, adoption and acquisition of technology, with respect to the benefits and economic gain obtained from the application of the use of technology.

5. Research questions

Is there a relationship between the acquisition and use of technology with respect to the benefits obtained from this application in the Organizations?

6. Hypothesis

H1: The Acquisition and Use of Technology in Organizations are a positive influence that is reflected in economic benefits.

H2: The Acquisition and implementation of Technology is a competitive strategy of organizations.

H3: The Acquisition and implementation of Technology positively influences organizations that allows them to stay within the market.

7. Structure of the research work

The purpose of the document is to offer information to facilitate decision-making in the acquisition of new technology, through documentary evidence about the processes to be followed.

The processes of acquisition of new technology in organizations, are a key piece for these, because they are considered as the option that allows to keep organizations as competitive companies within the market. In the publication The Time (2014) in an interview with Brennan, vice-president at that time of the SMEs worldwide, affirms that the mission of the companies that provide technology of any kind, is to help SMEs to Get more results in the business from its investments in technology. Technology allows organizations to offer different products, solutions and services, among others.

For Belloch, C. (2012) ICTs are the set of technologies that allow access, production, processing and communication of information presented in different codes (text, image, sound, Leavit, (1965) define ICT in three categories,

A. Processing techniques

B. Application of statistical and mathematical methods for decision making

C. Simulation of higher order thinking through computer programs.

ICTs are expressed in the use of computers, equipment that allows storing, retrieving, transmitting and manipulating data in the context of business. ICT also includes television, telephones, hardware, software, the internet, e-commerce and computer services.

The acquisition or investment of technology is generally related to different processes that are expected to positively influence companies and how it should be adopted to obtain maximum benefits. It is presumed that the integration of technologies in companies allows:

A. Improve administrative processes

B. Facilitate information management.

C. Reduces costs

D. Increase competitiveness.

Especially in the current environments that have become very competitive, organizations are looking for more options that allow them to obtain this advantage with respect to other companies. Porter (2003) calls competitive advantage the value that a company is able to create for its customers.

The organizations in order to achieve the economic advantage, are able to adopt and modify anything within the company, from the structure, administrative processes, personnel update, technological advances, in short, adopt any change according to the preferences according to their consumers. Villaseca and Torrent (2001), cite the OECD (1998), which mentions that technological innovation has changed the economic structure of advanced economies from several dimensions and that in turn fosters the synergy that it generates over the rest of the economy. Thasos (2018), argues that technology has been an important factor in economic expansion throughout the history of mankind. Feeney, (2007), affirms that it is necessary to develop a technological leadership strategy that allows the creation of an economic and institutional regime that allows providing an efficient creation and application of knowledge to the economic process of the company.

However, technology alone cannot achieve success, it is necessary to make a series of adjustments within the company, rely on all possible tools to achieve the efficient use of technologies. The organization has structure, administrative processes, goals and objectives to be achieved, which are directly linked to the constant updating of technology. A consequence of the acquisition, implementation and use of technology allows to improve the administration processes.

Therefore, the organizations are aware of the need to invest in the acquisition of state-of-the-art technology that allows them to appear in the market in a good position and at the same time allows them to perfect their administrative processes with the ultimate goal of achieving greater success. From the above it is argued that it is advisable to rely on the following theories:

8. Theoretical framework

A. Dynamic capacities:

According to Rivera and Figueroa, referring to Ahenkora and Adhei (2012), Dávilas (2013), Ellonen et al., (2011) and argue that companies develop dynamic capacities that allow them to generate sustainable competitive advantages. They also say that dynamic capacities are developed as a route that allows the continuous exploration of competencies according to the transformations in the environment. Miranda, (2015), presents the model of dynamic capabilities in organizations, where he cites Oregan and Ghobandian, (2004) as those who argue that resources are defined as the set of knowledge, physical assets, human capital and others tangible and intangible factors that organizations own and control, which allow them to produce efficiently and effectively to offer their products and services to the market. And he says that these resources serve as a source of competitive advantage in the long term, when they can be evaluated, rare, difficult to imitate and not substitutable, and dynamic capabilities allow the resources of the organization to have these attributes and be superior to those of the competition (Eisenhardt and Martín, 2000). Garzón, (2015) in his article the dynamic capacities in the organizations, he mentions that the dynamic capacities show common characteristics for several organizations, likewise he maintains that the dynamic capacities will be source of competitive advantage of the organizations. It also says that the theory of dynamic capabilities is aimed at achieving greater understanding about why some organizations build and maintain a competitive advantage, despite the changes that occur today.

B. Neo-institutionalist theory.

According to Vargas, (2015) neo-institutionalism studies the features of the economic institutional structures that enable the development of peoples. According to Arias Pineda (2008), he mentions that neo-institutionalism helps to study administrative phenomena systemically and in context, establishes relationships between cultural and social factors, as well as the various forms of human association, in order to understand the process organizational.

While Tijerina (2008) in his article of "The neo institutionalism of Duglas ..., states that organizations are conceived as groups of individuals with common identities and objectives for-profit companies, political bodies, economic bodies, social bodies, educational bodies. It talks about the transaction costs defined by the cost of acquiring information. He also mentions that they are jointly determined by incentives, the behavior of state agencies and technology, among others. Esquinca (2011), states that neo-institutionalism aims to carry out actions according to reality without departing from the legal norm. These are to give organizations a certain degree of freedom without falling into legal contradictions.

C. Network theory

Salazar López (2016), suggests that the modeling of networks allows the resolution of multiple mathematical programming problems through the implementation of special algorithms. Presents the following basic concepts in network theory.

1) Graphic; represented by a series of points called nodes, joined by lines called branches.
2) Network; graph with some type of flow in its branches. Symbols representing the nodes and branches are used.
3) Chain; Series of branch elements
4) Route; the nodes that constitute a chain.
5) Cycle; a cycle corresponds to the chain that links a node to itself.
6) Tree; It is a graph in which there are no cycles.

Although the conception of network theory focuses on solving mathematical programming problems, the existence of different types of networks is known:

1) Social. **2)** Transportation. **3)** Electric.
4) Biological. **5)** Internet, and **6)** Information.

The theory of social networks according to González (2014), who says that the idea of social network began to be nuanced in the social sciences, since the thirties of the last century. He points out that social networks arise from the process of social interaction and cites Madariaga & Sierra, (2000), who defines it as the process by which a group of people are oriented towards others and act accordingly to the behaviors of one another. The importance of networks is the possibility of establishing connections to any part of the world with any person that is of our interest. At this time in the world there is a mega conglomerate of networks, which allows, facilitate and promote connectivity between different organizations, people and devices that may or may not be in different countries.

The theory of networks takes importance within organizations, by the evolution in the way that organizations, organizations that haveintroduced technologies, which allow a better interaction between people, with greater speed and efficiency, this in turn generates relationships that allow the creation of a support network between organizations. However, the introduction of technologies has become a challenge for companies that have a rigid structure, and if they want to survive they must adapt to this new social environment, where it is very important to know how communication mechanisms work between people, how to access information, the necessary change in decision making, transmission and dissemination of messages, ideas, promotion of collaboration, drive innovation to compete in the market.

Therefore, it is important to recognize the existence of types of networks, and consider the way in which information circulates in these networks.

First, the type of computer networks according to Apser (2015) specialized in platform design is presented:

Table 1: Types of computer networks

Types of computer networks		
According to its use	Shared networks	Unites a large number of users.
	Exclusive networks	Connect two or more points exclusively. (Security, speed or absence of other types of networks).
According to your property,	Private networks	They are managed by companies, individuals or associations. (owners only)
	Public networks	belong to state agencies and are open to

		anyone who requests it.
Depending on your location and service coverage	Local area networks (LAN):	Connected computers are at small distances, for example, those that connect home or office equipment
	Metropolitan area networks (MAN)	More extensive than the previous ones, they are formed by several LANs connected to each other.
	Wide area networks (WANs)	Cover a large area, often even a whole country or continent.
Depending on the type of access	Wired:	Computers connect to the network through electromagnetic waves transmitted by air (Wi-Fi).
	Wireless:	computers connect to the network through electromagnetic waves transmitted by air (Wi-Fi).
	Combination of the previous two: the network has both WAP wireless access points and cable connections.	

Source: Own elaboration, based on the information of Apser (2015).

For this case, it is important to present the classification of type of business tools, presented by ANTENNA communications (2016), and are centralized and decentralized networks.

Centralized: the communication revolves around a single person, who is in charge of directing the whole process and works as a link or main axis for the other Decentralized members: the participants interact constantly without there being a leader or prominent member in the chain.

From the above it is necessary to consider Robinson's social network analysis (2014), who says that it is a methodology imported from the field of sociology and widely used in Social Sciences as well as in Natural and Exact Sciences, which allows to identify underlying structures of the relationship between different actors and the situations of power and subordination that exist between them. It is based on the theory of networks that conceives the object of analysis not as independent units, but as members of a network in which relationships are established among themselves. And in this sense, the analysis allows the identification of collaboration groups, the power relations among the collaborators themselves.

For this case it is important to present the classification of type of business tools, presented by ANTENNA communications (2016), and are centralized and decentralized networks.

D. Knowledge management theory

Nonaka (1999) argues that knowledge management is a system that facilitates the search, coding, systematization and dissemination of individual and collective experience of the human talent of the organization, to turn them into knowledge, with the objective of generating competitive advantage in a dynamic environment.Rodríguez Rovira, (1999) affirms that information professionals can help today, the top management of companies and all types of corporations, to understand the determining role that knowledge management can play to guarantee the future of their organizations through the Influence and competitive advantages.

Competitive advantages of Knowledge Management:

1) Improvement of quality in products and services.
2) Improvement of customer service.
3) Improvement of relations with suppliers.
4) Create conditions to improve the work environment.
5) Better interpersonal communication.
6) It improves the information and the communication, it stimulates the participation of the workers.
7) Reduction in the number of management / production processes.
8) Simplification of management / production processes.
9) It allows greater efficiency in the use of resources.
10) It provides better tools for managing management.

Knowledge management involves different components, mainly learning, human capital, intellectual, all this aims to raise and strengthen the areas of companies through increased learning, with the ultimate goal of increasing competitiveness. With this, being leaders in the market, to have new business opportunities, improvement in communication between the members of the organization, generation of a network of collaborators.

However, to achieve an efficient knowledge management it is necessary to consider the possibility of having documentary evidence, for constant consultation and to be able to share it with the members of the organization. It is of no use if it is not distributed. This is where the

technologies take an important role, because they provide the possibility of facilitating access to information through different tools, such as 1) Creation of databases. 2) Software. 3) Internal platform and everything that facilitates access to this information, which allows a timely consultation for its application and administration.

For organizations, knowledge management promotes communication among collaborators. Something that cannot be ignored, is that globalization covers all areas, markets and technological progress, said globalization forces economies to seek cost reduction in the production of goods and services offered to the customer.As a result of the above requires companies to an increase in the use, application and implementation of technology, to be able to figure within the market.

From the above it was considered necessary to consult the 2014 economic censuses of INEGI, to obtain information that may reflect at least the heading of the introduction of technologies, specifically the use of computer equipment in several sectors and it was obtained that in the manufacturing area, business and services; with respect to the items of:

1) banking and financial operations.
2) Procedures or governmental procedures.
3) Purchase-sale of services or products.
4) Information search.
5) Perform business management.

With the following results expressed in percentages:

In Greater application of computer equipment in the heading of manufactures:

Search for information with	91.2%
Business management with	65.4%
Banking and financial operations	62.7%
The two remaining items below	50. %

In Greater application of computer equipment in the commerce area:

Search for information with	83.2%
Business management with	65%
Banking and financial operations	51.2%

The two remaining items below 40%

In Greater application of computer equipment in the field of services:

Search for information with 89.9%

Business management with 62.9%

The three remaining items below 42%

These three items are those that make it possible to demonstrate the use of technology in activities within organizations. INEGI (2014). This gives us a small idea of how it is present, the use of technology in the life of organizations.

9. Methodology (Method)

It is based on documentary information obtained mainly from studies conducted about organizations, technology, strategy, technology acquisition, competitive advantage, which are the main variables, as well as knowledge management and different theories that can allow a review and analysis, about the influence and benefits of technology as a strategy in organizations (Hernández, Baptista and Fernández, 2010).

10. Results

An own elaboration scheme is presented based on the theories addressed in the document, which allows to visualize, how these theories intertwine and show interest in the central variables, technology and competitive advantage, mainly.Hence, it is considered that technologies are a positive influence in organizations and that they are used as a strategy, to figure and remain valid and within the market.

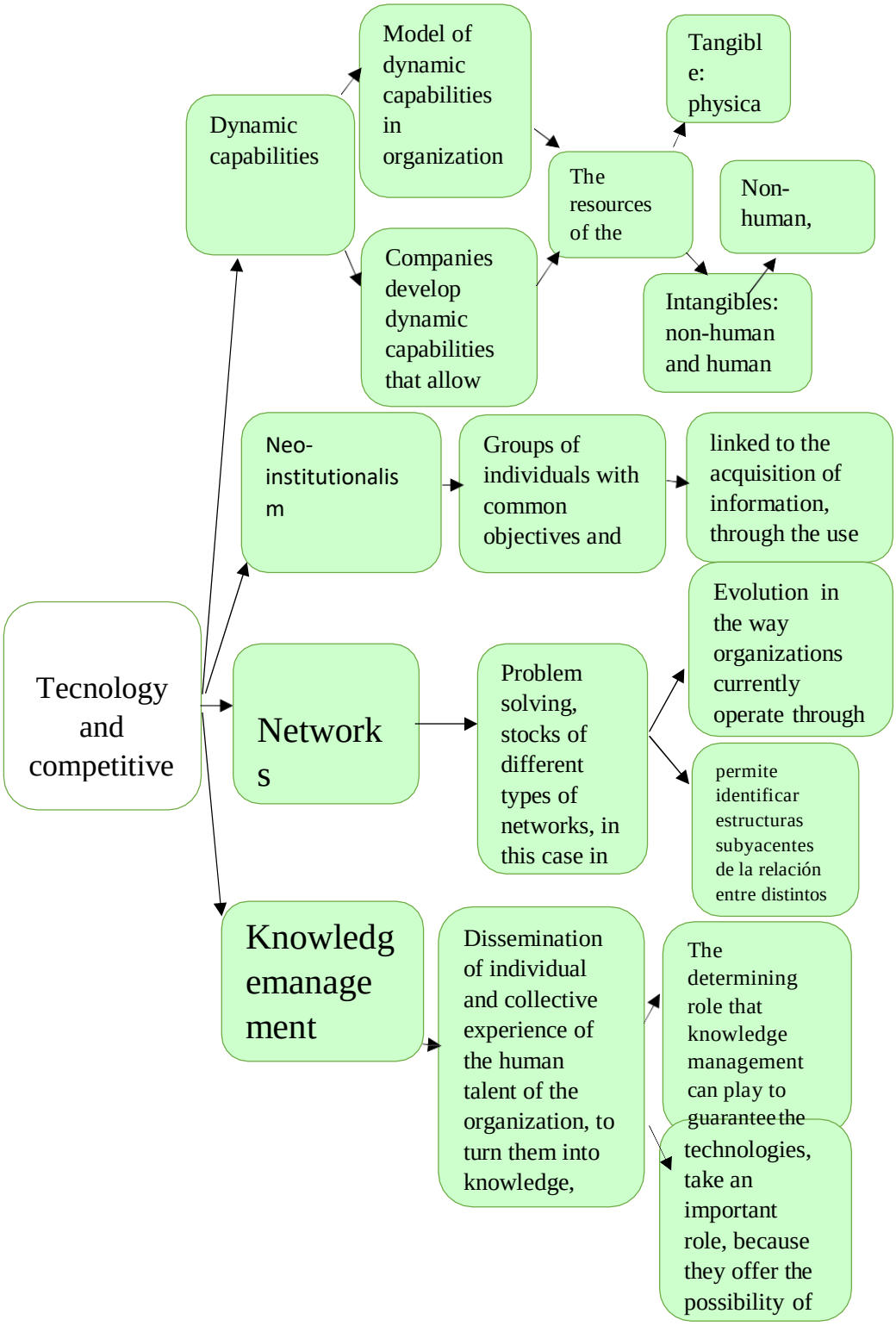


Figure 1: Technology and its relation to competitive advantage

Source: Own elaboration.

11. Discussion, conclusions and future lines of research

Miranda, (2015) affirms that the competitive advantage is one of the most studied topics in the field of strategic management, and cites Teece, Pisano and Shuen (1997), which explains how the combination of skills and resources can be developed by employees and oriented to achievement of competitive advantage.

It is concluded that, with the documentary information obtained from different sources, it allowed to show where, as the technologies and the competitive advantage are manifested and that is evidently a strategy and influence within the organizations, as well as the benefits and economic gain obtained from the application of the use of technology.

The Acquisition and implementation of technology in organizations generate a positive influence, because it allows its members to develop communication skills.

The introduction of technologies in organizations allows developing new strategies that increase competitiveness.

In conclusion, the acquisition and implementation of technology has a positive influence on the organizations that allow them to stay within the market.

12. Proposal for future studies

The analysis of information about the influence and benefits of technology as a strategy in organizations will serve as a framework for conducting deeper theoretical and empirical studies on the specific relationships between economic benefits and technology.

1) Identify the level of technological management in organizations and consider the characteristics of the organization in which the study will be conducted.

2) Clearly identify the dimensions of technology adoption capacity.

3) Apply measurements to each variable.

4) Apply qualitative methodologies in the case study.

5) In summary, the document is an important contribution that presents an extensive review of specialized bibliography.

References:

1. Ahenkora, K.; Adjei, E. (2012). A Dynamic Capabilities Perspective on the Strategic Management of an Industry Organisation. *Journal of Management and Strategy,* 3 (3), pp. 21-27.
2. ANTENA comunicaciones (2016). Tipos de redes de comunicaciónempresarial, consultado el 02 de mayo de 2018. Recuperado de http://www.antennacomunicaciones.com/tipos-redes-comunicacion-empresariales/
3. APSER. (2015). Las redesinformáticas: que son, tipos y topologías, *Cloud Computing para Negocio y CEO`S, ServiciosGestionados*. Consultado el 02 de mayo de 2018, recuperado de http://www.apser.es/blog/2015/06/20/las-redes-informaticas-que-son-tipos-topologias/
4. Arias, P. A. A. (2008). El Neo-institucionalismo y susaportes a la teoría de la organización, *Gestión y Región. Universidad católica de Pereira* num.6. consultado el 1 de mayo 2018. Recuperado de http://biblioteca.ucp.edu.co/ojs/index.php/gestionyregion/article/view/902
5. Belloch, C. (2012) *Las Tecnologías de la Información y la Comunicación (TIC) en el aprendizaje*, Universidad de Valencia.
6. Dávila L., J. C. (2013). Capacidadesorganizacionales: dinámicaspornaturaleza. *Cuadernos de Administración*, Bogota, Colombia, v. 26 no.47. pp. 11-33. Consultado el 26 de mayo. Recuperado de: http://www.redalyc.org/html/205/20531182002/index.html
7. Eisenhardt, K. & Martin, J. 2000. Dynamic Capabilities: What are They?. Strategic Management. *Strategic Management Journal*. No.21
8. El tiempo. (2004). La importancia de la tecnologíaen las empersas. Consultado el 30 de abril de 2018. Recuperado de http://www.eltiempo.com/archivo/documento/MAM-1532000
9. Ellonen, H.; Jantunen, A.; Kuivalainen, O. (2011). The Role Of Dynamic Capabilities In Developing Innovation-Related Capabilities. Lappeenranta University of Technology.
10. Esquinca, A. J. (2011). El Neo-institucionalismo. *Gestiopolis.* Consultado el 26 de mayo de 2018. Recuperado de: http://www.gestiopolis.com/el-neoinstitucionlismo/

11. Farfán, B. D.Y. y Garzón, C. M.A. (2006). La gestión del conocimiento. *Documentos de Investigación.* No. 29.pp 107.Consultado el 28 de abril de 2018. Recuperado de https://www.researchgate.net/publication/27627446_La_gestion_del_conocimiento

12. Feeney, R. (2007), Innovación y DesarrolloeconómicoenLatinoamérica, *Boletín de estudioseconómicos*, Bilbao, v.62, iss. 190, pp. 61-80

13. Garzón, C.M.A. (2015). Modelo de capacidadesdinámicas. *Revista Dimensiónempresarial*. Vol. 14, no.1, pp.111-131, consultado el 25 de mayo de 2018, recuperado de: www.scielo.org.co/pdf/v13n1/v13n1a07.pdf

14. González, B.N. (2014). La teoría de redessociales y las políticaspúblicas. Unaaproximación al debate teórico y a las posibilidades de intervenciónenrealidadessociales. *FORUM*. RevistaDepartamento de CienciaPolítica. No. 6. Consultado el 15 de abril de 2018, recuperado de file:///C:/Users/May/Downloads/Dialnet-LaTeoriaDeRedesSocialesYLasPoliticasPublicasUnaApr-6119901.pdf

15. Hernández, S. R., Baptista, L. P. y Fernández, C. O, (2010) *Metodología de la investigación.* 5a Ed. México, McGraw-Hill

16. INEGI (2014). Uso de equipo de cómputo e internet en las empesas, *Censoseconómicos.* consultado el 08 de mayo de 2018, recuperado de internet.contenidos.inegi.org.mx

17. Leavitt, H. J. (1965) Applied organizational change in industry: Structural, technological and humanistic approaches in En J. G. Marzo (ed), Handbook of organizaciones. pp.1144- 1170. Editores Rand McNally

18. Madariaga, C., & Sierra, O. (2000). Redessociales y pobreza. Psicologíadesde el Caribe (5), 127-156.

19. Miranda, T.J. (2015). El modelo de las capacidadesdinámicasen las organizaciones. *InvestigaciónAdministrativa*. No.116. pp 81-93. Consultado el 28 de abril de 2018. Recuperado de: http://www.redalyc.org/pdf/4560/456044959005.pdf

20. Nonaka, Ikujiro y Takeuchi, Hirotaka (1999). La organizacióncreadora del conocimiento, Editorial Oxford Press, México D.F. Regan, N. & Ghobadian, A. (2004). The importance of capabilities for strategic direction and performance. *Management Decision*. 42: 292- 312.

21. OCDE (1998). Relaciones con losmedios de comunicación. Consultado el 28 de abril de 2018. Recuperado de: http://www.oecd.org/centrodemexico/46440894.pdf

22. Porter, M. E. (2003). *Ventajacompetitiva*: creación y sostenimiento de un desempeño superior México: Continental, 2003. pp. 165-201.

23. Porter, M. E. (2009) SerCompetitivo, ed. Actualizada y aumentada, edit. Deusto S. A. Ediciones. 624 p.

24. Rivera, R. H.A., Figueroa, G. L. S. (2003). Capacidadesdinámicas, unafuente de ventajacompetitiva, *Criteriolibre journal*. v. 11, no. 19., Bogotá Colombia. Pp. 245-261

25. Robinson, G. N. (2014). El análisis de redessociales. Definición y aplicación, consultado el 2 de mayo de 2018. Recuperado de https://nrobinsongarcia.wordpress.com/2014/01/13/el-analisis-de-redes-sociales-definicion-y-aplicaciones/

26. Rodríguez R. J.M. (1999). La gestión del conocimiento: una gran oportunidad. *El profesional de la información*. Consultado el 10 de mayo de 2018. Recuperado de http://www.elprofesionaldelainformacion.com/contenidos/1999/marzo/la_gestion_del_conocimiento_una_gran_oportunidad.html

27. Salazar, L.B. (2016). Teoría de redes. *Ingeneriaindustiralonline.com.* consultado el 18 de abril de 2018, recuperado de https://www.ingenieriaindustrialonline.com/herramientas-para-el-ingeniero-industrial/investigaci%C3%B3n-de-operaciones/teor%C3%ADa-de-redes/

28. Stern, C. (2002). *A strategy for Development.* The world, Washington, D.C.

29. Tasos, V. (2018). Las ventajas y desventajas de la tecnologíaennuestraeconomía, consultado el 17 de mayo de 2018, recuperado de: http: //www.cuidatudinero.com

30. Teece, D., Pisano, G. &Shuen, A. (1997). Dynamic Capabilities and Strategic Management. Strategic Management Journal. 18: 509-533.

31. Tijerina, G. E. (2008). *El neoinstitucionalismo de Douglass C. North: unaexposicióncrítica*. Universidad AutónomaMetropolitana. UnidadIztapalapaconsultado el 10 de abril de 2018. Recuperado de http://www.laisumedu.org/desin/fronteras/Tijerina.pdf

32. Vargas, H. J. G. (2015). TeoríaInstitucional y Neo-institucionalen la administracióninternacional de las organizaciones. *Sistema de informacióncientífica*, Red de Resvistascientíficas de América Latina y el Caribe, España y Portugal, http://www.UAEM, redalyc.org.

33. Villaseca, R. J. and Torrent, S. J. (2001). Tecnología y economía: unaaproximación a la interpretacióneconómica del conocimiento, consultado el 28 de abril de 2018, recuperado de http://www.uoc.edu/web/esp/art/one/0104013/one04.html

BRANDING STRATEGY FOR ENTRY TO NEW LATIN AMERICAN MARKETS AN INSTITUTIONAL AND CULTURAL APPROACH BIMBO CASE

José G. Vargas-Hernández, M.B.A.; Ph.D.
Centro Universitario de Ciencias Económico Administrativas. Universidad de Guadalajara
Periférico Norte 799 Edif. G201-7, Núcleo universitario Los Belenes,
Zapopan, Jalisco, 45100, México
jvargas2006@gmail.com,
jgvh0811@yahoo.com,josevargas@cucea.udg.mx

Raquel de Guadalupe Flores Murguía
Centro Universitario de Ciencias Económico Administrativas.
Universidad de Guadalajara
División del Norte 1904, Zapopan
Jalisco, México

ABSTRACT

The main objective of this work is to analyze from an approach based on the theory of institutions in conjunction with culture and how these aspects influence when entrepreneurs are interested in entering new markets. Throughout this work you can observe the application of Branding strategies accompanied by the aforementioned positions, specifically in practical cases that the Bimbo company made in its entry to the Latin American markets, specifically in Argentina, Brazil and Peru. A description of some strategies was presented and the Branding processes that arose from them are presented in graphic form. Finally, we can conclude that the success that Bimbo has had in entering new markets is derived from the previous study of all the factors that identify a new market, such as culture, consumption habits, customs, values and laws. of the markets where they intend to enter, is a fundamental part to define strategies.

Keywords: *Strategies, branding, internationalization, culture, institutions.*
JEL: F23, F18, M31, M37

Resumen

Este trabajo tiene como objetivo principal el analizar desde un enfoque basado en la teoría de las instituciones en conjunto con la cultura y como estos aspectos influyen cuando los empresarios están interesados en entrar a nuevos mercados. A lo largo de este trabajo podrán observar la aplicación de las estrategias de Branding acompañado con las posturas antes mencionadas, específicamente en casos prácticos que la empresa Bimbo realizo en su entrada a los mercados latinoamericanos, específicamente en Argentina, Brasil y Perú. Se realizó una descripción de

algunas estrategias y se presentan en forma gráfica los procesos de Branding que surgieron a raíz de las mismas. Por último, podemos concluir que el éxito que ha tenido Bimbo al ingresar en nuevos mercados es derivado al previo estudio de todos los factores que identifican a un nuevo mercado, siendo tales como la cultura, los hábitos de consumo, costumbres, valores y las legislaciones de los mercados a donde se pretenden ingresar, es parte fundamental para definir estrategias.

Palabras clave:
Estrategias, branding, internacionalización, cultura, instituciones.

1. Introduction

The growing globalization and constant economic growth have driven companies to generate strategies to compete in global markets. The development of such strategies have focused on the positioning and acceptance of products.Companies today have great challenges to conquer new international markets, since the prior knowledge of their target market in variables such as culture, consumption habits, trade agreements and institutions will set the tone for the identification of opportunities to develop key strategies which in turn reduce the risk of failure in the decision to enter global markets.

Acquisitions is a way to internationalize. Acquiring companies that are already established in the target market is a way of reducing risk by contrasting it with arriving and settling from zero in a new market. However, it also generates a process in which different strategies are proposed to position the brand of the company that acquired the company. This process cannot occur immediately because the credibility and consumer loyalty would be affected. It is where Branding plays an important role.

A branding strategy is based on planning, design and actions that are aimed at ensuring that the image of the brand that is transmitted to consumers is faithfully what the company wants. It will consist of those actions that are directed both in the design of the logo, as well as the adaptations in the names of the products. However, these actions do not generate that the essence of the brand or original name is lost.

This work aims to recognize and know the strategies of Branding that has been implemented by Bimbo Group (Grupo Bimbo), relating these strategies in the theory based on institutions specifically on cultural impact. Considered as a consolidated global company, its learning curves

stand out, which supported the continuous improvement of its strategies for the conquest of future target markets. The concept of theory based on institutions and the impact that culture has on the generation of Branding strategies is analyzed. As well as it shows in detail some of the strategies that Bimbo implemented to establish in the markets of Argentina, Brazil and Peru.

2. Background of the problem

A. Entry to international markets. Knowledge of culture to reduce the risk of failure

International business initiative is defined as "a combination of innovative proactive behavior and in search of risks that cross national borders with the intention of creating wealth in organizations" McDougall and Oviatt (2000, p.903). That said, the entrepreneurs who decide to undertake the challenge of becoming international are clear that the risk of failure is a latent possibility.

To identify the necessary factors to consider in how they plan their internationalization strategies, it must be considered the "tripod of the strategy", which consists of the leading perspectives in strategy: the vision based on industry, resources and institutions (Peng, 2012). This considers that it generated a complete model for entrepreneurship.

It is spoken of the vision based on the institutions it is emphasized that this implies knowing what the restrictions are in a formal or informal way, considering that the formal restrictions refer to all those regulations, laws and regulations that the country where the company intends to reach has. On the other hand, informal rules refer to all those cultural factors that include values and behaviors.

Grupo Bimbo is one of the most important companies in the baking industry worldwide. The accelerated growth to position itself in new markets leads it to generate new strategies, due to the cultural exchange for the commercialization of its products. It considers important challenges in knowledge of consumer habits, preferences, norms, as well as the perception of the brand. Once seen that the prior knowledge of the culture and values that define the new target market is relevant to accompany as an important element of the global marketing strategy is the brand, or the strategy of Branding.

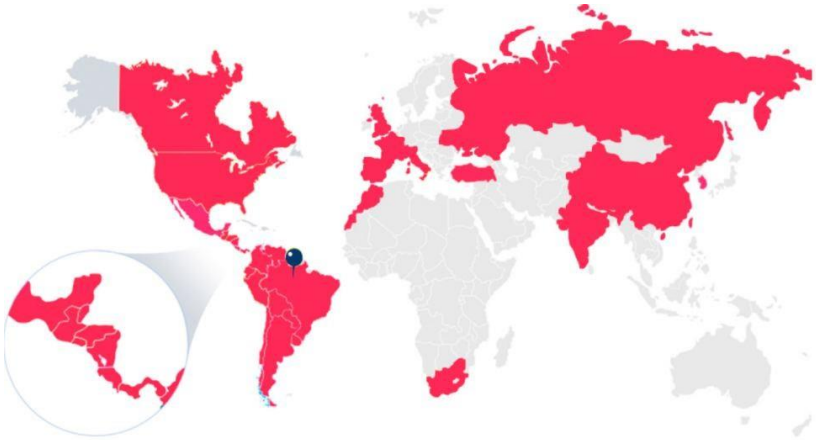


***Figure 1*. Presence of Grupo Bimbo worldwide.**

Source*:* Bimbo

An important element of a company's overall marketing strategy is its brand policy. Strong brands help the company establish an identity in the market and develop a solid customer franchise (Aaker, 1996). They can also serve as a basis for brand extensions, which further reinforce the company's position and improve value (Aaker and Keller, 1990).

In international markets, the company's brand strategy plays an important role in the integration of the company's activities throughout the world. A company can, for example, develop global brands (using the same brand name of a product or service around the world) or approve local brands of countries with the brand or company logo, thus establishing a common image and identity through the markets of countries. It is for this reason the importance of combining both concepts from the perspective of the theory based on institutions and the strategy of Branding for the incursion to new international markets.

3. Theoretical-conceptual review: The theory based on institutions and the Branding strategy for entering new markets

A. The vision based on institutions, cultural perspective

The vision based on the institutions maintains that in addition to the conditions at the level of the company and the industry, they must take into account the domain and transcendence that the state and society can have when proposing strategies (Peng, 2012). Scott (1995) in his book describes that there are different ways in which institutions can be regulated based on their function and their way of relating to other elements that surround the institution. It establishes that informal organizations are identified by including norms, cultures and ethics.

Scott (1995) mentions that there is a formative pillar, which refers to the influence on the behavior of individuals or companies, based on the values and beliefs of these.

According to Scott (2013) the institutions are all the commitments that include regulatory, normative and cultural cognitive elements that, together with the associated activities and resources, provide stability and meaning to social life.

The culture is made up of several elements that are related to each other. Hostede (1997) defines it as "the collective programming of the mint which distinguishes the members of one group or category of persons from another" (p 421). This author proposes a classification scheme of culture composed of the following 4 dimensions:

a) Distance of power, referring to the degree of inequality that the people of a country see as acceptable. To exemplify the nations that have a high distance are Arab countries, Mexico and West Africa. On the other hand, those with a low distance are countries such as Germany, Great Britain and the United States.

b) Avoidance of uncertainty, which is interpreted as up to which a culture people prefer structured rules and clear to unstructured ones.

c) Individualism, are societies that prefer current as individuals rather than as groups, the "I" over the "we".

d) Masculinity, makes a distinction between the values that define as masculine those that are like assertiveness, success, competitiveness within society, in terms of feminine values are those such as solidarity and quality of life.

Investigations subsequent to Hofstede's work in Asia conferred a fifth dimension: the long term, in which denominates the companies that are oriented for the long term as those that have future values (e.g. perseverance, economy). On the other hand, short-term societies are concerned that their values reflect their past and present (e.g. respect for traditions).

The adaptation to foreign cultures is a fundamental factor to consider when entering foreign markets, derived to each one has cultural stereotypes, damages that are summarized in the cultural sensitivity that this market presents. Therefore, the cultural adaptation of the host country is indispensable. This adaptation is often difficult due to the criterion of self-reference (CAR), a term coined by J.A. Lee, cultural anthropologist. That refers to that interpretation with an unconscious tendency that people have to resort to their cultural experience and values to assimilate a business situation. Lee (1966) designed a procedure that consists of 4

stages that allows designers of global marketing strategies to identify intercultural differences and define the necessary actions to face them. The mechanism is the next:

a) Stage 1: Define an objective in terms of its own traits, customs and cultural values.

b) Stage 2: Define an objective in terms of the traits, customs and cultural values of the host country.

c) Stage 3: Isolate the influence of the CAR on the objective and examine how it interferes with the objective of the company.

d) Stage 4: Redefine the objective of the company, but this time without the influence of the CAR, and define the optimal actions to achieve the objective.

The definition of what establishes the theory based on institutions and the particular concept of culture allows us to address the problems of this study, because through these theory decision makers will be able to consider these factors relevant to the development of strategies that allow internationalize and reduce the uncertainty of the risks involved in carrying it out.

A. The Branding strategy for entering new markets.

The questions the company faces in the development of an international brand strategy depend on how it has expanded internationally and how its international operations are organized. Some companies, such as Procter & Gamble (P & G) and Coca-Cola, have expanded by taking advantage of their national "power" brands in international markets. Consequently, in their attempt to expand further, they should consider developing brands adapted to specific regional or national preferences and how to integrate them into your brand strategy.

Other companies such as Nestlé and Unilever have adopted strategies traditionally focused on the country, building or acquiring a mix of national and international brands. These companies must decide to what extent they move towards greater harmonization of brands across countries and how to do it. Such issues are particularly important in markets outside the United States, where the concept of "power" brand is relatively new (Barwise and Robertson, 1992).

4. Review of the empirical literature

A. Perspectives of Branding strategies

Today the constant development of the history of nations is linked to business growth and development. Globalization and high costs have forced companies to use options to improve the efficiency of their processes (Grosse and Glock, 2014), as a result of which improving processes has an impact on costs and if companies cannot generate benefits that require this could leave them behind. That is why the adoption to promote their distinctive features and remains with their position respecting a unique identity based not only on tangible but intangible elements (Kavoura, 2014).

For the above, and looking for strategies that can continue to guarantee economic results and reduce the uncertainty of risk, marketing arises which plays an important role in the operations of a company. Branding is used today as a key tool in companies and has been strengthened in marketing processes, putting as a focal point the creation of activities in their brands, since it determines everything will persevere in the mind of the consumer that is summarized as the perception of the brand (Kotler and Keller, 2012).

5. Research method and data analysis

A. Bimbo in the Latin American market: Argentina, Brazil and Peru

This research was carried out using a methodology of qualitative type, where as an instrument for obtaining data, it was the interview with key administrative personnel of the Bimbo organization that had contact or had the opportunity to be implementers of the strategies that helped Bimbo to consolidate in the Latin American market.

Today Grupo Bimbo is a world leader in the baking industry for production and sales volumes. It has a presence in 32 countries of America, Europe, Africa and Asia where has 197 plants, more than 139 thousand employees and an approximate 3 million of points of sale. And it has one of the largest distribution networks in the world.Bimbo reaches annual sales of 14.4 million dollars, produces and distributes fresh and frozen bread, buns, biscuits, pastries, Engisch muffins, bagels, packaged products, tortillas, salted snacks and confectionery, among others.

Below are some Branding strategies in brands, logos that Bimbo made in its adaptation process for some of the Latin American markets.

B. Bimbo and Plus Vita Brazil

In 2001, Bimbo announced that it had acquired Plus Vita, one of the largest baking companies in Brazil, which produces a wide range of products including packaged white bread, specialty breads, buns, cakes and fried foods. The brands that will be acquired are some of the most recognized and traditional in Brazil, such as: Pullman, Plus Vita, Ana Maria, Muffs and Van Mill.

Bimbo's interest in the Brazilian bread industry was considered several times, since it fit in with its expansion strategy in Latin America. For this market in particular, when making the acquisition of that company and its cashier line called Pullman decided to bet on a Branding strategy where the Pullman brand suffered an adaptation to the logo as a hallmark of its acquisition. Respecting the name of the brand acquired by consumer issues will not assimilate it as invasive, just decided to add an element to the current logo. See Figure 2. Product as the "Medias noches" traditional in the Mexican market also has its counterpart in the Brazilian market under the name of "Misino". See Figure 3.

***Figure 2*. left Logo Antes, Rightcurrent logo F*igure 3*. Left Medias Noches, Roght Mistinho**

Source: Official page of Bimbo (2018).

C. Bimbo and the Tortillas market in Argentina

In 2011 Bimbo made the acquisition of Fargo. Said company is the main producer and distributor of bread products in Argentina, with sales of approximately $ 150 million dollars per year. With five plants and more than 1,500 employees, the company sells its products under the brands FARGO®, LACTAL® and ALL NATURAL®, among others, through the wholesale, retail and institutional channels. This acquisition strengthened the regional profile and the growth strategy of Grupo Bimbo in Latin America.

The experience in particular described is the incursion into the Tortillas market, Bimbo wanted to add to the portfolio of products that had acquired the line "Tortillinas under the

brand Tía Rosa". It did marketing the product, to its surprise it saw that the returns were very high, and the result of its saturation to position this product did not give the expected result. Generating different market research observed that the consumption habits of the Argentine market did not include tortillas as it is in Mexico.

So it generated a strategy of branding in that product changing the name of Tortillinas to "Rapiditas under the brand Bimbo". However, this strategy was not only the name change but followed by an advertisement that had to do with explaining the forms of consumption of this product. The result of this advertising was very successful and the name had to do with the fact that the consumption of this product is for fast food. See figure 4.

***Figure 4*. Left Tortillinas, Right. Rapiditas**

Source: Official page Bimbo (2018)

D. Bimbo and the Peruvian market

The case of Peru has to do with the problems he had when entering his cake "Pingüinos Marinela", a derivative that said name already had a patent, therefore, a branding strategy was carried out based on the change of the name of the product. However, it keeps all the original packaging. The new name that the firm adopted was that of "Biri Biri", which today is used as an advertising strategy in the Mexican market and has great success. See Figure 5

***Figure 5*. LeftPingüinos, Right Biri Biri**

Source: Official page Bimbo (2018)

As well as these strategies, there is a diversity of them that Bimbo has had to carry out. It is important to emphasize that for the development of these strategies, it has as a solid base the previous knowledge of the target market, to carry out investigations of consumption habits, where the preferences that consumers have are evaluated and the place where Bimbo wants to sell its products. This gives it the opportunity to further diversify its already wide portfolio of products, which allows it to be sharing showers wallets in all countries where it is present today, where they resemble the cultures and consumption habits.

The sources indicate that teams of work are brought together in the market that they want to reach with the brand and studies, strategies are carried out, for months, making tests even consumption by launching test markets of some products to evaluate their acceptance. With this, Bimbo can define and reduce the uncertainty that emerges from exploring new global markets.

6. Conclusions and recommendations

The vision based on the institutions provides key points as to how the state behaves and the repercussions that the interested company can have to enter a new global market, and from this the culture that derives from the topic of food product commercialization. it detonates several aspects, such as the habits of consumption, the beliefs and customs of the target market.

The vision based on the institutions provides key points as to how the state behaves and the repercussions that the interested company can have to enter a new global market, and from this the culture that derives from the topic of food product commercialization. it detonates several aspects, such as the habits of consumption, the beliefs and customs of the target market. As noted Bimbo now positioned in the global market. During the period of internationalization, it has had crucial stages of learning derived from these issues of culture. Adaptation is not easy and requires willingness to a possible failure, as in the case of Bimbo in Argentina, the losses that had to enter the product of Tortillas and the risk that ran to re-intern position the product at the end I generate an optimal result.

The process of defining an optimal Branding or internationalization strategy depends on the entrepreneur being at least trained in the prior knowledge of his target market. This must verify if the portfolio of products is adapted to this new market, or will have to be carried out adaptations, innovations in the products, or in the communication required to publicize the

brand. Branding is a very useful tool to develop short and long term strategies to achieve its main objective, which is that the brand is remembered as an intangible asset and generates a link with the consumer, so that their preference is not only for the shopping instinct but also for the love of the brand.

Bimbo is a sign that through its products generates this link among its consumers. The various procurement strategies and ways in which it has led to position as a world leader in baking, are relevant to the study applied to the various theories that exist.

7. References

Aaker, D. (1996). Building Strong Brands. New York: The Free Press.

Aaker, D. & Keller, K. (1990). Consumer Evaluations of Brand Extensions, Journal of Marketing, vol.54, 27–33.

Barwise, P. & Thomas R. (1992).Brand Portfolios, European Management Journal, 10 vol. September, 277–85.

Bimbo (2018) Fusiones y adquisiciones. Obtenido de https://www.grupobimbo.com/sites/default/files/GrupoBimbo_II_CP_20010319_esp_1.pdf

Grosse, E. H. & Glock, C. H. (2014). The effect of worker learning on manual order picking processes. *International Journal of Production Economics.*

Hofstede, G. & Bond, M. (1988). The Confucius Connection: From Cultural Roots to Economic Growth, Organizational Dynamics, 16 (4), pp. 4-21.

Hofstede, G. (1997). Cultures and Organizations: Software of the Mind, New York: McGraw-Hill

Kloter, P. & Keller, K. (2012*). Dirección de Marketing. Journal of Chemical Information and Modeling*, Vol. *53.*

Lee, J. A. (1966). Cultural Analysis in Overseas Operations, Harvard Business Review (marzo-abril), pp.106-114.

McDougall, P & Oviatt, B. (2000). La promesa de la iniciativaempresarialinternacional.AMJ, 43:902-906.

Peng, M. W. (2012). *Global Strategy*. Cincinnati: Thomson South-Western.

Scott, W. R. (1995). *Institutions and Organizations*. Thousand Oaks, CA: Sage

A STUDY OF SOCIAL MEDIA RECRUITMENT

Prof. Swati Yeole **Dr. Asha Pachpande**

ASM IBMR, Chinchwad, Pune-411019. ASM IBMR, Chinchwad, Pune-411019.

EXECUTIVE SUMMARY

In a short space of time, the use of social media in recruitment – currently being called social recruiting – has increasingly moved up the agenda of business executives. The recruitment industry has always maintained a healthy relationship with innovation and change, and when the social networks, like Facebook, LinkedIn and Twitter, started their exponential growth back in 2008, recruiters the world over immediately recognized the opportunity to use these fast growing people networks as part of their ongoing recruitment strategies.

The immediate result of this global phenomenon was that business executives all around the world believed this to be a threat to their businesses, information security and workplace efficiencies. So they proceeded to restrict employee access to all the social networks in the workplace. At this stage there was no real evidence that social media could be used effectively for recruitment, so it wasn't even on the agenda.

Technology evolved again – the age of the smartphone arrived. These same business executives now had a problem. Previous restrictions on accessing the social networks became inconsequential as anyone with a smartphone now had easy access to all the social networks they wanted.

Social media was now becoming a viable way to interact quickly with candidates, and a number of innovative companies immediately saw the potential of using social media in their recruitment strategies. Now, social recruiting case studies were starting to appear, as more and more companies accepted that social media was going to become firmly part of their business agenda.

Smart Social Media Recruitment Strategies looks at why organizations now need to embrace the use of social media, the business case for such a move and a selection of new social recruiting case studies that finally prove that obtaining a social media return on investment (ROI) is now a measurable metric. This report examines why business has been slow in adopting social media in recruitment, and how the changing expectations of job seekers are now fuelling the need to adopt new approaches to recruiting future talent.

There are numerous social media networks, platforms, tools and applications to choose from and this report will look at those being adopted by this company as part of their recruitment strategy, and provide advice and guidance on which ones would best suit companies starting out in the world of social recruiting.

LITERATURE REVIEW

Recruitment:

According to Flippo, "Recruitment is the process of searching for prospective employees and stimulating and encouraging them to apply for jobs in an organisation." It is the activity which links the employer and the job seekers.

According to Yoder, "Recruitment is a process to discover the sources of manpower to meet the requirements of the staffing schedule and to employ effective measures for attracting that manpower in adequate number to facilitate effective selection of an efficient working force".

"Recruitment is the development and maintenance of adequate manpower resources. It involves the creation of a pool of available labour upon whom the organisation can draw when it needs additional employees".

SOCIAL MEDIA RECRUITMENT

Selecting the opportune individual at the ideal time is not a simple undertaking. It's no big surprise why spotters are continually searching for the silver slug and why each merchant touts their capacity to give the shot itself!

The first silver shot came as candidate following frameworks that guaranteed to streamline the selecting procedure, spare spotters time, and give a plenitude of applicants through the organization's vocation site. In spite of the fact that there is awesome incentive in legitimately utilizing an ATS, numerous selection representatives depended only on the applicants that came to them, making a profoundly value-based, exceptionally authoritative spotter. Basically, candidate following frameworks improved contracts.

Finally! A goldmine of LinkedIn gatherings to loot, MySpace and Facebook profiles to inspect (and even vet ahead of time), Twitter tribes to meet and join. Aloof applicants are currently accessible on the Web, gathering in gatherings and uncovering an abundance of data about themselves. Self-announced web-based social networking ―experts‖ jump up every day, showing classes on the most proficient method to locate the ideal hopeful quick and shoddy.

Starry-looked at selection representatives are again dropping every other strategy and concentrating via web-based networking media as their definitive sourcing device.

What Social Media is Good For:

Let's get straight to the point: social media is digging in for the long haul for years to come and can be a powerful recruitment device if utilized appropriately. It is additionally essential to comprehend that this same device can conflict with your association. These new media channels can help recognize hopefuls whose abilities and interests coordinate those of your association. The twofold edged sword is that these same channels can annihilate your association's image as a business of decision. The experience every competitor has with your association, your selection representatives, and the enlisting procedure can wind up spread crosswise over many social media channels – similar ones your scouts use to recognize potential applicants.

In the event that we are going to appropriately use instruments, for example, social media, it is basic to comprehend who is utilizing these devices and how they utilize them with a specific end goal to focus on the correct applicant fragment. Forrester Research finds that the best utilization of social innovation is spoken to by the accompanying three gatherings:

- Highly paid experts (Annual wages in overabundance of $100,000)
- The knowledgeable (Some post-graduate instruction)
- New contestants into the workforce.

How about we take a gander at them in detail:

Facebook:

Begun in 2004, Facebook is a long range relational correspondence goals used for partner with various customers wherever all through the world. It's been more than 10 years we are using Facebook and now its usage is obliged to sharing pictures and messages and in addition now it is used for sharing openings for work too. Specialists use their profiles to convey openings and offer openings for work with others. Facebook has crossed 100 million customers in India, making it the second greatest nation on the online person to person communication page, after the US As a nation.

LinkedIn:

Begun in the 2003, LinkedIn is a champion among the best individual to individual correspondence areas used by work searchers and choice agents to find best match for the association. The focal limit of LinkedIn grants customers (workers and supervisors) to make

"relationship" with each other in an online framework which may address certifiable master associations. Customers can request anyone to wind up discernibly an affiliation. In like manner occupations can be shared, implied and display by organizations on find sensible candidates. It is said that there are more than 20 million LinkedIn customers in India.

Twitter:

2006 was the year in which this long range relational correspondence site opens the portal for customers to send and read short 140-character messages. These messages are known as "tweets". Twitter allows to enlistment experts and work searchers to interface and offer purge occupations keeping in mind the end goal to find the suitable match. It is used for people's view about association and gives a photograph to work searchers about association's condition and its lifestyle.

Google+:

Propelled in 2011 it is a long range casual correspondence site which empowers a customer to incorporate his mates and known "Around", Circle is an extraordinary segment given by Google + which gives another option to customer to give information just to his picked float not to all. Notwithstanding the way that Google + is an as of late pushed site yet in the meantime it is collecting a significant measure of thought of determination delegates and business searchers and from an examination it is seen that out of each one of the 37% of occupation searchers favouring Google+ for work pursuing.

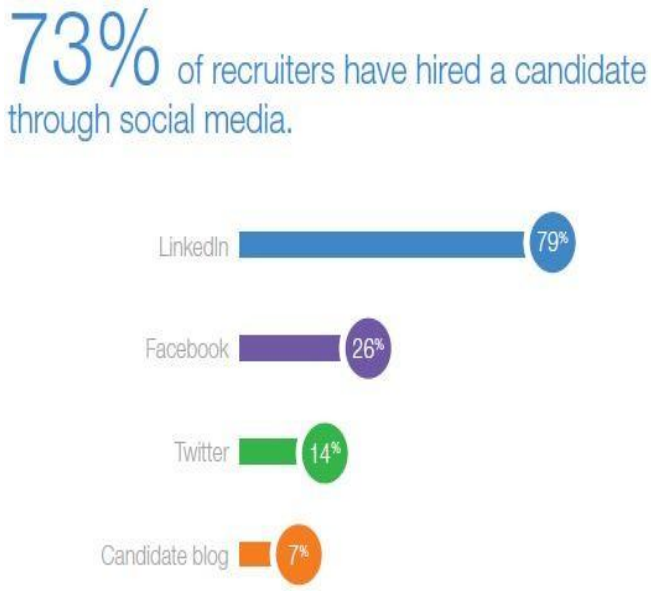
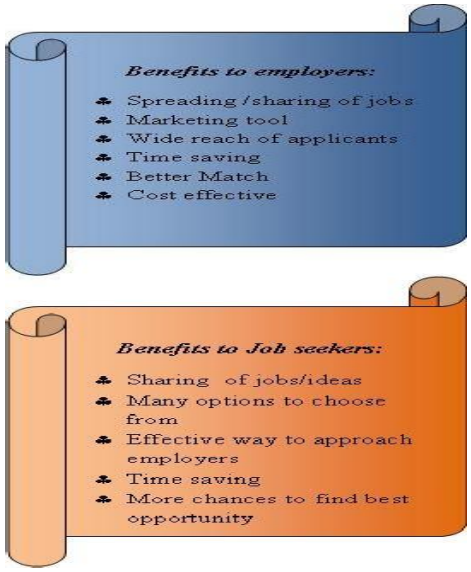


Fig 3: *Jobvite - Social Recruiting Survey Results 2014*

Considering information from study led by Jobvite we can see that around 79 % of spotters have procured applicants from LinkedIn and around 26% have employed through Facebook and rest 14 % and 7 % from twitter and web journals. This demonstrates the explanation behind long range interpersonal communication getting popular among selection representatives as it gives them a substantial number of opportunities to discover best match applicant. Likewise from an overview it is said that in coming years businesses are intending to build their interest in informal communities around 73 % and furthermore to put around 60% in their corporate sites.

Major benefits of using Social networking sites are:



Along with benefits there are some concerns/issues with SNSs like privacy issues are major concern in SNSs in fact some people do not reveal their true identity to SNSs only because of the fact that their personal information and activities can be seen by all friends on networking sites. SNSs are too impersonal reason behind this is that people are using virtual environment to get in contact with each other and therefore they can't meet each other physically and which makes it less effectual then personal meeting. Sometimes when recruiters use social media to find suitable candidates, they get occupied with other things or links which distract their mind and attention from work to personal stuff and therefore it leads to wastage of productive time. As people get addicted to SNSs they tend to speak less and this leads to lack of communication among family members. This is a serious issue as real world is much important for all then virtual world so people should divide their time to SNSs and their real life as it will help them to be more

enthusiastic and more productive for both family and company. SNSs and their issues are as follows:

□ **Twitter:**

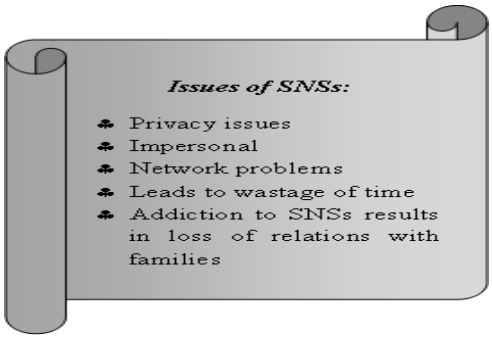
It is little complicated to effectively broadcast vacant jobs in Twitter. "Tweets" have a low shelf life (Because of lot of traffic on Twitter) making the lifeline of updates limited. The 140 character limit restricts which makes difficult to say all about the profile.

□ **Facebook:**

Initially Facebook is mainly used as a social tool to communicate with friends and family rather than for business and this makes many candidates maybe unwilling to connect with companies through Facebook. If we are looking for a skilled niche of applicants, we may face problems finding such candidates via Facebook. Privacy settings on the site make communication with individuals far more difficult. Candidates that we find may not necessarily genuine.

□ **Linked In:**

It allows a limited number of emails to be sent to other contacts which can make communication with many difficult. It's a long approach as it requires users to build contacts first. You cannot send messages to users who are not in your contact list.



OBJECTIVES

- To study the effectiveness of the use of Social Media in the recruitment process.
- To identify few of the most effective social networking sites that is helpful in the recruitment of right candidates for the right vacancies.
- To spread awareness about the effectiveness of the use of social media to attract passive job seekers.
- To integrate the use of social media as a part screening and assessing the candidate before hiring them.

- To identify and use certain tools found in the internet which helps in sourcing the right candidates through various social media platforms.

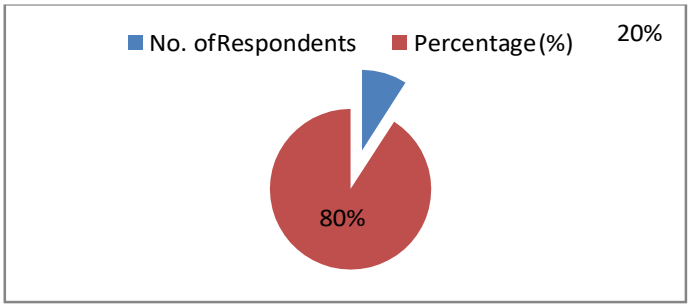
RESEARCH METHODOLOGY

The study is based on secondary data collection from published sources and internet search. The exploratory research design is used. The collected data was analysed with the help of simple analytical tool like percentage, average etc. The tabular analysis is done and results are presented to meet the objectives of the study.

DATA ANALYSIS AND INTERPRETATION

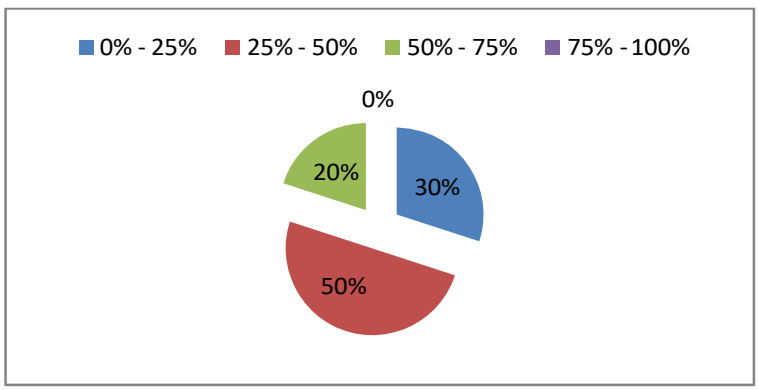
1. Do you think that Social media is considered an effective tool in finding job vacancies?

- ⌋ Yes
- ⌋ No



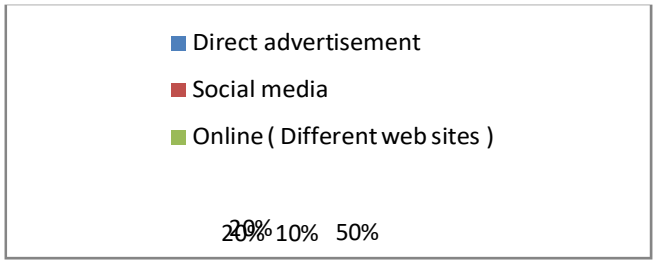
2. How much percentage of the total recruitment is being covered by Social Networking Sites as recruitment method?

- ⌋ 0% - 25%
- ⌋ 25% - 50%
- ⌋ 50% - 75%
- ⌋ 75% - 100%



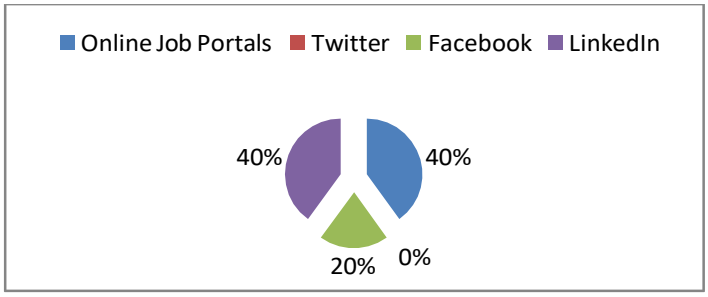
3. Which way is more preferable to you to advertise your job vacancies ?

- ⌋ Direct advertisement
- ⌋ Social media
- ⌋ Online (Different web sites)
- ⌋ Recruitment Companies



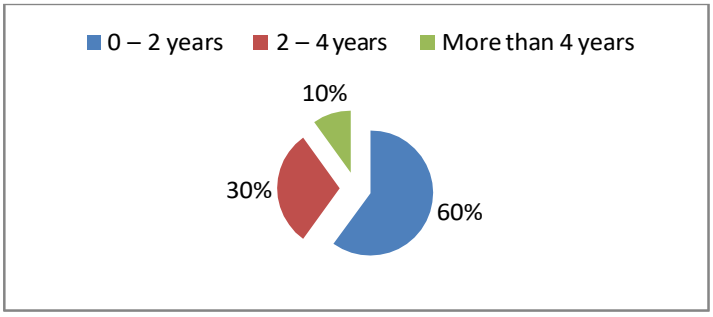
4. Which of the sites do you more prefer to use to select your Employees?

- ⌋ Online Job Portals
- ⌋ Twitter
- ⌋ Facebook
- ⌋ linked IN



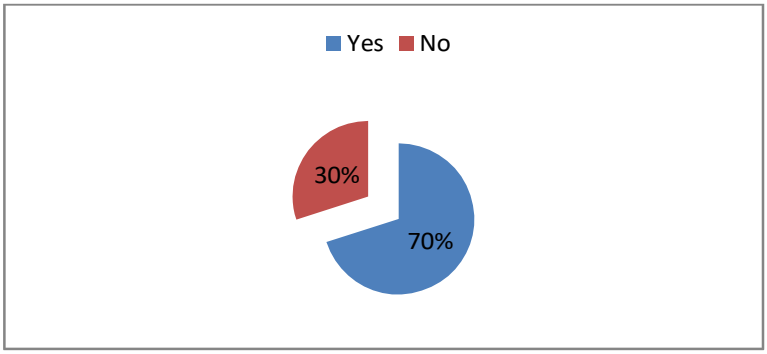
5. Since when did you start to use Social media as source of your employee selection?

- ⌋ 0 – 2
- ⌋ 2 - 4
- ⌋ More than that



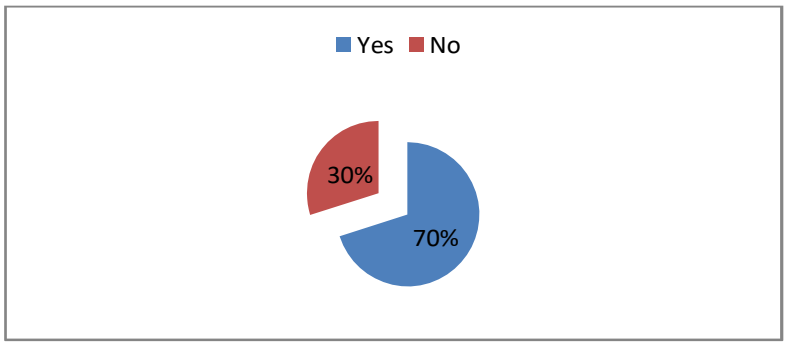
6. Do you think Social media gives opportunity and diversity to the companies to choose qualified Employees (nationality, qualifications) ?

- ⌋ Yes
- ⌋ No



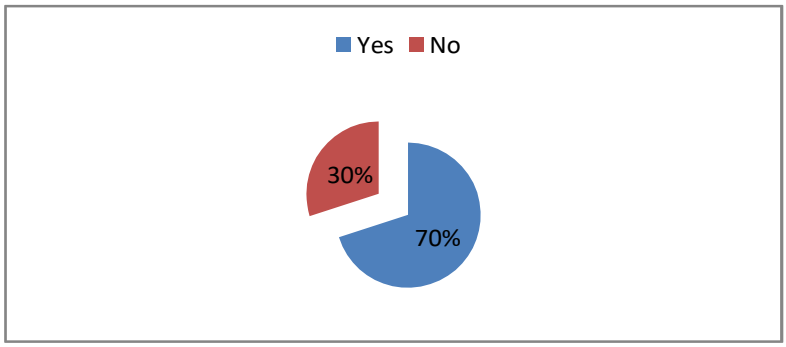
7. Do you think that Social network helps in selecting the right employee?

- ⌋ yes
- ⌋ No



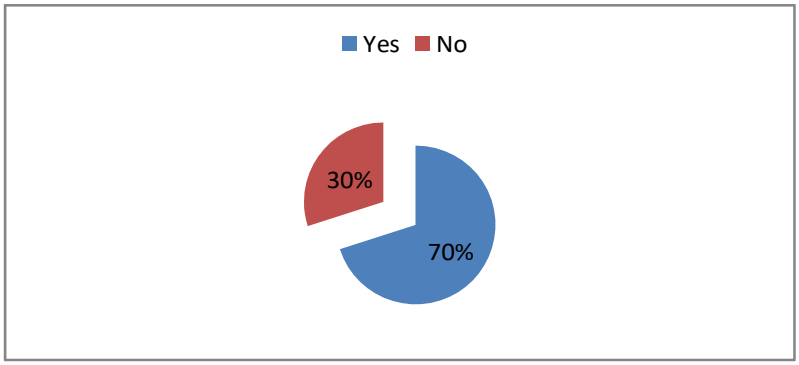
8. Do you think that qualified employee used social media to present their talent?

- ⌋ Yes
- ⌋ No



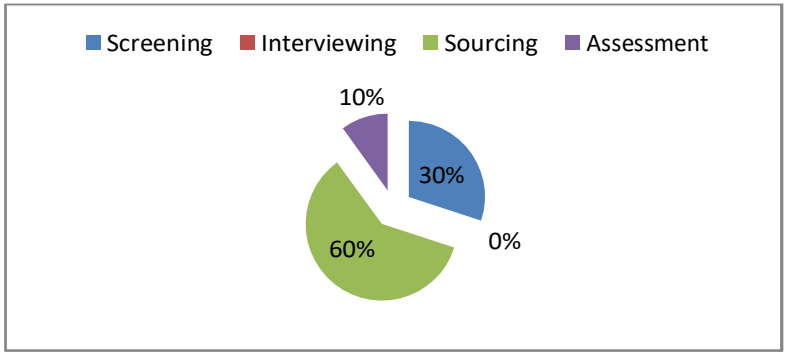
9. Do you think that social media facilitate and helps in managing the recruitment process?

- ⎦ Yes
- ⎦ No



10. What according to you has social media improved more in the recruitment process that?

- ⎦ Screening
- ⎦ Interviewing
- ⎦ Assessment
- ⎦ Selection
- ⎦ Induction



FINDINGS

After the data analysis and interpretation the findings are:

- The findings show that the recruitment team of this company have started the use of social media sites and tools as part of their recruitment process.
- In this study, Facebook is defined as a social-oriented site. It is not often used for recruitment at this point in time, but companies predict that Facebook will gain more importance within the next few years.

- LinkedIn has been extensively used and it is turning out to be the first place recruiters go to post exhausting the Job Portals.
- Social Media has been widely used for the Bulk Hiring Requirements or for the very Niche Hiring Requirements.
- The team estimate the networking scope as a benefit for recruitment. The wider the networking scope, the easier to reach more people and to hit the right target group.

LIMITATIONS OF THE STUDY

Limitations of the study can be outlined as the following:

- The research sample is limited to recruitment team of a single company in Chennai and it can be ruled out that certain cultural influences have affected the results.
- In addition, the amount of members in the recruitment team which are making use of social-oriented networking sites is small which may limit the generalizability of the study.
- Use of social media in recruitment in the current scenario is a bit more time consuming.
- As many of the social media pages have low shelf life, the lifeline of your job posts or updated regarding the job or your company is limited.
- It sometimes becomes difficult to find a candidate directly who fits in all our required criteria. Hence we need to go through a bit longer process of contacting him and then trying to know about his credentials which at the end may or may not match our requirement.

SUGGESTIONS & RECOMMENDATIONS

In order to conclude this study in brief, following are the suggestions for the recruiters to have an effective and upgraded recruitment process to hire perfect candidates for the available vacancies:

- Use of social media can increase the sources to search the right candidates for your organization.
- There are lot of tools available on the internet that helps to contact the right person who are mostly passive job seekers and who do not provide their contact information directly on any site.
- These tools use the presence of the person on various social media sites and give us more information about his professional and personal profile.
- Social media sites have also started coming very much handy to screen the personal attributes of any person.

CONCLUSION

A combination of the theoretical background and the findings of the survey lead to the conclusion that Social Networking Sites are an important and upcoming topic in the corporate HR departments. Especially, the networking scope of the Social Networking Sites is the most predicting factor for effective recruitment, in particular for the target group orientation. Interestingly, recruitment costs are not affected by the qualities of Social Networking Sites. It can be assumed that HR departments cannot observe a cost reduction caused by the usage of Social Networking Sites because of the fact that they have recently started using them for recruitment.

A cost reduction might be experienced on the long-term. In conclusion, HR departments are entering a new terrain and gaining their first experiences with Social Networking Sites in combination with recruitment. The outcomes indicate a trend to use the sites for recruitment and it has become obvious that this issue will gain importance in the future.

BIBLIOGRAPHY

Social Media Recruitment: How to Successfully Integrate Social Media into Recruitment Strategy

- Author: Andy Headworth

Recruiting on the Web: Smart Strategies for Finding the Perfect Candidate

- Author: Michael Foster

Social Media in Employee Selection and Recruitment: Theory, Practice, and Current Challenges

- Author: Richard N. Landers

Eldon, E. (2009). 8 practices for recruiters on Facebook. Retrieved 10.10.2010, from http://www.insidefacebook.com/2009/12/08/8-best-practices-for-recruiters-on-facebook/.

Facebook (2011). Press Room. Retrieved 20.04.2011, from http://www.facebook.com/press/info.php?statistics.

Giles, M. (2010). A World of Connections-A special report on social networking. The Economist. Retrieved 01.06.2010, from http://www.economist.com/surveys/downloadSurveyPDF.cfm?id=15383450&surveyCode=%254e%2541.

Holm, A.B. (2010). The Effect of E-Recruitment on the Recruitment Process

Kaplan, A.M., Haenlein, M. (2009). Users of the world, unite! The challenges and opportunities of Social Media, Business Horizons, 59-68.

Kim, W., Jeong, O., Lee, S., (2009). On social Web sites., 215-236.

Pin, J.R., Laorden, M. and Sàez-Diez, I. (2001). Internet Recruitment Power: Opportunities and Effectiveness, Retrieved 01.09.2010, from http://www.iese.edu/research/pdfs/di-0439-e.pdf.

O`Murchu, I., Breslin, J.G., Decker, S. (2004). Online Social and Business Networking Communities.

Retrieved 03.06.2010, from http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.1.4901.

INTERNATIONAL JOURNAL OF TECHNOLOGY ENHANCEMENTS AND MERGING ENGINEERING RESEARCH, VOL 3, ISSUE 07 ISSN 2347-4289

IOSR Journal of Business and Management (IOSR-JBM) e-ISSN : 2278-487X, p-ISSN : 2319-7668, PP 37-41

ROBERT WALTERS WHITEPAPER - USING SOCIAL MEDIA IN THE RECRUITMENT PROCESS

TOWARDS GREENER CENTRAL BANKING: INSIGHTS INTO THE ECB

Margherita Mori
Full Professor in Financial Markets and Institutions
Department of Industrial and Information Engineering, and of Economics
Economy Area - University of L'Aquila
Via Giuseppe Mezzanotte - Località Acquasanta, 67l00 L'Aquila, Italy
Ph. +39 0862 434874 - +39 3471041062 (mobile)
Email : margherita.mori@univaq.it

Abstract:

This paper aims at providing a framework for analysis on forward steps that central banks could move in sight of promoting a greener financial industry. Actually, significant efforts have been undertaken even before the 17 Sustainable Development Goals were agreed upon by the United Nations but much remains on the global agenda: in particular, it is a matter of integrating environmental – as well as social and governance – criteria more deeply into the core (and other) activities carried out by central (and other) banks.

A case in point has to do with embedding these criteria in their operating schemes, including their asset purchases, with a special emphasis to be put on climate risk aspects and to the transition to a low carbon economy. As far as the European Central Bank, evidence of its contribution to the European Union's environmental goals can be found in its Environmental Statements; they tend to emphasize what has been achieved in terms of fostering an internal culture of environmental awareness and keeping resource consumption low.

Anyway, it seems appropriate to question whether the pursuit of greener central banking needs more than that and supporting arguments stem from the legal obligations to be fulfilled by the European Central Bank. Conclusions pave the way to further research that may draw upon the unexploited potential for the banks under investigation to act as catalysts for greening the financial system; progress can be envisaged, which involves monetary policy instruments, as well as financial regulation, encompassing capital requirements and disclosure rules.

Keywords: *Central banking, Green finance, Sustainable development, Sustainability indexes.*

Introduction:

Dreaming of greener central banking? Too easy! For sure, it would prove tougher to spell out how to make this brave dream come true and, even more difficult, to act accordingly. Yet, this is

a *must* – not just an option – for many reasons, including the moral imperative of fulfilling the generation pact. To make things less hard, workable solutions include some forward steps that could be taken within a relatively limited time span, for instance by endorsing acknowledged criteria such as those that underpin the Equator Principles, as well as sustainability indicators, and by exploiting the potential of green financial innovation.

The European Central Bank (ECB) makes no exception to the rule that should ensure a stronger commitment to greening the financial industry and the Environmental Statements that can be found on this bank's website look impressive. However, a more comprehensive approach would allow to best combine local and global issues while mixing up the micro- and macro-economic levels of analysis: on one hand, each central bank should feel engaged to work towards becoming increasingly green by itself and to promote green finance within its area of influence; on the other hand, central banks as a group – possibly including all of them – can be expected to further cooperate in order to develop a greener financial system on a global scale.

Along this pathway, a few milestones can be identified that stem from the debate on sustainability, encompassing its multifaceted set of dimensions, and mostly have to do with the Sustainable Development Goals (SDGs) agreed upon by the United Nations (UN 2015) while setting the "2030 Agenda". Many of them are closely linked to green finance[1], which has emerged as a priority in policy debate in recent years; however, implementing the unprecedented range of policies that international for a keep generating to preserve the environment remains a challenge, thus leading to conclusions based on key messages and recommendations for policy intervention, as well as for future research and development.

A Quali-Quantitative Approach:

Sustainability issues have been discussed for quite a long time so far, and valuable resources have been devoted to meet the implied generation pact in the last decade, so as to leave an

[1]See "Goal 3. Ensure healthy lives and promote well-being for all at all ages","Goal 7. Ensure access to affordable, reliable, sustainable and modern energy for all", "Goal 8. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all","Goal 11. Make cities and human settlements inclusive, safe, resilient and sustainable", "Goal 12. Ensure sustainable consumption and production patterns", "Goal 13.Take urgent action to combat climate change and its impacts" and "Goal 15.Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss".

equally sustainable world and possibly an even better one in terms of sustainability. Undeniably, the trend towards sustainable development has been strengthened by forging this Agenda, with its 17 SDGs and 169 associated targets, that also tends to promote cooperative efforts to share the burden of "transforming our world";the "Global Partnership" that they aim at revitalizing[2] promises to unlock additional funding for development flows in a context that also implies an increased commitment to boost green finance; no surprise that leading banks have heavily invested to meet more sustainable requirements.

If it is true – as it is – that the gap between theory and practice needs to be bridged, it makes sense to foster a wider adoption of sustainability indicators that draw upon the link between sustainability and financial performance; relevant criteria including corporate sustainability as a business approach expected to create long-term shareholder value by embracing opportunities and managing risks that derive from – among others – climate risk aspects. Actually, corporate sustainability performance has been perceived more and more often as an investable concept and its relevance is confirmed by the more and more massive recourse to such indicators as the globally renowned Dow Jones Sustainability Indices that have been launched in 1999 and are designed to allow for a measurable environmental (and/or societal) impact.

Since the corporate sustainability performance can be financially quantified, this concept has been evolving into an investable corporate sustainability concept. "What gets measured, gets done": this philosophy tends to inspire the recourse to quantitative methods that by the way should be better combined with qualitative ones, as far as promoting green finance too. Focusing on the need to assess and monitor the environmental – and social – impact of lending, a few critical views (Weber and Acheta 2016; Wright and Rwabizambuga 2006) do not significantly impact the relevance of the Equator Principles that were launched in 2003 as a voluntary set of standards modeled on the environmental standards of the World Bank, as well as on the social policies of the International Finance Corporation, and apply globally to several financial products such as project finance (and pertaining advisory services), project-related corporate loans and bridge loans, whereby the use of proceeds is known to be devoted to a specific goal.

The ECB's Environmental Statements:

[2] See "Goal 17. Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development".

Within this framework, it sound sappealing to survey the ECB's Environmental Statements that have been compiled since 2010and that provide information on the environmental performance scored year after year by this central bank. It is openly committed to the achievement of the European Union (EU)'s environmental goals, with the ECB's support to their fulfillment being considered "of paramount importance for the well-being of our society" (Diemer 2018, 4): they encompass the commitment to protect, conserve and enhance the Union's natural capital, to turn the European Union into a resource-efficient, green, and competitive low-carbon economy, and to safeguard the Union's citizens from environment-related pressures and risks to health and well-being, in line with the 7th Environment Action Programme (2014-2020); even more ambitious targets pinpoint the low-carbon economy roadmap that implies cost-efficient ways to make the European economy more climate-friendly and less energy consuming by 2050.

While converting its Environmental Statements into practice, the ECB participated in international campaigns such as the European Mobility Week and the Earth Hour sponsored by the World Wide Fund for Nature. Progress is on the card, as this bank's service areas continue to raise awareness internally about the environmental impact of the services they provide and the ways to mitigate it: several staff-led initiatives have been developed to make this institution more environmentally sustainable, for instance to reuse or donate information technology equipment, to increase biodiversity in the ECB's grounds, to install electric vehicle charging stations and to advocate the replacement of disposable items (such as plastic bottles and cups) with equivalent items made of durable materials.

Further insights reveal that its Main Building in Frankfurt was designed to fulfill the ECB's aims to have sustainable premises that achieve efficiency in terms of energy and water consumption. The design of the Main Building comprises some the key features, that also warrant a notable addition to Europe's architectural heritage, as follows: energy-efficient triple-layered facade for the new high-rise tower and efficient insulation for the facades and roof of the *Grossmarkthalle*; natural ventilation based on operable facade elements, electric sun-shading and low-energy lighting, to provide optimal workplace conditions with a maximum use of daylight; rainwater harvesting and recycling, e.g. for toilets and watering the parkland area; use of recycled heat (from the computer centre and atrium); the recourse to geothermal energy for heating and cooling (ECB 2016, 7-9; ECB 2015, 5-6).

Environmental Protection as a *Must*:

Undoubtedly, the ECB has been deeply involved in an innovative process aimed at applying environmental criteria to its organization. However, it seems that a broader perspective should be assumed, since legal obligations to promote environmental protection have been conferred by the EU legislation upon this bank, to the point that failure to comply might eventually invalidate some of its policies (Jourdan 2018) and particularly its Corporate Sector Purchase Programme: it is not a case that purchasing bonds issued by non-financial corporations in the oil, gas and automotive industries under this programme would reduce the cost of finance for these issuers, thus "facilitating and prolonging their emission of greenhouse gases and aggravating climate change" (Solana 2018, 14). What acts as a reinforcement is that this bank' smandate is often perceived as very narrow, with its inflation target being depicted as its quasi-unique objective, and this approach tends to be translated into limits to the ability of the ECB to look at other policy areas in which it could – or better should – contribute, such as financing the green transition.

Actually, both the Treaty on the Functioning of the EU (article 127) and the Protocol (No. 4) on the Statute of the European System of Central Banks and of the ECB (article 2) contain a pretty big to-do list that this bank should pursue "without prejudice to the objective of price stability": support is explicitly requested to "the general economic policies in the Union with a view to contributing to the achievement of the objectives of the Union" itself; it is supposed to "work for the sustainable development of Europe based on balanced economic growth and price stability, a highly competitive social market economy, aiming at full employment and social progress, and a high level of protection and improvement of the quality of the environment", according to the Treaty on EU (Consolidated Version, article 3, section 3). As if these provisions were not enough, the Treaty on the Functioning of the EU (article 11) states that "environmental protection requirements must be integrated into the definition and implementation of the Union's policies and activities, in particular with a view to promoting sustainable development".

It must also be accounted for the Paris Agreement that was signed by 195 countries on December 12, 2015 and that was ratified by the EU on 5 October 2016 thus enabling its entry into force on 4 November 2016 and binding all its institutions; as such, the ECB has no choice but to contribute to the achievement of the goals of this first-ever universal global climate deal, that is supposed to put the world on track to avoid dangerous climate change, including the long-term goals of keeping the increase in global average temperature to well below 2°C above pre-

industrial levels and aiming to limit the increase to 1.5°C. The role of the ECB as regards sustainable finance has been recently pointed out by the European Parliament (EP 2018, 16), with a special emphasis on the legal obligation to abide by this agreement that also fosters the need to reduce global emissions in accordance with the best available science.

Moral Duties vs. Legal Obligations to Support the Green Transition:

Against this backdrop, it sounds disappointing that – according to calculations based on publicly available information – "62.1 per cent of ECB corporate bond purchases take place in the sectors of manufacturing and electricity and gas production, which alone are responsible for 58.5 per cent of Eurozone area greenhouse gas emissions, but only 18 per cent of gross value added" (Matikainen et al. 2017); not surprisingly, these (and other) data have led to recommendations that call for increased transparency around these purchases and the preliminary selection process, as well as for reviews on the impact of monetary policy on high- and low-carbon investment; accordingly, the ECB should consider options for adjusting its purchasing strategies, in particular its corporate quantitative easing. For instance, monetary policy could be used more effectively to support long-term sustainable growth by purchasing green bonds, such as those issued by the European Investment Bank (EIB), that has just shed light on the need to accelerate EU investment in climate change mitigation and to dramatically increase investment in energy efficiency to meet EU targets for 2030 and beyond (Revoltella 2018, 3).

At the same time, the ECB has been recommended by the EP "to explicitly take into account the Paris Agreement and ESG goals in its guidelines orienting its purchase programmes" provided "that such guidelines may act as a pilot for establishing a future ESG-oriented investment policy consistent with high standards on an EU sustainable taxonomy". Therefore, it seems that this bank – just like any other central bank – can (and should) act as a catalyst for greening the financial industry more than it has provided evidence for up to now: besides avoiding potential litigation, integrating more and more deeply environmental protection into the design and implementation of monetary policy measures could raise awareness about their environmental impact and prompt further action in sight of playing a more proactive role.

For instance, central banking could aim at making, encouraging and even requesting a wider recourse to sustainability indicators in an attempt at actively supporting the green transition: here it suffices to consider that, as shown by recent literature, it may prove beneficial to make

recourse to the Ecological Footprint and Genuine Progress Indicator while choosing among assets; an extensive analysis on China's ten megacities between 1978 and 2015 (Huang 2018) should be interpreted as an incentive to privilege best performing issuers – and, generally speaking, borrowers (such as municipalities and other local bodies) – in terms of sustainability assessment. By the way, some businesses should not be financed at all, no matter how profitable channeling funds might be in these cases, including unsustainable logging in rainforests or operations in the properties inscribed in the World Heritage List by the UN Educational, Scientific and Cultural Organization.

Challenging Issues:

The search for innovative, green-oriented measures again leads to that country, due to the recent decision made by the People's Bank of China (BPoC) to widen the range of collateral it accepts in its medium-term lending operations by adding green bonds, as well as other assets tied to small-business funding (for instance, lower-grade bonds) (Yeung 2018). As announced last June (PBoC 2018), this move can be expected to help guide financial institutions to increase their support to the green economy and other market segments often underserved by the banking industry (first of all, small- and micro-enterprises that find it difficult and expensive to get financing, especially in the rural sector);at the same time, this decision should provide support to smaller financial institutions, that tend to lack much high-quality collateral to get more loans from the central bank, as high-quality collateral is concentrated among large-scale commercial banks.

In more general terms, not only monetary policy measures could be redesigned to increase the proportion of green assets on their balance sheets, but also credit allocation policies could be used to drive lending and investment towards prioritized low-carbon sectors. Recommendations that are likely to contribute to the green transition could conveniently involve macro-prudential tools to be used as a disincentive to loans carrying carbon-risk or as an incentive to low-carbon investment: for instance, both of these targets might be possibly favored by financial institutions by charging comparatively lower rates to borrowers who wish to improve the environmental footprint of their home; such a green attitude might be eventually shared with investors in related financial assets (including asset-backed securities), with relevant implications from an economic viewpoint too, should lower yields be accepted.

Challenging issues also involve regulatory capital requirements, that aim at improving the solvency of banks and are determined on the basis of the credit risk of the banks´ assets. For instance, central banks can be expected to promote green rating when it comes to further revising the Basel framework, as far as the calculation of risk-weighted assets(Pillar 1), risk management and supervision (Pillar 2), and disclosure requirements (Pillar 3): there are reasons to believe that overhauling traditional energy systems, curtailing harmful industry practices and scaling emerging technology make economic sense, despite often meaning steep frontloaded costs (Ewing and Nahreen 2018); the (more or less) green footprint of central banks (as well as of sovereigns, non-central government public sector entities, multilateral developments banks and other banks) should be accounted for and properly disclosed.

The "Global Partnership":

In this context, it is worth focusing on climate-aligned financial regulation in sight of contributing to environmental protection and ultimately to the achievement of the SDGs; positive side-effects might be accrued in terms of enhancing the role of the banking industry in the political process, given the deep implications that both climate change and the low-carbon transition are likely to have for the functioning and stability of the macro financial system. Up to now, many successful initiatives have allowed to set forth a wide range of policies to protect the environment, though their implementation remains a challenge to a considerable extent while an unquestionable need is widely felt to keep the pressure on up to 2020 and beyond.

To be optimistic, advancements should be achieved by the Central Banks and Supervisors Network for Greening the Financial System (NGFS), that brings together a significant number of central banks and supervisors, including the ECB; several institutions have joined this network as observers. It was launched at the Paris "One Planet Summit" in 2017, two years to the day after the historic Paris agreement was concluded, and can be expected to explore ideas and policy options for steering the sustainable finance agenda while addressing environmental issues, that go well beyond the scope of the first ever "International Climate Risk Conference for Supervisors" held on April 6, 2018 in Amsterdam.

According to official statements, the NGFS is supposed to help to strengthen the global response required to meet the goals of the Paris agreement and the Sustainable Development Goals; it will also try to enhance the role of the financial system to manage climate and environmental risks

and to mobilize capital for green and low-carbon investments in the broader context of environmentally sustainable development. Nobody would deny that concerted action is urgently needed, not only to deal with the risks of climate change, and challenges ahead could even involve the promotion of energy finance as an emerging subset of the financial industry, in line with the SDGs and the "Global Partnership" that their achievement is based upon.

Conclusions:

To sum up, despite some questionable views, banks still play a fundamental role in any economy, first of all by hopefully selecting what and who is most appropriate to channel money to. However, environmental – as well as social and governance – criteria need to be better incorporated into the activities performed in the financial arena, particularly by central banks: this is especially true of their monetary policy operations, such as their asset purchases that do not seem to properly comply with the "2030 Agenda" with respect to the promotion of environmental protection; similar thoughts involve the collateral framework, that may be expanded to include assets linked to green finance, such as green bonds.

As far as the ECB, it takes pride in announcing its Environmental Statements year after year, though there is no choice but to better define the way in which this institution should pursue environmental goals. Evidence of activities developed by other central banks acts as a reinforcement to address these issues while discussing about banking and financial regulation; the undisputed ties between the real and financial spheres of the economy lead to emphasize the implications of green finance beyond the boundaries of the financial arena, not only in sight of fulfilling the generation pact.

All in all, central banks can – or, better, should – take conveniently advantage of their position and leadership to promote a greener financial system, both internally and externally, both locally and globally, both directly and indirectly, and by way of both moral suasion and enforcement. What sounds surprising is that much remains on the global agenda, though green finance falls within the scope of several SDGs: lessons learned worldwide show that many banks have taken measures to reach them, even without being requested to act accordingly from an institutional view point; therefore, it comes natural to suppose that further progress can be envisaged should central banks get more involved in leading the process towards greening the financial industry.

References:

1) Diemer, M. (2018). Foreword, *2018 Update of the ECB's Environmental Statement*. ECB, Frankfurt am Main, p. 4.

2) ECB (2016). *ECB Environmental Statement 2016*, Frankfurt am Main.

3) ECB (2015). *2015 Update of the ECB's Environmental Statement*, Frankfurt am Main.

4) EP (2018). *Report on Sustainable Finance*. Committee on Economic and Monetary Affairs, Brussels, May 4.

5) Ewing, J. and Nahreen, A. (2018). The sustainable development goals and climate finance: Catalytic agent or empty vessel?.*Brookings*, July 6. Available from:https://www.brookings.edu/blog/future-development/2018/07/06/the-sustainable-development-goals-and-climate-finance-catalytic-agent-or-empty-vessel/[Accessed: 30 November 2018].

6) Huang, L. (2018). Exploring the Strengths and Limits of Strong and Weak Sustainability Indicators: A Case Study of the Assessment of China's Megacities with EF and GPI. *Sustainability*, vol. 10 (2). Available from: https://www.mdpi.com/2071-1050/10/2/349.[Accessed: 4 December 2018].

7) Jourdan, S. (2018).Why the ECB Has a Legal Obligation to Account for Environmental Protection. *Positive Money Europe*, October 1. Available from:http://www.positivemoney.eu/2018/10/ecb-legal-mandate-environment-protection/[Accessed: 11 November 2018].

8) Matikainen, S., Campiglio, E.,and Zenghelis, D. (2017).*The Climate Impact of Quantitative Easing*, Grantham Research Institute on Climate Change and the Environment, London, May.

9) PBoC (2018). *The People's Bank of China decided to appropriately expand the scope of medium-term loan facilitation (MLF) collateral*, June 1. Available from:http://www.pbc.gov.cn/goutongjiaoliu/113456/113469/3549913/index.html [Accessed: 30 November 2018].

10) Revoltella, D. (2018).Executive Summary, *Retooling Europe's Economy - Investment Report 2018/2019*, EIB, Luxembourg, pp.1-7.

11) Solana, J. (2018).*The Power of the Eurosystem to Promote Environmental Protection*, University of Oslo, Research Paper Series, No. 23, July25.

12) UN (2015).*Transforming our world: the 2030 Agenda for Sustainable Development*, Resolution 70/1 adopted by the General Assembly, September 2015, New York, NY.

13) Weber, O. and Acheta, E. (2016).*The Equator Principles – Do They Make Banks More Sustainable?*, Inquiry Working Paper 16/05. UN Environment Programme, Geneva, February.

14) Wright, C. and Rwabizambuga, A. (2006). Institutional Pressures, Corporate Reputation, and Voluntary Codes of Conduct: An Examination of the Equator Principles.*Business Society Review*, vol. 111 (1), March, pp. 89-117.

15) Yeung, I. (2018). PBoC accepts lower-grade and green bonds as collateral. *Central Banking*, June 12. Available from:https://www.centralbanking.com/central-banks/monetary-policy/operating-framework/3569726/pboc-accepts-lower-grade-and-green-bonds-as-collateral. [Accessed:30 November 2018].

TAKING BANKING SERVICES TO THE COMMON MAN 'AAM ADMI' – INCLUSIVE GROWTH

Prof. Dr. Firdos Temurasp Shroff
(Ph.D, MBA, MA, LLB, CAIIB, PGDBT, PGDIRPM, PGDCM, Fellow IIBF)
Professor/Motivational Coach, Universities/B-Schools;
SEBI Certd. Trainer in Financial Education; ex-Union Bank of India;
Fellow, Indian Institute of Banking & Finance, Senate Member, Pune University
Email : firdos_shroff@yahoo.com
Mobile : 09821274825

Prof. D. Gopalakrishna,
(MBA, IIM, Bangalore)
Consultant & ex-Sr.Manager, SBI
Email : dgopalakrishna17@gmail.com
Mobile : 07411967440

Introduction :

'Financial Inclusion'; 'Informal Financial Sector'; Unorganised Sector; are the buzz word today.

What is 'Financial Inclusion' ?

"Financial inclusion is delivery of banking services at an affordable cost ('no frills accounts,) to the vast sections of disadvantaged and low income group. Unrestrained access to public goods and services is the sine qua non of an open and efficient society. As banking services are in the nature of public good, it is essential that availability of banking and payment services to the entire population without discrimination is the prime objective of the public policy."

Access to finance by the poor and vulnerable groups is a prerequisite for poverty reduction and social cohesion. This has to become an integral part of our efforts to promote inclusive growth. In fact, providing access to finance is a form of empowerment of the vulnerable groups. Financial inclusion denotes delivery of financial services at an affordable cost to the vast sections of the disadvantaged and low-income groups. The various financial services include credit, savings, insurance and payments and remittance facilities. The objective of financial inclusion is to extend the scope of activities of the organized financial system to include within its ambit people with low incomes. Through graduated credit, the attempt must be to lift the poor from one level to another so that they come out of poverty.

A well functioning financial system empowers individuals, facilitates better integration with the economy, actively contributes to development and affords protection against economic shocks. Inclusive finance - through secure savings, appropriately priced credit and insurance products,

and payment services – helps vulnerable groups such as low income groups, weaker sections, etc., to increase incomes, acquire capital, manage risk and work their way out of poverty.

Notwithstanding the efforts made so far, a sizeable majority of the population, particularly vulnerable groups, continue to remain excluded from the opportunities and services provided by the financial sector. With a view to correct this situation and extend the reach of the financial sector to such groups by minimising the barriers to access as encountered by them, the Government of India in June 2006 constituted a "Committee on Financial Inclusion" under Chairmanship of Dr. C Rangarajan, Chairman, Economic Advisory Council to the Prime Minister.

Statement of the Problem :

There is a huge problem for the country and a matter of deep concern to address the issue on financial inclusion seriously and bring about the entire population into the banking net for the prosperity of the individual, in particular and the growth of the country at large, in general.

Need for the Study :

The profile of Indian banking has undergone a metamorphosis in the post-nationalisation era. Banks have emerged as effective catalytic agents of socio-economic change. With this in view, there is a dire need to carry out the Study as Reserve Bank of India as also Government of India has concerns to include the entire population of the country in the banking net, so that they are freed from the clutches of money lenders who lend money at exorbitant rate of interest. As per the broader definition of financial inclusion, it would take care of issues not only, related to savings and credit, but also insurance and financial advisory services.

Importance of the Study :

There is a need for the formal financial system to look at increasing financial literacy and financial counseling to focus on financial inclusion and distress amongst farmers. As part of the Community Reinvestment Act in US, banks are expected to contribute towards educating persons from socially and financially disadvantaged groups on matters relating to their financial needs. Indian banks and financial market players should actively look at promoting such programs as part of their corporate social responsibility.

Objectives of the Study :

The objectives of the study would facilitate Financial Inclusion Initiatives undertaken by Reserve Bank of India/NABARD/GoI, etc.

Methodology :

To study the reasons of rural villagers not being in bank net as also to understand hardships/shortages faced by the villagers/SHGs to open bank account (No-frill account/General Purpose Credit Cards); remittance needs of the poor; risk faced by poor and to study environment and infrastructure facilities available and required; technology applications and suggest various schemes to be adopted on the BC/BF Model in the select Village for 100% financial inclusion.

The study will also be supported by international experiences – key learning areas in financial inclusion and bring out commonalities observed in the various approaches applicable in the Indian context. Last but not the least, the study will surface challenges faced in Financial Literacy and Credit Counselling.

The study will also carry learning from success stories of various banks in the areas of financial inclusion.

Review of Literature :

Primary Data Collection :

Primary data collection will be through Questionnaire face-to-face meeting in order to study the intricacies/issues of financial inclusion in the select Village and from the findings of the data collected-analyse the same and suggest BCs/BFs Model for implementation by banks.

Secondary Data Collection :

1) FULL Report of the Committee on Financial Inclusion – NABARD – January 2008 – to study the recommendations on BFs/BCs Model and come out with suggestions for implementation, which will be the base of the study
2) RBI Report on Trends & Progress in Banking in India
3) RBI Guidelines on Financial Inclusion
4) National Rural Financial Inclusion Plan
5) Role of Commercial Banks in Financial Inclusion
6) Study material published by Indian Institute of Banking & Finance on Financial Inclusion
7) Speeches of Governors/Dy. Governors/Experts on Financial Inclusion
8) Visit to NABARD/RBI/IBA to study the vision on financial inclusion
9) Visit to SADHAN, Delhi/SEWA Bank, Ahmedabad to learn and study the new concepts on financial inclusion from them to be incorporated in the study.

Limitations of the Study :

The study has the following limitations :

1) The study will cover nearby village at Mumbai only

2) The result of the study mainly depends upon the information given by the respondents. Since the attitudes and character of the respondents are subject to frequent changes, the results of the study will be based on the present conditions only.

To quote :

"The country has moved on to a higher growth trajectory. To sustain and accelerate the growth momentum, we have to ensure increased participation of the economically weak segments of population in the process of economic growth. Financial inclusion of hitherto excluded segments of population is a critical part of this process of inclusion. We hope that the recommendations made in this Report, if implemented, will accelerate the process of financial inclusion" Dr. C. Rangarajan, Chairman.

'No-Frills' Account :

In the Mid Term Review of the Policy (2005-06), RBI exhorted the banks, with a view to achieving greater financial inclusion, to make available a basic banking 'no frills' account either with 'NIL' or very minimum balances as well as charges that would make such accounts accessible to vast sections of the population. The nature and number of transactions in such accounts would be restricted and made known to customers in advance in a transparent manner. All banks are urged to give wide publicity to the facility of such 'no frills' account, so as to ensure greater financial inclusion.

'Simplification of 'Know Your Customer (KYC)' Norms :

Banks are required to provide a choice of a 'no frills account' where the minimum balance is nil or very small but having restrictions on number of withdrawals, etc., to facilitate common man's access to bank accounts.

Further, in order to ensure that persons belonging to low income group both in urban and rural areas do not face difficulty in opening the bank accounts due to the procedural hassles, the 'KYC' procedure for opening accounts for those persons who intend to keep balances not exceeding rupees fifty thousand (Rs. 50,000/-) in all their accounts taken together and the total credit in all the accounts taken together is not expected to exceed rupees one lakh (Rs. 1,00,000/-

) in a year has been simplified to enable those belonging to low income groups without documents of identity and proof of residence to open banks accounts. In such cases banks can take introduction from an account holder on whom full KYC procedure has been completed and has had satisfactory transactions with the bank for at least six months. Photograph of the customer who proposes to open the account and his address need to be certified by the introducer.

Ensuring reasonableness of bank charges :

As the Reserve Bank has been receiving several representations from public about unreasonable service charges being levied by banks, the existing institutional mechanism in this regard is not adequate. Accordingly, and in order to ensure fair practices in banking services, the RBI has issued instructions to banks making it obligatory for them to display and continue to keep updated, in their offices/branches as also in their website, the details of various services charges in a format prescribed by it. The Reserve Bank has also decided to place details relating to service charges of individual banks for the most common services in its website.

Committee on Procedures & Performance Audit on Public Services (CPPAPS) :

The monetary and credit policy for the year 2003-04, the RBI has brought into sharp focus the inadequacy in banking services available to common person and the need to benchmark the current level of service, review the progress periodically, enhance the timeliness and quality, rationalize the processes taking into account technological developments, and suggest appropriate incentives to facilitate change on an ongoing basis. Accordingly, the CPPAPS under the able and sagely Chairmanship of Shri S. S. Tarapore was set up. The Committee was both clinical and critical in its observations and made a number of recommendations covering an individual customer's dealing with the bank.

Customer service – institutional machinery :

In the area of customer service, the institutional machinery in banks should comprise -

- At the Board level, RBI has asked the bank to constitute a Customer Services Committee of the Board including as invitees experts and representatives of customers to enable the bank to formulate policies and assess the compliance thereof internally.
- RBI has asked banks to convert the Ad-Hoc Committee of Executives on customer service headed by the CMD/ED into a Standing Committee that periodically reviews the policies and

procedures and working of the bank's own grievance redressal machinery. These committees have been found to be very useful as the top management team is singularly focused on matters relating to customer services at the meetings of these committees and decisions for improving services tend to get taken instantly, cutting across different departments.

- Each bank is expected to have a nodal department/ official for customer service in the HO and each controlling office, whom customers with grievances can approach in the first instance and with whom the Banking Ombudsman and RBI can liaise. More interaction between the RBI/BO and the nodal officers will enable banks to take necessary correctives at the local level.

Areas of concern by banks :

- The banking industry has shown tremendous growth in volume and complexity during the last few decades.
- Despite making significant improvements in all the areas relating to financial viability, profitability and competitiveness, there are concerns that banks have not been able to include vast segment of the population, especially the underprivileged sections of the society, into the fold of basic banking services.
- Internationally also efforts are being made to study the causes of financial exclusion and designing strategies to ensure financial inclusion of the poor and disadvantaged.
- The reasons may vary from country to country and hence the strategy could also vary but all out efforts are being made as financial inclusion can truly lift the financial condition and standards of life of the poor and the disadvantaged.

RBI's Policy on 'Financial Inclusion' :

- When bankers do not give the desired attention to certain areas, the regulators have to step in to remedy the situation. This is the reason why the Reserve Bank of India places a lot of emphasis on financial inclusion.
- With a view to enhancing the financial inclusion, as a proactive measure, the RBI in its Annual Policy Statement of the year 2005-2006, while recognizing the concerns in regard to the banking practices that tend to exclude rather than attract vast sections of population, urged banks to review their existing practices to align them with the objective of financial inclusion.

Consequences of Financial Exclusion :

Consequences of financial exclusion will vary depending on the nature and extent of services denied. It may lead to increased travel requirements, higher incidence of crime, general decline in investment, difficulties in gaining access to credit or getting credit from informal sources at exorbitant rates, and increased unemployment, etc. The small business may suffer due to loss of access to middle class and higher-income consumers, higher cash handling costs, delays in remittances of money. According to certain researches, financial exclusion can lead to social exclusion.

RESEARCH STUDY:

The **research** looks into in details **BCs/BFs Recommendations** as per the Report of the Committee and such recommendations by the Committee can be evaluated / implemented through BCs/BFs Model thereat on the technology front and suggesting implementation strategy for replicating the same at respective bank levels

RBI has permitted banks to use the services of NGOs / SHGs, MFIs and other civil society organisations as intermediaries in providing financial and banking services through the use of BF and BC Models.

The response of the banking system has been of low key and the model is yet to be fully grounded.

Business Facilitators / Business Correspondents (BF/BC):

With the objective of ensuring greater financial inclusion and increasing the outreach of the banking sector, the RBI has permitted banks to use the services of NGOs / SHGs, MFIs and other civil society organisations as intermediaries in providing financial and banking services through the use of BF and BC Models vide RBI Circular of 25 January 2006.

Business Facilitator Model :

Under the BF Model, banks may use intermediaries such as NGOs, farmers' clubs, cooperatives, community based organisations, IT-enabled rural outlets of corporate entities, post offices, insurance agents, well functioning Panchayats, village knowledge centres, agri-clinics / agri-business centres, Krishi Vigyan Kendras and KVIC / KVIB units for providing facilitation services. It has been clarified that such services may include :

- Identification of borrowers and fitment of activities,
- Collection and preliminary processing of loan applications,

- Creation of awareness about savings and other products, education and advise on managing money and debt counseling,
- Processing and submission of application to banks,
- Promotion and nurturing of SHGs / JLGs,
- Post sanction monitoring,
- Monitoring and hand holding of SHGs / JLGs / credit groups / others, and
- Follow-up for recovery.

Business Correspondent Model :

Under the BC Model, NGOs / MFIs set up under the Societies / Trust Act, Societies registered under Mutually Aided Cooperative Societies Acts or the Cooperative Societies Acts of States, Section 25 Companies, Registered NBFCs not accepting public deposits and post offices may act as BCs. Banks have been advised to conduct due diligence on such entities and ensure that they are well established, enjoy good reputation and have the confidence of local people.

In addition to the activities listed under the BF Model, the scope and activities to be undertaken by BCs will include –

- Disbursal of small value credit,
- Recovery of principal / collection of interest,
- Collection of small value deposits,
- Sale of micro-insurance / mutual fund products / pension products / other third party products, and Receipt and delivery of small value remittances / other payment instruments.

The activities to be undertaken by the BCs would be within the normal course of the banks' business, but conducted through the entities indicated above at places other than the banks' premises.

To study analyses the following **RECOMMENDATIONS** in respect of the BF/BC Model made:

Business Facilitators (BFs)

Originally, only individuals who were insurance agents could act as BFs while no individuals could be placed as BC. This was later on widened to include retired officials, viz., Government servants like postmasters, school teachers and headmasters, who were considered by RBI as eligible to act as BF. Banks may make use of this relaxation and use individuals as indicated above as BF.

Banks may appoint ex-servicemen/ retired bank staff as their BFs.

Banks should ensure that the banking awareness created by BFs get converted to business potential by providing suitable banking services like mobile outlets.

Banks may facilitate easy roll-out of this mobile banking model through simplification and rationalization of back-end processes and front-end procedures so that banking operations are made more customer-friendly.

Business Correspondents (BCs) :

In addition to the institutions presently allowed by RBI to function as BCs, individuals like locally settled retired Government servants like postmasters, school teachers, ex-servicemen and ex-bank staff, whose relationship with the banking system through a pension account has already been established, may be permitted to act as BCs.

Further, MF-NBFCs may be allowed to act as limited BCs of banks for only providing savings and remittance services.

Technology has to be an integral part in sustaining outreach efforts thru' the BC model. Ultimately, banks should endeavour to have a BC touch point in each of the six lakh villages in the country.

In order to sustain and encourage the arrangements, banks may formulate suitable incentive mechanism for BCs linked to the number of accounts opened/transactions put through by them. Further, banks may consider placing BCs even in areas having their own branches.

To begin with, the BC model envisaged by RBI could be implemented widely. In due course, when the BCs reach a higher level of turnover, they should bear commensurate financial responsibilities.

Banks may appoint any individual/institution of their choice as BCs, after exercising due diligence. This will facilitate greater acceptance of the BC Model by banks.

Funds may be provided to specialized institutions which provide capacity building inputs to BCs. Such funding support could be extended on priority basis to most excluded areas/ sectors of the society.

SLBC convener banks may initiate discussion with their respective State Governments regarding routing government payments through BCs using the smart card or other relevant technology on a pilot basis.

SLBCs may undertake a study to identify organisations having the capacity to serve as customer service points and BC. In States like Andhra Pradesh and Kerala, the VOs and Kudumbashree structures already exist and these can be used as customer service points.

Training modules for BFs/BCs may be prepared in vernacular and in culture sensitive pictorial forms.

Technology Applications Model :

Technology – The Driving Force for Low-cost Inclusion Initiatives

To study Multi-application Smart Card Features (Financial Innovations and Network Operations (FINO) Ltd.) and IT-enabled Financial Inclusion Model (ALW)

The study features of each of the illustrative models as under :

Pigmy Collection Terminal Model (Krishna Bhima Samruddi Local Area Bank)

Simputers Model(Krishna Bhima Samruddi Local Area Bank)

Field Hand Held Device Model (FINO Ltd.)

Model Using Mobile Technology (A Little World Pvt. Ltd.- ALW)

The recent developments in banking technology and expansion of telecommunication network in the hinterlands of the country have provided the perfect launch pad for extending banking outposts to remote locations without having to open bank branches in the area. The Committee feels that this could be achieved by leveraging technology to open up channels beyond branch network and create the required banking footprints to reach the unbanked so as to extend banking services similar to those dispensed from branches. In short, technology has to enable the branch to go where the customer is present, instead of the other way around.

Further, RBI has urged the banks to scale up efforts for IT-based financial inclusion and develop technologies that are highly secure, amenable to audit and follow widely accepted open standards to allow inter operability among the different systems adopted by different banks. The enabling provisions and support of RBI has facilitated successful pilot projects in use of IT for extending the banking outreach for the “excluded”. These projects are premised on technology which uses hand-held devices and connectivity with host computers through General Packet Radio Service (GPRS) / Global System for Mobile Communications (GSM) / Code Division Multiple Access (CDMA) / landline networks. The devices also come in several forms like Simputers (Simple Inexpensive Multi-lingual Computers) / personal digital assistants, programmed mobiles, etc. There are also rural bio-metric ATMs which have been introduced by banks and found to be very

popular among rural masses. Some major banks are introducing low cost rural ATMs for cash dispensing and other services in rural areas.

The Committee took cognisance of the fact that the RBI has set up an advisory group for IT-enabled financial inclusion to facilitate development of IT solutions for delivery of banking services. It is understood that the group will advise certain minimum parameters and standards that are essential for setting up robust interoperable systems on open platforms. The Committee, while concurring with this approach, is of the view that nearly all models converge on certain essential components and processes to be followed in a technology application. The essence of all the models under consideration features the issue of a smart card to the farmer on which all his transactions are recorded, a hand-held terminal with the BC at the village level and a Central Processor Unit (CPU) linking the smart cards and BC terminals with the banks. The precautions taken ensure that every transaction made is accompanied by a print-out being provided to the farmer. There are also other models where smart cards are dispensed with and mobile telephones, etc. are used.

However, for better clarity, the Committee has thought it appropriate to delineate the fundamental outlines of a technology-based model which may be examined for application in such manner and to such extent as may be deemed fit.

The Committee also perused two initiatives – the SBI Tiny Initiative on Banking Facility through use of smart card facility and Government of Andhra Pradesh (GoAP) Project on Social Security Payments thru' Smart Cards – to draw conclusions that can be helpful in devising the strategy for achieving 100% financial inclusion in the country.

The operating costs of the various models are expected to be minimal and can be easily absorbed by banks as the increase in business volumes will justify the absorption of incremental operating costs. Also, the costs of the models are substantially lowered if the infrastructure is shared. It is, therefore, recommended that a shared infrastructure of different banks enabling nationwide financial inclusion for the participant banks would confer large scale benefits and also enable effortless transfer of funds between the card holders of the various banks.

Essentially, the start up costs are the initial investment costs comprising cost of the smart card, terminals to the BC and the CPU. The Committee is of the view that the Financial Inclusion Technology Fund can provide the necessary support for defraying technology application and hardware costs of technology adoption.

As the technological capability for achieving outreach has been satisfactorily proved in the ongoing projects at Andhra Pradesh, Karnataka, Mizoram, etc., banks are urged to scale up the projects all over the country to achieve financial inclusion.

Optimisation of Existing Infrastructure :

The Committee is of the opinion that the existing banking infra-structure and NGOs which have already developed extensive inroads into rural areas should be made optimal use of for enabling outreach of banking services. The BF/BC models backed by technology applications should encourage a role for the small players and integrate them into the national system. The Committee is of the opinion that State Governments should make payments to NREGP and Social Security Payments through such technology-based solutions.

Building database :

The Committee having discussed extensively the issue of using technology as a driver is of the opinion that the requirement of rapid financial inclusion as a national goal can only be achieved by using appropriate IT. The creation of a national database, sectoral, geographic and demographic reports, and also a payment system among the card holders to benefit the under privileged unbanked population of the country is not possible without extensive use of IT. This alone can bring down the costs of the small ticket transactions of the financially included and make nationwide financial inclusion a reality.

The technology suppliers and banks should evolve common minimum standards for ensuring inter-operability between their systems.

Capacity building of BFs/BCs

Funding support, on priority basis, to be extended to specialized institutions which provide capacity building inputs to BFs/BCs. To study the strong federations supported to act as BFs and BCs to the banks. Such federations can also engage in financial intermediation, micro-insurance, etc. and they can be supported for intensive capacity building for the purpose.

Conclusion :

- It is becoming increasingly apparent that addressing financial exclusion will require a holistic approach on the part of the banks in creating awareness about financial products, education, and advice on money management, debt counseling, savings and affordable credit.

- The banks would have to evolve specific strategies to expand the outreach of their services in order to promote financial inclusion. One of the ways in which this can be achieved in a cost-effective manner is through forging linkages with microfinance institutions and local communities. Banks should give wide publicity to the facility of no frills account.
- To sum up, banks need to redesign their business strategies to incorporate specific plans to promote financial inclusion of low income group treating it both a business opportunity as well as a corporate social responsibility. They have to make use of all available resources including technology and expertise available with them as well as the MFIs and NGOs. It may appear in the first instance that taking banking to the sections constituting "the bottom of the pyramid", may not be profitable but it should always be remembered that even the relatively low margins on high volumes can be a very profitable proposition. Financial inclusion can emerge as commercial profitable business. Only the banks should be prepared to think outside the box!

REFERENCES :

1) Full Report of the Committee on Financial Inclusion – NABARD – January 2008

2) Commemorative Lecture by Shri V. Leeladhar, Dy. Governor, Reserve Bank of India on 'Financial Inclusion' at the Fedbank Hormis Memorial Foundation at Ernakulam on December 2, 2005

3) Inaugural address by Smt. Usha Thorat, Dy. Governor, Reserve Bank of India at the Financial Planning Congress 2006 on "Establishing Consumer Centric Financial Services Delivery Infrastructure" organized by the Financial Planning Standards Boards of India on May 29, 2006 at New Delhi

4) Press Note dated 16.5.2006 - National Commission for Enterprises in the Unorganised Sector under Chairmanship of Dr. Arjun Sengupta

5) Report of the Committee on Informal Financial Sector Statistics (Summary) under Chairmanship of Dr. C. Rangarajan

6) Role of Financial Intermediation Services in the Informal Sector

7) The Report of National Statistical Commission, and the Report of the NSSO on Informal Sector in India, 1999-2000, dealt with the concepts and definitions of informal sector in greater detail

8) Central Statistical Organisation (2001), *National Accounts Statistics*, Ministry of Statistics and Programme Implementation, Government of India, New Delhi, July

9) National Sample Survey Organisation (NSSO), (2001), "Informal Sector in India, 1999- 2000- Salient Features", NSSO, Ministry of Statistics and Programme Implementation, Government of India, New Delhi, May.

10) National Statistical Commission (2001), *Report of the National Statistical Commission, Vol.I, II*, Government of India, New Delhi, August.

11) Shroff, F. T., (2007-Reprint 2010) - ***Modern B@nking Technology***, Foreword by Dr. R. B. Barman, ED, RBI & Message & blessing from H. E. Shri S. C. Jamir, Governor of Maharashtra, Published by Northern Book Centre, 4221/1, Ansari Road, Daryaganj, New Delhi -110 002 – (www.northernbook.com).

12) Shroff, F.T., 20015 – Pearls of Wisdom – Inner Engineering

FAMILINESS: STRATEGIC DETERMINANT FOR SHARED VALUE CREATION

Paola Olimpia Achard
University of L'Aquila Department of Industrial and Information Engineering and Economics,Via Giuseppe Mezzanotte, 67100 L'Aquila (Italy)
paolaolimpia.achard@univaq.it, phone +39 0862 434878

Valentina Castello
University of L'Aquila Department of Industrial and Information Engineering and Economics, Via Giuseppe Mezzanotte, 67100 L'Aquila (Italy)valentina.castello@univaq.it, phone +39 0862 434878

Abstract
The paper addresses the pivotal role of familiness asa strategic determinant enhancing family businesses (FBs) capability in boosting business innovation and value creation processes. More specifically, the paper highlight as familiness might represents a key strategic determinant driving FBs innovation and growth when coupled with a corporate shared value (CSV) framework. The proposed research frame is confirmed and enriched by the analysis of a case study of Antonelli, an Italian small FB working in the food sector.The paper is articulated on three part: the first one briefly presents the main features of FBs and the concept of familiness; the second part deepen the role of familiness as strategic determinant of FBs' success and shared value creation; the last part reports the main evidences from case study.

Key words:*family business, familiness, shared value,strategic management.*

Acknowledge
We acknowledge Mario Antonelli, CEO, owner and director of Antonelli'sfirm, for having accepted to participate to our study, with great availability and courtesy.

1) Family Business and Familiness

Family Businesses (FBs) are among the most double-sided and differentiated phenomenon in the entrepreneurship and strategic management research areas. In Europe there are more than 14 million of FBs, representing around the 50% of the total EU GDP and employing around 60 million of peoplein the private sector(European Family Businesses, 2018).According to AIDAF

(2018), in Italy around 85% of the total number of business are FBs almost equally distributed between medium-large size and small-medium size one. These numbers, together to the long-term perspective commonly of FBs, highlights their relevance as strategic resource for the local growth and development (KPMG,2018).

There is not a common and widely accepted definition of FBs (Siebel and zuKnyphausen-Aufseß, 2011; Gibb Dyer, 2006), neither there is a common legislative framework (European Family Business, 2018).FBs are mainly characterized by: the small size; the capacity of being risk averse; the poorly structured and formalized management practice and the family influences in determining the innovation and internationalization paths (IFC, 2011).

FBs have proved to be both successful and resilient (Kachaner et al., 2012), thanks to their specific business longevity factors mainly related to risk tolerance degree, prioritization and long-term vision (KPMG, 2018). Other typical FB strategic resources are commitment, knowledge continuity, reliability and pride (IFC, 2011). The identification of common features allows developingan organic and institutional (Besharov and Smith, 2014)research and practice frame in addressing FB' strategic and managerial features. However, the diversity of competitive behaviors, performances and longevity of FBs call for more integrated perspectives, which allow deepening the understanding of FB specific features and their drivers factors.

Several Authors (Cesaroni and Ciambotti, 2011; Nordqvist et al., 2014) identify a three-stage model,which represent a typical FB evolution: Founder(s), Sibling Partnership and Cousin Confederation.Non-allFBs follow the same evolution and fundamental is the role and visioning of the founder.This perspective is also linked to the contributions deepening the successionprocesses and the inter-generational impacts on FBs' strategic and organizational dynamics. Kraus et al., (2018) address the different behavioral configuration of FBs, depicting three main configurations of innovative behavior: i) resistant to change, proactive and risk-averse; ii) innovative, proactive and risk-averse; and iii)innovative, proactive, open-minded to external non-family managers but risk-averse.

All these variables, dimensions and stages can assume different mix, underpinning specific FB development process, as an output of different factors "specific to both the family and the social, cultural, and economic environment of the region in which the family resides" (Chrisman et al., 2005).

According to Besharovand Smith (2014), FB hybridity is related to a combination of several institutional logics. Basically, FBs are the resultant of two institutions: the family and the business. Different combinations of these – and the systemic interactionsamong family, its individual members and the business (Habbershonand Williams, 1999) – determine multiple FB models. Thus, FBs can be considered as systems of interconnected and interdependent three components (ownership, management and "familiness"), which influence the business ongoing process in term of resources, strategies and paths (von Schlippeand Frank 2013; Nordqvist et al., 2014; de Araujo et al., 2015; Cano-Rubio, Fuentes-Lombardo and Vallejo-Martos, 2017).

FBs' performances depend on the *distinctive familiness* generated by the family business system (Vallejo-Martos, 2014).Success or failure of FBs as well as overall business growth decisions - including internationalization - is related to familiness (Chrisman et al., 2005; Pongelliet al., 2016).In these terms, familinesscan be considered a dynamic capability (Teece et al., 1997) allowing FB strategic and organizational flexibility, embedded in the specific processes affected by internal and external contexts. Familiness can be represented in six clusters of resources grouped in:*human*(experience/insight and skills);*organizational* (learning and decision-making); *process* (relationship and network). The impact on performance is related not to the resource itself but to the management of the "paradoxical nature of each resource" (IravaandMoores, 2010).All familiness' resources might havedouble-sided impacts; for instance, founder' reputation represents a key strategic resource but it mighthinder subsequent generation capability to sustain it or base their own.

2) Familiness as FBs' Strategic Management Dimension to create shared value

The principal FBs features are: simultaneous roles, shared identity, lifelong common history, emotional involvement and ambivalence, private language of relatives, mutual awareness and privacy, meaning of the family company(Tagiuri and Davis, 1996; Cubico et al., 2010).Familiness has bivalent attributes, so representing the source of advantages and disadvantages of FBs (Tagiuriand Davis, 1996). Consequently, FB'governance systems are called to manage multiple institutional logics andthe dynamic complexity of the conflict - strategic and managerial - between family and business dimensions, improving both innovation and control mechanisms (Greenwood et al., 2011; Ediriweera et al., 2015).

Assuming a principal-agentperspective, different models of FB governance system can be drafted, according to the grade of involvement of the family.The most commons are:i) the perfect match between family business ownership and management; ii) the exclusive family business ownership and the non-family management; and iii) the mixed family business ownership, where the family held the majority. The separation between ownership and management creates cost-agency conflicts (Siebelsand zuKnyphausen-Aufseß al., 2011).At the same time, the mixedtypology deals with the potential conflictsamong family members in different roles (Siebelsand zuKnyphausen-Aufseß, 2011; SonginiandGnan 2013; Kraus etal., 2018)that affect the relationships among them and influence the internal/external networks.

In analyzingFB governance it is important to valorize these relationships, as in the stewardshipperspective(Davis et al.,1997). According to Miller andLe Breton-Miller (2006), stewardship in FBs can have three forms: continuity, community and connection.

Continuity refers to the intention to ensure the longevity of the firms, which in the long run benefits various family members. The aspiration of continuity can induces communityand connection, as a result of strong relationships with external stakeholders (Miller and Le Breton-Miller 2006; Arregle et al., 2007). FB typical long-term orientationfacilitates the long-termrelationships with suppliers, finance system and other stakeholders in order to build and dynamic re-define unique resource configurations(continuity and connection) (Siebelsand zuKnyphausen-Aufseß, 2011). The relevance of re-thinking the value creation processes at the intertwine of intra- and inter-organizational borders is one of the pillars of the corporate shared value (CSV) perspective (Porter and Kramer, 2011). The capacity of FBs to define and realize growth and innovation processes - quite differentiated and unconventional - also during critical period can be understood by integratingfamiliness with a CSV perspective. CSV offers a new perspective in interpreting and guiding value creation and relative strategic and managerial processes valorising both the firm resources and the re-configuration or relationships along the value chain. Employing a shared value perspective enables the reconsideration of the overall value creation processes within a multi-actor and multi-level perspective. This is achieved, in the CSV model, by three possible actions: i) rethinking markets and products; ii) redefining value chain performance; and iii) developing clusters. All the three proposed actions could valorise the familiness dimensions along the continuity/connection continuum and in turn, the FB' sustainable competitive advantage. Familiness attributes and resources can allow FBstoestablish

robust and reputation-based collaborative relationships with a wide variety of stakeholders and fosters the creation of shared value through the reinforcement of strong relationship with the local territory, the coopetition opportunities with other businesses, and, the renewal of managerial practices, the ability to catch potential customer needs or those to understand market dynamics and conditioning drivers (Sharma and Vredenburg, 1998).CSV applied to familiness dimension allows building a more integrated FB strategic management frame able to catch such differentiated FB features, behaviours and performances. It also allows a further shift of the FB research area to the *corporate social opportunity*(CSO) approachwhere social and economic growth and innovation processes: arestrongly embedded within business strategies; are driven by competitive dimensions and not by philanthropy or externally driven; benefit contemporarily organizations and society; generate a win-win game (Moon and Parc 2017).

3) Familiness and shared value creation: the Antonelli Case Study

FBs are aimed at creating socio-economic value for the family,also during the crisis periods, focusing on resilience more than performance (Kachaneret al., 2012). Familiness expresses FB bivalent attributes, managing and combining several institutional - family and business- logics (Besharovand Smith, 2014). Distinctive familinessderives to specific internal/external factors and represents the key strategic determinant driving FB governance system. The Antonelli case study represents a qualitative longitudinal analysis allowing describing the firm competitive, strategic and organizational processes evolution in the last decade. The case study allows deepening the understanding of familiness as strategic dimension explaining the FB growth and innovation processesassuming a corporate shared value framework. The three main CSV processes (rethinking markets and products, redefining value chain performance and developing clusters) above mentioned has been activated along the decade allowing the firm to realize and sustain a sustainable competitive advantage, boosting at the same time corporate and social value. The case study also allows addressing the resilience dimension (activating strategic innovative options after a serious earthquake on 2009) as well as the continuity(of mission and vision in a long-term perspective), community (with families playing different roles) and connection (networks activated along the value chain) aspects. The case study offers elements related to the intergenerational/succession aspects (passing, after 2009, from the 1st to the 2nd generation and leveraging on the reputational and entrepreneurial resource of the 1st).

Many meetings and interviews been based on the STEP project interview protocol guide (Nordqvist and Zellweger, 2010) focusing to governance mechanism, familiness-drivers and succession process constrains have been realized with Antonelli CEO; data analysis (mainly on balance sheets) and PESTEL(Johnson, Scholes and Whittington, 2008)desk-research has also been carried out. The case study has also valorized the information, evidences and outputs gathered over time within a stable University-Company collaboration, startedsince 2010.

Antonelli is a small Italian family business, which works in the food sector (Table 1).It has a revenue of less than 2 million of euro, has the legal form of the limited company (from 1985) and is a micro business, employing less than 10 persons.

Table 1. **Antonelli's main characteristics.**

Family Business	Founded	Latest Active Generation	Share owned by family	Position held by family	Country/ Region	Industry
Antonelli Food Srl	1976	2nd	100%	CEO, Owner, Director	Italy/ Abruzzo	Food

It started by working with the fresh handmade pasta, adopting a differentiation strategy in term of product lines. Nowadays, it is working in the fresh handmade pasta, traditional and bio, plus in the condiments and sauces, adopting a correlate diversification strategy (Antonelli's business differentiates the packaging dimension for businesses, consumers and seasons). Products have a middle-high positioning in term of value for money.

The founder and its family are mainly involved in the commercial area, meanwhile the others work in the production and/or in the physical distribution of products. The local area -Abruzzo Italian Region- has been the main basin of consumers till 2009, the earthquake year, principally working for the retail purchase channel. After the earthquake with the people emigration, Antonelli choose to **rethink markets and products**.An international mass retail channel, opened to local producers the opportunity to sell their products in its store. Not many producers accepted/have been able to accept the challenge for a) lack of visioning, and/or b) lack of managerial competences, and/or c) fear of loosing the firm identity and/or, d) the strategic, organizational and operational flexibility. Antonelli instead decided to accept the opportunity and invested in the construction of a new larger productive site in L'Aquila (continuity, community and connection). The layout site has been optimized making it U-shaped; in this way, the firm infrastructure represents a business facilitator in terms of security and quickness of the

operations flow. The production is daily made, preferring the duplication of products market pulled. The new production allows fresh products to have a conservation of 45 days. Once the product is packaged, it is conserved in the cell fridge till the orders are receipted and dispatched. Every morning the orders from the local restaurants, which are loyal customersare dispatched before 8 am. The commercial area is also responsible for the product positioning in the mass retail channel, thus it is easier to arrange it for the local market, in term of dislocation of sites and personal contacts (**redefining value chain performance).**

Although the roles are not explicitly formalized, Mario Antonelli (2nd generation) has mainly the strategic task of developing new business opportunities, using also the relationships with mass-retail distribution channels. Antonelli's strength points are procurement, operations and marketing (handmade process and link to traditions - continuity, connection). The weak point (now by-passed by the new firm's strategies)was the ability to access to new market related to the small size (structural entry barrier) and the difficulties to build commercial agreement with the mass retail channels in term of transaction power (strategic entry barrier).

From the presented results it is possible to obtain some important elements to investigate the external influencing drivers on familiness. Constraints and opportunities for the business are linked to the constraints and opportunities ofnetwork of relationships in which the firm is embedded, and to the sectorial and unpredictable conditions. Thus, a strong trustworthy relationship between the business and the others external actors represents a source of competitive advantage for the business, and a source of shared value (developing clusters leveraging on continuity and connection). This relationship can be based on complementary resource-capabilities, knowledge exchange, sites proximity, and, "investments in relation-specific assets"(Gibb Dyer, 2006).

The strong commitment with the local area has been clearly expressed by Claudio (1stgeneration):"I am contributing to rebuilding my City with my way to act and react"; it determines and influences the organizational culture of the business (continuity and community).This challenge generates a) strategic changes in term of market and investment and, b) operative changes in term of location and product line. As an example, the FB changed the pasta machinery flow to extend the expiration date from 7 to 45 days.In FBs the strong relationship with the local area determines and influences the development path of the capabilities useful for the sustainability of the businesses.As stated by Mario (2nd generation)

"before earthquakes of 2009 the main market was in L'Aquila and it absorbed all the production". The firm did not perceive the necessity to look over, a) for a perception problem b) for the characteristic of their product thus the fresh hand-made pasta, which expired after seven days from the date of production. The external, unpredictable natural catastrophe changed the rules of the game. Claudio said that the economic weakness of the L'Aquila province was already before the earthquake, but then there was no longer a city. The earthquake swept away everything, and these people thought of joining their forces (coopeting instead of competing - changing method) especially for the lack of quick public interventions in terms of financing and supporting the existing businesses (continuity, community and connection).

The role of Mario changed with a gradual increase of tasks, from production assistant to distributor, to member of the directorial team. He said:"I was 'working' in the business since I was 6 years old. My role was to break eggs from 6 to 8 am, before going to school, and after school I continued it".Concerning the succession, there was not a perfect theoretical generational succession, but the transformation from an individual business to a limited company when the founder's son decided to continue the family business activity. There are neither intergenerational nor intragenerational conflicts. For the directorial belong the founder and his three sons, but effectively two of them are working in the FB. There is a perfect balance of roles because only one of the sons is interested in continuing the business activity, meanwhile the other considers the activity as would an external collaborator.About the intergenerational conflict it is not present because there is a mentoring relationship between the founder and his son (continuity, community).This contributes to grant the continuity and sustainability of the FB because the founder and his son have the same concept and commitment for the business activity. This cross-generational continuity started even before the formalization through the change of the legal status.

The Antonelli *distinctive familiness*has valorized all -human, organizational and process-familiness resources in driving the company competitive and strategic re-configuration processes in the last decade, starting from the critical challenges emerging after the serious 2009 earthquake. The effective governance of the familiness resources - potentially bivalent - has been driven by asystemic shared value perspective, assumed as a driving frame from all family members (and roles).

Rethinking markets and products, redefining value chain performance and developing clusters was decisive for the business reconfiguration, in term of development and growth paths.Nowadays, Antonelli extended his commercial network in a neighbor Italian region, and caught new market opportunities through the diversification in correlated business (condiments, sauces and others).Fundamental has been the visioning of the founderand his active role in the business representative associations(leveraging on continuity and community) coupled with the innovations on markets, clusters and value chain configurations implemented by the second generation, assuming asystemic shared value perspective.

References

1. AIDAF (2018). [online] Available at:www.aidaf.it/en/aidaf-3/1650-2/[Accessed 27 Dec. 2018].
2. Arregle, J., Hitt, M., Sirmon, D. and Very, P. (2007). The Development of Organizational Social Capital: Attributes of Family Firms. *Journal of Management Studies*, 44(1), pp.73-95.
3. Besharov, M. and Smith, W. (2014). Multiple Institutional Logics in Organizations: Explaining Their Varied Nature and Implications. *Academy of Management Review*, 39(3), pp.364-381.
4. Cano-Rubio, M., Fuentes-Lombardo, G. and Vallejo-Martos, M. (2017). Influence of the lack of a standard definition of "family business" on research into their international strategies. *European Research on Management and Business Economics*, 23(3), pp.132-146.
5. Chrisman, J., Chua, J. and Steier, L. (2005). Sources and Consequences of Distinctive Familiness: An Introduction. *Entrepreneurship Theory and Practice*, 29(3), pp.237-247.
6. Cesaroni, F. and Ciambotti, M. (2011). *La successione nelle imprese familiari*. Milano: FrancoAngeli.
7. Cubico, S., Togni, M. and Bellotto, M. (2010), Generational transition guidance: support for the future of family firms,*Procedia - Social and Behavioral Sciences*,5, pp. 1307-1311.
8. Davis, J., Schoorman, F. and Donaldson, L. (1997). Toward a Stewardship Theory of Management. *The Academy of Management Review*, 22(1), p.20.

9. de Araujo, T., Bucher-Maluschke, J. and Pedroso, J. (2015). Systemic Principles in the Study of Family Businesses. *Systems Research and Behavioral Science*, 33(2), pp.259-264.

10. Ediriweera, A., Armstrong, A. and Heenetigala, K. (2015). Governance in Family Business: A Literature Review. *Journal of Law and Governance*, 10(2), pp. 36-46.

11. European Family Businesses (2018). [online] Available at: http://www.europeanfamilybusinesses.eu/, [Accessed 27 Dec. 2018].

12. Frank, H., Lueger, M., Nosé, L. and Suchy, D. (2010). The concept of "Familiness". *Journal of Family Business Strategy*, 1(3), pp.119-130.

13. Gibb Dyer, W. (2006). Examining the "Family Effect" on Firm Performance. *Family Business Review*, 19(4), pp.253-273.

14. Greenwood, R., Raynard, M., Kodeih, F., Micelotta, E. and Lounsbury, M. (2011). Institutional Complexity and Organizational Responses. *The Academy of Management Annals*, 5(1), pp.317-371.

15. Habbershon, T. and Williams, M. (1999). A Resource-Based Framework for Assessing the Strategic Advantages of Family Firms. *Family Business Review*, 12(1), pp.1-25.

16. IFC International Finance Corporation World Bank Group (2011).[online] Available at: www.ifc.org/wps/wcm/connect//FamilyBusinessGovernanceHandbook_English.pdf, [Accessed 27 Dec. 2018].

17. Irava, W. and Moores, K. (2010). Clarifying the strategic advantage of familiness: Unbundling its dimensions and highlighting its paradoxes. *Journal of Family Business Strategy*, 1(3), pp.131-144.

18. Johnson, G., Scholes, K. and Whittington, R. (2008). *Exploring corporate strategy*. New York: FT/Prentice Hall.

19. Kachaner N., Stalk G. Jr. and Bloch A. (2012). "What You Can Learn from Family Business", *Harvard Business Review*, 90 (11), pp.102-106.

20. KPMG (2018).[online]Available at:https://home.kpmg.com/content/dam/kpmg/xx/pdf/2016/11/hidden-growth-within-familybusinesses.pdf [Accessed 27 Dec. 2018].

21. Kraus, S., Kallmuenzer, A., Stieger, D., Peters, M. and Calabrò, A. (2018). Entrepreneurial paths to family firm performance. *Journal of Business Research*, 88, pp.382-387.

22. Miller, D. and Le Breton-Miller, I. (2006). Family Governance and Firm Performance: Agency, Stewardship, and Capabilities. *Family Business Review*, 19(1), pp.73-87.

23. Moon, HC., Parc, J. (2017). [online] Available at: https://www.researchgate.net/, 10.13140/RG.2.2.14112.89604[last accessed 27Dec. 2018].

24. Nordqvist, M., Sharma, P. and Chirico, F. (2014). Family Firm Heterogeneity and Governance: A Configuration Approach. *Journal of Small Business Management*, 52(2), pp.192-209.

25. Nordqvist, M. and Zellweger, T. M. (2010). *Transgenerational entrepreneurship*. Cheltenham: Edward Elgar Publishing.

26. Pongelli,C.,Caroli M.G., Cucculelli M. (2016), "Family business going abroad: the effect of family ownership on foreign market entry mode decisions", *Small Business Economics*, 47(3), pp.787-801.

27. Porter, M. E., and Kramer, M. R. (2011). The big idea: Creating shared value.*Harvard Business Review*, 11(30), pp. 3-17.

28. Sharma, S. and Vredenburg, H. (1998). Proactive corporate environmental strategy and the development of competitively valuable organizational capabilities. *Strategic Management Journal*, 19(8), pp.729-753.

29. Siebels, J. and zuKnyphausen-Aufseß, D. (2011). A Review of Theory in Family Business Research: The Implications for Corporate Governance. *International Journal of Management Reviews*,14(3), pp.280-304.

30. Songini, L. and Gnan, L. (2013). Family Involvement and Agency Cost Control Mechanisms in Family Small and Medium-Sized Enterprises. *Journal of Small Business Management*, 53(3), pp.748-779.

31. Tagiuri, R. and Davis, J. (1996). Bivalent Attributes of the Family Firm. *Family Business Review*, 9(2), pp.199-208.

32. Teece, D., Pisano, G. and Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, 18(7), pp.509-533.

33. Vallejo-Martos, M. (2014). Institutionalism and the Influence of the Cultural Values of the Family Subsystem on the Management of the Small-Medium Family Firms. *Systems Research and Behavioral Science*, 33(1), pp.119-137.

34. Von Schlippe, A. and Frank, H. (2013). The Theory of Social Systems as a Framework for Understanding Family Businesses. *Family Relations*, 62(3), pp.384-398.

BUSINESS RESEARCH: DETERMINATION OF SAMPLE SIZE AND RELEVANCE OF RESEARCH DESIGN ADOPTED

Satish N Pawar, ASM's IBMR, Chinchwad

Lalit J Kanore, ASM's IPS, Chinchwad

Abstract:

Determination of sample size for any business research is most vital part of research design. In this article researcher explored and discuss various methods of determining sample size. Information and discussion has been done to adopt appropriate sample size for particular research design adopted. Basically there are two methods depending on unknown and known population. Researcher try to correlated significance of variation, standard deviation, level of significance, precision, power of test and methodology adopted. Research here suggested way of calculating sample size for suitable research design.

Introduction:

Business Research and Design:

In a business research, researcher always wonders about appropriate sample size for their research. Researcher should not ignore the fact that wrong sample size leads to wrong inferences. Hence before starting any business research, every researcher should address to the question; 'What is appropriate sample size to draw valid inferences from their research?' Appropriate sample size depends on the numerous factors; these factors need to be taken into consideration while calculating appropriate sample size. To arrive at the correct and appropriate sample size, researcher should have knowledge of research design to be adopted and basic knowledge of inference statistics used in business research. Researcher need to adopt following steps to arrive at valid sample size.

1) Acquire in-depth Functional Knowledge.
2) Strong Review of literature.
3) Strong knowledge of Research Design.
4) Use appropriate sample size formula and calculate sample size.

Other terminologies related to the inferential statistics such as level of significance, power of test, degrees of freedom, confidence internal and level of tolerance plays an important role in determining the sample size. Thus researcher must have knowledge of the above mentioned terms pertaining to their research area.

Objective:

To empower research scholars to arrive at valid sample size according to research design adopted.

Researcher should not forget the fact that there is strong relationship between research design adopted by them and determination of sample size. Size of sample largely depends on the type of research to be carried out. For example; explorative research may require smaller sample as the level of confidence of such type of research may be low. On the other hand the confidence level for descriptive research is very high hence it requires larger sample as compared to an exploratory research.

Sample size is also affected by accuracy and precision of research. To achieve more accuracy and precision, large sample size may be taken.

For a novice researcher who is adopting explorative research design, sample size does not matter much. As explorative research design is very flexible in nature where researcher wants to explore the phenomena than describing it. In such studies very few observations (small sample size) may achieve the desired objectives with less accuracy.

Variability:

Variability plays an important role in deciding sample size. Researcher need to have more sample size for the heterogeneous (more variability) population, whereas for homogenous population (less variability) relatively less sample size is required.

Appropriate sample size of appropriate research design:

When size of population is known:

$$n = \frac{N}{1 + (N \times e^2)}$$

Where n = Sample size.

N = Size of Population

e* = Accepted level of significance.

* For 95% confidence interval, e= 0.05

Above mentioned formula is developed by Yamane (1967). This is the most famous formula used by social science and management science research scholars. For given population size, the only thing that makes the difference is the accepted level of significance (i.e. value of 'e'). Researcher need to use different value of precision according to the research design adopted. When size of population is unknown:

1. When size of population is unknown:

a) $$N = \frac{Z^2 \times s^2}{d^2}$$

b) $$N = \frac{Z^2 \times p(1-p)}{d^2}$$

Where: Z*- Value of normal deviate at considered level of confidence

s: Expected standard deviation of the variable in the group.

d: Expected absolute allowable error in the mean / proportion.

p: Expected prevalence of the event in the study group.

**** For example Z = 1.64 at 5% level of significance.***

Both of the above mentioned formulae are to be used when researcher do not have idea of population size (unknown) or cannot estimate the population size. Here the most important thing that the research should know is formulation of objectives. Objectives should be formulated correctly and precisely which may enable researcher to decide the parameter of interest.

If parameter of interest is average, arithmetic mean or mean the researcher need to use formula a) mentioned above. Research should be capable of understanding and transforming objectives to parameter of interest; here **Arithmetic** Mean. Here researcher should understand variability or estimation of variability (S^2) and expected absolute allowable error or difference in mean (d^2).

If parameter of interest is proportion/percentage, researcher should use formula b) mentioned above. Here also researcher should be capable of understanding and transforming objectives to parameter of interest; here **proportion/percentage**. Here researcher should understand proportion of event/objective in the study group (p) and expected absolute allowable error or difference in proportion (d^2).

Discussion, Findings and Recommendations:

A) Explorative:

1. When size of population is known:

For exploratory research design we know precision or accuracy of research is very low. Some results which yields up to 50% accuracy may be regarded as important contribution to the knowledge of body. In exploratory research design confidence interval of 90% or less than 90% can be regarded as valid in contrast to social descriptive research. Hence in such type of research design the choice of precision depends on previous researches in the desired or related fields if any. Thus even if the value of 'e' in the above formula is kept 0.10 or more, the outcomes of the research can be considered as valuable contributions in the concerned research area.

2. When size of population is unknown:

For Exploratory research design when size of population is unknown, researcher needs to use estimated mean, proportion and variance of population. To calculated estimated mean, proportion and variance of population researcher need to use pilot study group or estimated value from outcome of earlier researcher. It is observed that the findings and outcomes of earlier researchers are not useful for estimating population parameter, so it is advisable to go for pilot study in case of exploratory research design.

Next important challenge is to decide expected allowable error or difference allowed (d). This is the gap researcher can tolerate between actual and expected outcome. Researcher should have in-depth knowledge of event to be studied then only researcher can decide the value of d. More the error is, less the sample size and vice versa. For an exploratory research, choice of allowable difference is high.

B) Descriptive:

1. When size of population is known:

For Descriptive research design, it is expected that before proceeding for descriptive research, numerous explorative and descriptive researches have been already done by other researchers. While conducting descriptive research, researcher has acquired in-depth knowledge about the area of research; hence precision for descriptive research design is

expected to be high compared to the exploratory research design. Generally it is expected to have a confidence interval between 95% to 99%, this leads to reduced level of significance in the range of 0.05 – 0.01. Further this reduced level of significance results in increased sample size. From the above discussion it can be inferred that, the researcher should take greater sample size as compared to an exploratory research in order to achieve higher confidence level.

2. When size of population is unknown:

For Descriptive research design, when size of population is unknown researcher need to use estimated mean, proportion and variance of population; which researcher will get very easily from previous research / Review of literature. To calculate estimated mean, proportion and variance of population researcher need to use pilot study group if sufficient evidences are not found from earlier studies.

Next important challenge is to decide expected allowable error or difference allowed (d). This is the gap researcher can tolerate between actual and expected outcome. Researcher should have in-depth knowledge of event to be studied then only researcher can decide the value of'd'. More the error is, less the sample size and vice versa. For an exploratory research choice of allowable difference is high. Since this is descriptive researcher accuracy should be high, therefore value of d should be low to get more accuracy.

C) Experimental:

1. When size of population is known:

For Experimental or casual research design, it is expected that before proceeding for this type research, numerous explorative and descriptive researches have been already done by other researchers. While conducting experimental research, researcher has acquired in-depth knowledge about the area of research; hence precision for experimental research design is expected to be extremely high as compared to the exploratory and descriptive research design. Generally it is expected to have a confidence interval more than 99%, this leads to reduced level of significance to less than 0.01. Further this reduced level of significance results in increased sample size. From the above discussion it can be inferred that, the

researcher should take balance sample size as compared to an exploratory and descriptive research in order to achieve higher confidence level.

2. When size of population is unknown:

For Experimental research design when size of population is unknown, researcher needs to use estimated mean, proportion and variance of population; which researcher will get very easily from previous research / Review of literature. Here expected allowable error is very low, so that researcher will get more and more correct decision with high level of accuracy.

Bibliography:

1. Business Research Methods by Donald Cooper & Pamela Schindler, TMGH, 9th edition.
2. Business Research Methods by Alen Bryman & Emma Bell, Oxford University Press, 2nd Edition.
3. Business Research Methods by William G. Zikmund, Barry J. Babin, Jon C. Carr, Mitch Griffin, Cengage Learning, 8th Edition

References:

1. Yamane, Taro. 1967. Statistics, An Introductory Analysis, 2nd Ed., New York: Harper and Row.
2. Robert V Krejcie, Daryle M Morgan, (1970), "Determining Sample Size for Research", Educational and Psychological Measurement, Vol. 30, pg. no. 607-610.
3. Marlies Noordzij, et all (2010), "Sample size calculations: basic principles and common pitfalls", doi: 10.1093/ndt/gfp732, Nephrol Dial Transplant, Vol. 25, 2010, pg. no. 1388-1393.
4. Sitanshu Sekhar Kar, Archana Ramalingam (2013), "Is 30 the magic number? Issues in sample size estimation", National Journal of Community Medicine, Vol. 4, Issue 1, 2013, pg. no. 175-179.

"ON UNDERSTANDING THE IMPACT OF DIGITIZATION AND CUSTOMIZED ERP APPLICATIONS ON TWIN'S OVERALL EFFICIENCY – A CASE STUDY APPROACH".

Dr Atul R. Deshpande
IBMR- PGDM, Director
E-mail:- atdash10@yahoo.com

Abstract

*This research paper entitled "**"**On Understanding the Impact of Digitization and Customized ERP Applications on Twin's Overall Efficiency – A Case Study Approach" has examined, through exploratory method and robust statistical analysis, whether 'digitization and customized ERP applications in the manufacturing process has affected overall efficiency at Twin Engineers. With data base (2009-10 to 2017-18), through primary and secondary sources and a 'focus group' survey along with the construction of 'efficiency indices' and 'relevant statistical analysis', that consists of 'regressions' and Granger causality tests, the analysis shows that the overall efficiency after digitization period has improved considerably. The hypotheses testing (parametric and non-parametric) done in this case also supports the conclusion cited above. The research work has used a linear regression model which has used 'turnover data' as proxy for efficiency and a host of factors such as persons employed, machines dispatched, different costs etc. as independent predictors which are highly correlated to turnover as predicted variable. The core discussion in the paper consists of analytical and evaluative aspects which are based on 'findings' from the survey. This discussion is carried out through 'a case study approach'. The paper is concluded with important recommendations along with implications and limitations of this work.*

(Abstract 165 words)

Key terms: *Efficiency, Digitization, Customized ERP Applications, Regressions, Granger Causality*

(1) Introduction and Company Profile

(1.A)This exploratory case -based study is an attempt to examine whether digitization and customized ERP process application has affected Twin Engineer's overall efficiency. This research, for its, comparative study purpose (pre-digitization versus post-digitization) has looked into Twin's strategic policy of growth from the era of 'local excellence' to the 'era of the application of digitization, customized ERP applications and IoTs (Internet of Things)'. Twin Engineers (Pvt.Ltd.) is and ISO 9001 – 2008 Certified company established in the year 1993. It is a leading manufacturer of 'Adhesive and Sealant Dispensing Machines' and 'Industrial Fluid Filling Machines'. Twin Engineers has developed more than 38 products which cater to a diverse and wide market segment including Flexible Packaging, Automobile, Electronics and other industrial sectors. Although Twin is primarily catering to domestic market, its foreign market sweep in terms of exports stands at nearly 10% of the total value of company turnover in 2012 (**Focus Group Survey 2018**). Twin has its valued customers that include Maruti Suzuki India Ltd., Honda Siel Cars India Ltd., Yamaha Motors Ltd., Honda Motor Cycles and Scooters India Ltd., Toyota Kirloskar Motor Pvt. Ltd., Ford India Pvt. Ltd., Renault Nissan Automotive India Pvt. Ltd.and many more to add to the list.

(1.B) Objectives of Research

1) To examine and understand the digitization and customized ERP application processes functionally.

2) To know the integration process between specific ERP application and a particular manufacturing process.

3) To establish a correlation between the turnover as proxy for efficiency and other independent variables such as costs, persons employed and machines dispatched.

4) To analyze the efficiency scenario prior to the introduction of the digitization process and post digitization process..

5) To analyze whether overall efficiency (measured in terms of saving of time, cost, labour productivity and volume of output) has increased or otherwise.

6) To identify the loopholes and improvements in the process of implementing the digitization process and the customized ERP application process in the manufacturing activity.

(1.C) Hypotheses of Research

1) There exists a significant correlation between turnover used as 'proxy' for efficiency and other independent variables such as costs, persons employed and machines manufactured and dispatched.
2) The performance of efficiency before digitization and after digitization is different from each other.
3) Persons employed alone and/or machines dispatched does not Granger cause turnover to change.

(1.D) Research Methodology

This research is primarily based on 'case study approach' while understanding Twin Engineers' overall efficiency. To meet with the objectives, the research uses 'exploratory method'. While using exploratory method, the research has used 'primary data' in the form of survey conducted with 'focus group'. To carry forward its efficiency analysis, this research has used 'secondary data' in the form of Company documents which consist of data on turnover, costs, persons employed and machines dispatched, used and installed capacity, activity and department-wise data of time consumed etc. The data on these variables has helped construct 'efficiency index', 'time efficiency and labour efficiency indices etc. The personal survey conducted as 'focus group' consists of 'department heads' who are also the owners of 'digitization and customized ERP application process. Since this is a 'focus group' survey only 5 persons as experts are used as 'sample' of this research. A separate interview was conducted with Company MD. For understanding relationship among dependent and independent variables from the model, a correlation analysis is used. To test two of the three hypotheses, the 'T' paired parametric and 'Sign and Wilcoxon non-parametric tests are used. To find out whether the data used from the questionnaire is reliable or otherwise, the Data Reliability test is conducted and the test result on the Cronbach's Alpha based on standardized items has turned out to be .948.

(1.E) The Model

With a view to examining Twin's efficiency, the researcher has employed turnover as proxy for operational efficiency. Further, it has been understood that efficiency is a function of a host of independent variables along with an error term. Our model, therefore, looks as follows:

TUR = f (PER, MACH, TC, DC, IC)

In this function the meaning of the subscripts used is as follows:

TUR = Turnover, PER = Persons employed, MACH= Machines dispatched, DC = Direct Cost, IC = Indirect Cost

$TUR = \alpha + \beta_1 PER + \beta_2 MACH + \beta_3 DC + \beta_4 IC + u$

TUR = 1103815.017-.058 PER + .412 MACH + .496 DC + .183 IC + 5717336.132 u

(.044) (-.467) (1.377) (3.182) (1.679)

The model summary through SPSS output (Annexure,(C)) states that the R = .996, R Square = .992, adjusted R Square = .985. These numbers suggest that coefficient of correlation between dependent and independent variables is very high. Except the variable 'number of persons employed' all other variables have positive correlation with turnover used as proxy for efficiency. Number of persons employed shows a negative correlation with turnover. But its coefficient is not very high and therefore insignificant. Rests of the independent factors do have their correlation with turnover but even they also do not show a very noticeable coefficient of correlation. In our model the independent factors do not show multicolinearity since the Durbin Watson statistics has turned out to be 2.17. The regression we have run and used does not show causality between our independent variable and a host of independent variables. To find out whether any causality exists between dependent and independent variables we have done the Granger causality test through 'R'. We have made more relevant use of the outputs of the Granger causality in our analysis of hypothesis testing.

(1.F) Testing of Hypothesis (Annexure, (E and F)

In this research out of the three major hypotheses the researcher has tested the following two immediately relevant hypotheses.

Hypothesis 1

1) H_{01}: The performance of efficiency before digitization and after digitization is not different from each other.
2) $H_{11:}$ The performance of efficiency before digitization and after digitization is different from each other.

To test this hypothesis the secondary data on time taken(time efficiency) to complete a specific activity before digitization and after digitization has been considered. To do that, the two activities have been considered. One consists of 'design' activity and the other consists of

'procurement' activity. The parametric "paired't' test has been conducted on the available data. The test results show that the mean score (4.0833) on the completion of design activity before digitization is considerably higher and the 'p'value (.02) denoting significance is lower than .05. The coefficient of correlation between design to design is .891 which is highly significant. With the similar test conducted on 'procurement' data the results are similar. For example, the mean score (1.8333) on the completion of procurement activity before digitization is considerably higher and the 'p'value (.04) denoting significance is lower than .05. The coefficient of correlation between the two pairs is .867 (considerably higher) at significance level .000.The 'Wilcoxon Signed Ranks Test', a non-parametric, has also been conducted on time taken to complete design activity before digitization and after digitization. The time taken after digitization is greater than time taken before digitization shows all 'negative differences (all 6 are negative differences) and time taken after digitization is greater than time taken before digitization shows positives equal to zero. The ties between the two are also equal to zero. The test statistics is .02 which is less than 05. And the Binomial distribution test statistics is also significant at the level equal to .03 which is also less than .05.

From the above discussion we can reject the null hypothesis and accepts the alternative hypothesis.

Hypothesis 2

1) H_{02} : Persons employed alone and/or machines dispatched does not Granger cause turnover to change.
2) H_{22} :Persons employed alone and/or machines dispatched does Granger cause turnover to change.

To test this hypothesis the researcher has run the Granger causality test(Annexure, (D)) through 'R' software. In the causality function it was tested that whether persons employed alone as independent factor granger causes turnover to change as a dependent variable? The test statistics shows the 'p' value equal to 0.20 which is greater than .05 at significance level of 0.006. The 'F'statistics estimated is 2.0726 is far greater than the 'p'value. This result suggests that persons employed alone does not Granger cause turnover to change. This further suggests that it might be a combined effect of digitization and customized applications along with factors from our original model that affect turnover to change. Based on this result we accept the null hypothesis and reject the alternative hypothesis.

(2) Review of Literature and Identification of Gaps

Since this research work is an independent case study which has its own problem area and strategies of growth, there are hardly any previous studies which can be compared with this research on the basis of 'similarities or differences'. In the past there appear a good number of studies which have gone into examining the impact of ERP product and processes on productivity and profitability. But the problem areas of such studies are found to be entirely different from what has been discussed in this paper. Also important is the fact that the previous studies have not used in multiple numbers the case study form in their development of research studies. Notwithstanding, a few studies need to be mentioned.

1) A study (2016) entitles 'Enterprise Resource Planning ……..Operational Efficiency' by Madanhire, Ignatio and Mbohwa, Charles discusses how ERP framework was designed to reduce work in progress on the shop floor and inventory of South African Company.

2) In another study (2006) entitles 'Improvement in Operational Efficiency Due to ERP Systems Implementation: Truth or Myth? by Memuri, Vijay and PalviaShailendrathe authors investigated the impact of ERP systems implementation on operational efficiency of medium sized firms in the pharmaceutical and chemicals industry. Their analysis of the data indicates that for a majority of the firms improvement of operational performance expected due to ERP systems did not materialize.

In addition to these major efforts, a number of other studies have just examined the significance of application of either SAP or ERP in the context of specific manufacturing processes without going into any serious analytical research. These many studies have provided a descriptive case approach without making any data-based analysis. This research primarily looks at this major gap and bridges the same through a combined analysis of primary and secondary data with construction of linear regression model and hypotheses testing. The general framework used is a case approach. Most of the previous works in this context have not brought out the limitations of their research and have also not included in their research the implications of their studies for respective companies. This research has also made a conscious effort to take care of these gaps.

(3) Discussion: Analysis and Evaluation

(3.1) Findings from 'Focus Group Survey

1) It has been found from the survey that Twin Engineers has been using digitization process and customized ERP applications in the entire assembly process of adhesive dispensing

technology and in all its corresponding and relevant departments for more than 5 years. This seems to be reasonably adequate period to look into the results of the impact of digitization technology and customized ERP on the overall assembly process of adhesive dispensing technology machines.

2) Among the reasons that have prompted Twin Engineers to use digitization and customized ERP applications include product suitability, cost saving thought and most prominently efficiency improvement criterion.

3) It has also been noticed through the survey that prior to using digitization process and the customized ERP applications; a few of the manufacturing and non-manufacturing processes were carried out manually. Even during this time period, a few of the processes were digitized. When a few important processes were manually carried out, there were important issues related to operational efficiency. In a descending order of importance, the issues observed included high time consumption in implementing processes, loss of resources, high cost, low efficiency and finally quality compromise.

4) Through the survey conducted with a 'focus group', it is found that the digitization process and customized ERP products are partially integrated with required select processes. This, therefore, suggested that there exists a greater scope for complete integration of digitization processes and customized ERP products with the existing required processes.

5) Since there has been partial integration of digitization processes and the customized ERP variants, the existing processes are subject to multiple issues related to low efficiency. The issues included are the existing processes prior to digitization and /or with partial digitization have been greater time consuming, partial digitization appeared to be technically complicated and therefore required process specific training to technical and non-technical employees.

6) In spite of partial integration of digitization and customized ERP variants, a considerable improvement took place in overall efficiency. The variables in which a noticeable improvement is being noticed are considerable time saving in implementing processes, considerable improvement in labour productivity, and improvement in quality of applications and products and considerable saving in cost.

7) If we need to use the number to show the average rise in efficiency level, it is found from the focus group that as compared to pre-digitization situation the efficiency level grew by 20 t0 25% after digitization.

8) While setting up digitization process and using customized ERP applications, the overall costs have increased to an average level of 10 to 20%. In some exceptional applications the costs have increased by 30 to 40%. The increase in costs has been witnessed since 2014-15 when digitization process and customization of ERP applications are setting their tone.

9) Through the survey it has also been found that the RoI, after the implementation process of digitization and customized ERP application, has stood at nearly 10 to 15%. Since customized ERP applications and digitization process have been helping reduce costs and increase turnover, the overall profitability of the Company has been growing. Looking at the present RoI, the company has greater scope to enhance its RoI through the application of ERP processes which are in their initial stages of development and still getting streamlined.

10) Since the introduction of digitization and application of ERP customized solutions, it has now been 3 years that the RoI has been growing steadily. There are three specific reasons or factors accountable for the growth in RoI.First, in last three years the number of machines dispatched has been on the rise. Second, labour efficiency has been improving (labour efficiency index) and total cost to turnover ratio has fallen after digitization and customized ERP applications to the existing processes.

11) Our survey has also found that though the pace and impact of digitization process and the ERP application drive have been quite satisfactory, there are important issues that need to be taken care of on priority basis. These issues include important problems such as how to make structural adjustments and bring improvements in the initial stage of the development of digitization and ERP application process, how to improve on the present level of employee training specifically required for enhancing the speed of implementation process, how to reduce the cost of establishment and implementation of digitization process and customized ERP applications to the existing processes and with these important issues how to improve upon the overall efficiency after introducing digitization process.

12) It has been found through the survey that each crucial department is trying at its best level to adapt to structurally new design of assembling and manufacturing processes. To overcome the problems cited earlier, different improvements are taking place department wise. For example, they include such things as employee training and empowerment, new knowledge addition and enhancement, online help in acquiring new skills and digitized processes and

enhancement of reporting system. These steps will take care of improving on time, cost, quality and overall efficiency.

13) There is a general feeling among employees and medium and higher cadre management people that the digitization and customized ERP application have been a successful drive from the point of view of bringing about a structural change that has taken care of overall productivity and efficiency.

In spite of the existing problems, there seems to be a general consensus among employees of Twin Engineers that the success level of the positive impact of digitization and customized ERP applications on the overall improvement in operational efficiency has been more than 'least successful' on the Likert Scale of 1 to 5 where 1 being 'least successful' and 5 being 'most successful'

(3.2) Analysis of Efficiency

To understand overall operational efficiency of assembling and manufacturing processes,we have used 'capacity utilization' as a proxy to analyze operational efficiency. In this case, therefore, we have constructed 'efficiency index' by taking into account a ratio between actual capacity utilized against installed capacity built-up over a variety of product category. Although data is available on product-wise category, we have not constructed product-wise efficiency index. Instead, we have taken a total of installed capacity and actual capacity by simply adding a number of machines in each category of product. Secondly, the efficiency index is constructed over a period from 2015 to 2018. The reason for considering these three years has been the fact that Twin Engineers has started digitization process after 2012 and the robust results of the impact of digitization process and the customized ERP applications are being witnessed after 2015 onwards. The first three years have been utilized to streamline and strengthen the structural changes introduced in the assembly line and manufacturing processes. A few analytical underpinnings of overall operational efficiency are as follows:

(3.2.1) Efficiency Index (Efficiency through capacity utilization) (Annexure, Table 4)

1) Owing to improvement in time, labour and cost efficiency the efficiency index (capacity utilization) is ranging in the band of 0.77 and 0.88.As compared to the pre-digitization period (in the years before 2012) when the efficiency index was in the range of 0.55 and 0.65 due to greater structural bottlenecks. After a few years of digitization process, there has been a definite improvement in the efficiency index.

2) A product-wise analysis shows that the efficiency index is steady (except for the year 2017-18) primarily due to satisfactory performance on efficiency level by product and process categories such as packaging, MMD, Filling (this is one activity where actual capacity surpasses the installed capacity), SPM, SCDM (actual capacity is greater than the installed capacity)etc. In the year 2017-18, the efficiency index shows a noticeable fall mainly due to unsatisfactory performance in categories of product such as ROBOTIC and SCDM. In that specific year the capacity utilization in the category of ROBOTIC was just 16.66 % of the installed capacity (Annexure, LEI)

3) During the same period, labour efficiency index has also fallen considerably from its previous level of 1.75 (2016-17) to 1.50 (2017-18). This suggests that labour productivity (machines dispatched to labour employed ratio) experienced a fall in that specific year.

(3.2.2) Efficiency through Costs

To know about operational efficiency from a different dimension we have considered 'total cost to turnover ratio' (Annexure, Table 1) as another proxy. The behavioural pattern of this ratio is analyzed over two time periods. The first period looks at the pattern from 2009-10 to 2012-13; which is essentially a pre-digitization period. And the second period takes into account the behavioural pattern from 2013-14 to 2017-18; which is post-digitization period. Our analysis in this regards is as follows:

1) In the pre-digitization period the total cost to turnover ratio was in the band of 91 to 95%. During the same period, the direct cost to turn over ratio was in the range of 71 to 81 percent. The direct costs mainly comprised of the cost of purchases and the cost of salary. This range was, by any standard, very high in any organization. During this period there was hardly any digitization or the use of ERP related customized application to the existing processes. Most of the processes were done manually. What went true with direct costs was also valid in the case of indirect costs. The indirect cost to direct cost ratio (Annexure, Table 2(b)) was in the range of 26 to 39%. The indirect costs mainly comprised of such costs as cost of sales promotion, cost of travel, cost of electricity used, high office expenses, high cost of depreciation including insurance costs, professional, and legal and consultancy charges (The Company hired German Technical Consultancy).

2) During post-digitization period the total cost to turnover ratio has declined and now it stands at the range of 86 to 87% specifically since the year 2015-16. During this period, the direct

cost to turnover ratio (Annexure, Table 1(a)) has shown a considerable decline and has stood in the range of 62 to 71%. This has been mainly due to effective input utilization owing to digitization and the application of customized ERP processes. Along with this, the indirect cost to direct cost ratio has also declined and has stood at the range of 25 to 31% except for the year 2016-17. In spite of this, we may argue that the present level of indirect costs is high. This is high mainly because of the fact that digitization and application of customized ERP processes have yet to produce optimum results because they are, at present, in the nascent stage of development.

3) In the post-digitization period it can also be seen that the rate of growth in total cost as compared to the rate of growth in total revenue (Annexure, Table 3, (a and b)) is found to be marginally low. This has also added to the overall cost efficiency.

(3.2.3) Efficiency through labour productivity (LEI, Annexure, Table 5)

Company's overall operational efficiency is also affected by labour utilization process along with machines. To understand the impact of labour productivity on overall operational efficiency, we have constructed 'labour efficiency index'(Table 5) To construct labour efficiency index, we have used a ratio between number of machines manufactured and dispatched and number of persons employed. Our logical analysis in this regard is as follows:

1) In the pre-digitization period, most of the manufacturing processes were being done manually. With limited market size and process bottlenecks, the 'labour efficiency index' during this time period was in the range of 1.11 to 1.44.

2) In the post-digitization period the labour efficiency index has gone up and has stood between the range 1.50 and 1.83. This upward shift in the labour efficiency index was mainly due to the introduction of digitization and customized ERP application processes.

3) The improvement in labour efficiency is also viewed from the point of view of total time taken by labour along with digitization in specific activity carried out in specific department. The time taken is measured in terms of number of days utilized in completing total activities in various departments. The data on time taken to complete activities department-wise comparing pre-digitization period performance with post digitization shows some interesting results. For instance, in Design department, having considered various activities taken together, in the post-digitization period the total time taken to complete activities

shows a big fall to the extent of 72%, in the case of Procurement activity the fall in taken has been 57%, in the case of Stores it has been 68% followed by activities such as Sales and Marketing, HR, Administration and Accounts and Finance showing fall in timings to the extent of 58%, 45% and 29% correspondingly. From these findings our analysis shows that in Design, Stores, Sales and Marketing departments the impact of digitization and customized ERP applications on total time saving is much greater than the impact realized in departments such as HR and Admin and Accounts and Finance. In fact, it can be argued that the activities carried out in Accounts and Finance department need a wider level of integration with digitization and customized ERP application processes.

(3.3) Analysis of Strategy for Growth and Efficiency

(3.3.1) Identification of the Earlier Strategy (A Case of Local Excellence)

Twin Engineers, since its inception, has been employing indigenous technology for its overall growth. To enhance its technical excellence the Company concentrated on the four strategic issues. They consist of "continuous quality improvement, expanding product range, evolving customized local designs and multiple application with one product". To enhance local excellence through these four strategies involves people, processes, resources, partnerships and policies. For Continuous Quality Improvement programme Twin has been using statistical quality control through Cp and Cpk. The Cp index is used to summarize systems' ability to meet two-sided specification limits (upper and lower). The Cpk index is used for adjustment of Cp for the effect of non-cantered distribution. The robust processes are linked to Microsoft ERP. There is a clear-cut shift from 2D to 3D technological innovation in existing processes. Twin has in-house R&D activity and a help is being taken from outside research institutes such as NCL (National Chemical Laboratory) since processes use chemical engineering components. A proper benchmark is set for achieving excellence in processes. For example, to maintain consistency in processes, ratio variation is minimized and maintained. The process output is tuned with customers' specification to the extent of 50% of achievement of targeted expectation. The prominent goal of the process isto reduce lead time ratio for achieving targeted results. Twin has been spending nearly 10 to 15 % of its average turnover on R & D (2018, Personal Interview with MD).

Twin's local excellence has also featured through its expanding range of products. Today, Twin has 38 products to take care of its market growth. A variety of range has reduced Twin's overdependence on one particular type of machine. It has also helped Twin Engineers compensate for losses arising out of sale of one product by way of enhancing sales of another product. A variety of product range has resulted in market expansion for Twin Engineers. Most recently, Twin has shifted its focus from automobiles to packaging, electrical and electronics. Such shift has helped Twin increase its sales. With these diverse sectors and their growth, Twin's manufacturing capacity has also increased.

Twin's most featured local excellence is its Indian market customization. In this process of market customization Twin has been facing two important constraints. The first one relates to international price versus 'Indian Price Phenomenon' issue. It is found that the international prices of the similar machines Twin has been manufacturing are on a higher side (2018, Personal Interview with M.D.). As against this, there is something called the 'Indian price phenomenon'. Indian price is lower than that. Twin has to sell at this price. The second constraint relates to the fact that customers ask for machines where branded components are used. Twin has to rely on the import of such branded components. In such scenario, the strategic action is to lower costs and create multiple applications with one product. This is done by reducing design cost and using imported components in indigenously designed machines. This is done through standardization of products through robust processes which range from chemical engineering to software engineering along with mechanical, electrical and electronic sub-process orientation. What does Twin do is it reduces the lead time by reducing assembly time. This may be described as 'designing to assembly processes'. For domestic market the effort of excellence concentrates on 'focused customer requirement'. Since Twin has little scope to change its price in a global market, it prefers to opt for minimum changes in machine designs globally. This is because foreign customers do not prefer much of customization. This strategic option is much sought for in the domestic market. Inaddition to design cost reduction, Twin's local excellence also adheres to the regular practice of reducing engineering cost. For example, the local cost of fixtures is reduced through expertise input. By now, it is clear that Twin's local excellence lies in 'customization drive, own design, and reduction of process cost'. As our local excellence analysis suggests,the excellence also demands high productivity effort through digitization process and customized ERP processes' application and a qualitative improvement on the part of

people and other resources. This aspect, therefore, demands an enquiry into a shift in Twin's present strategy for growth.

(3.3.2) A Shift in Strategic Perspective for Efficiency

After having encountered a few structural issues related to lack of up-gradation of the previous technology, rigid organizational structure, low labour productivity, higher degree of price competition etc., Twin Engineers has made a strategic shift in its overall operational functioning. Its new strategic plan comprises three innovations under 'technological enhancement'. They include such things as "machine up-gradation, complete solution/plant, updated technology- IoT (Internet of Things) and global presence". We shall discuss these innovations in details given as follows:

1) **Machine Up-gradation**:

During the pre-digitization period, Twin Engineers employed in its manufacturing process the 'basic customized machine' such as basic machine for automation in process. During the post-digitization period, the earlier basic machine has been up-graded. This has helped reduce the existing cycle time of machine to half cycle time for completing the whole process (Focus Group Survey. Owing to this innovative change, the volume of production has increased and wastages have been reduced. The wider production base has helped customer base grow along with an increase in market size. For example, the Robotic Machine has increased customer production by 35 % and has reduced wastages by 30% (Focus Group Survey and Personal Interview with MD).

2) **Complete Solution/Plant:**

Earlier, Twin Engineers was engaged in providing its clients with product-specific solution. For example, 'standalone machine'. During the post-digitization period, the Company has started providing its clients with 'complete integrated customized solution'. For example, a complete integrated system is part of complete solution that consists of the MMD machine with Oven, Conveyor System and Robotic Dispensing Machine.

3) **Updated Technology – IoT (Internet of Things):**

Twin Engineers was earlier working with 'basic machine with MES System'. It is a centralized system with MES/ANDON/ERP. In the operational mechanism of this system the machine used to get connected with the centralized master. This is subsequently followed by the process of the master deciding upon the parameters. In the continuing

process the machine sends back to the master a few cycle parameters. At the same time, the machinestores the parameters locally. In this entire mechanism the machine operation is decided centrally and is not fully in control of the operator.

In the innovative centralized system the machine is IoT compatible. Through this compatibility, the IoT compatible machine can communicate with adjacent machines. The mechanism assures that the machine performs self diagnostically and generates preventive maintenance alerts. The IoT compatible machine can be operated from anywhere with internet connectivity. Through the internet facility the machine can generate e-mails and SMS.

4) Global Presence:

As part of Company's overall growth and expansion strategy, along with technological advancement, the Company has also been making headway towards expanding its global base through enhancing exports. Earlier, Twin Engineers was just confined to domestic market through their participation in domestic product exhibitions. In last couple of years, the Company is expanding its activity base and has been participating in overseas product exhibitions. For example, earlier the Company was exporting only to 1 or 2 countries. At present, its export base has been expanding and the Company is exporting to 10 to 12 countries (Twin's Documents). This suggests two things. One, as its strategic growth plan, the Company is also using actively the option of 'exports' in recent times. Second, as compared to the previous times, the Company is becoming more price competitive.

5) New Product Development (NPD)after digitization:

New product development has been a continuous activity at Twin Engineers. During digitization process, this activity has been scaled up even further. For example, after the initial level of digitization, a few important products have been developed. For example, the products such as MMD, Fluid Filling and Robotic have been developed through extensive R& D. These products have a wide domain of applications in many sectors such as renewable energy, power sector, auto electrical, automotive, wind energy, mining, elevator and solar etc. These, being highly digitized products, have helped speed up the manufacturing process on one hand and reduce labour time used in various activities in number of departments.

(4) Conclusion/s

This research on understanding the impact of digitization and the application of customized ERP processes on the overall operational efficiency at Twin Engineers distinctly recognizes the following conclusions. These conclusions have obviously emanated from the findings and the analysis of the findings.

1) We can firmly conclude that the operational efficiency at Twin Engineers, after and during the process of digitization, has gone up considerably.

2) The pre-digitization era of 'local excellence' has definitely shown a considerable progress in terms of overall company growth. Albeit this, the Company has had a couple of structural issues related to labour and resources efficiency along with high costs and competitive price. During the digitization era, these issues are being tackled with the introduction of new technology which is based on digitization and customized ERP application processes.

3) Since 2012 and more importantly 2015 onwards a variety of new products and processes have been developed whose basis is 'technological advancement' with the ERP and IoT. These newly developed products have improved overall operational efficiency.

4) Although digitization and customization through ERP products and processes are very much in place, their activity-wise and department-wise impact is not uniform. For example, the department such as stores, administration and accounts need a greater degree of integration with digitization.

5) The improved operational efficiency is a matter of a combined result of various factors such as time, labour and cost which are being satisfactorily integrated with digitization process. In spite of this, the present pace, degree and level of these new applications have been in nascent stage and they require a considerable amount of time to strengthen their operations andstreamline the overall integration process.

6) The original model (1.E) which uses turnover as a proxy for efficiency shows a significant correlation with such predictors as total cost, direct and indirect costs, labour efficiency index and number of machines produced.

7) Although this research paper has analysed the impact of digitization on overall operational efficiency, our regression outputs on turnover as predicted variable and direct and indirect costs as predictors suggest multicollinearity (Durbin Watson = 1.73) between cost variables.

So, we have room to argue that even predictors need a separate analysis to understand correlation and regression between them.

8) As against the suggestion number (7), one more regression between turnover as predicted variable and labour efficiency and machines manufactured as predictors have not shown multicollinearity (Durbin Watson= 2.17) between the predictors. This observation has made us conclude that these two predictors have separate association with turnover used as a proxy for operational efficiency.

9) Much greater drive towards digitization of processes will certainly help the Company enhance its present RoI (return on investment).

10) Twin's long-term growth strategy may focus on two important aspects. One is widening the base of 'technological advancement' along with greater level of digitization and deeper use of IoTs and the second aspect is exploring better opportunities for strengthening its present export base. Twin has to converge its 'local excellence' policy with better use of AIs, Robotics, and Machine Learning and wide spread of digitization.

(5) Recommendations

1) Although, at present, the digitization process and the application of customized ERP have been resulting in positive outcomes, the process is in its nascent stage. Its scope and speed need to be elaborated.

2) Our analysis of efficiency based on capacity utilization makes it clear that the efficiency in the categories of product such as ROBOTIC and SCDM should improve in recent future.

3) Our analysis related to time efficiency also makes it clear that the activities carried out in Accounts and Finance department need a wider level of integration with digitization and customized ERP application processes.

4) Although total cost to revenue ratio has fallen after digitization period, we can argue that the Company should control indirect costs in future.

5) On one hand, the Company is focusing on 'technological advance' through digitization and customized ERP applications; it should also lay a greater emphasis on 'human resource skills development'.

6) To enhance the participation rate of employees in various activities and in different departments, the employees should be given training which would help them handle digitized and IoT processes smoothly and with greater accuracy.

7) Twin's present organizational excellence is weak. To enhance it, employees need flexible deadline schedule, greater technical compatibility, proper training on quality performance of quality products and improvement in the present information network for employees.

8) Our earlier survey conducted in 2012 (Employee Survey, 2012) and our observations through our recent survey (Focus Group Survey, 2018) make it clear that a few things on the level of organizational excellence have not changed much. For example, a small section of employees (36% of the surveyed in 2012) feel that the rigid attitude to work culture should change. This will change through better understanding of functional responsibilities (10% of the employees surveyed in 2012) and cooperative learning (12% of the employees surveyed in 2012). It will also improve through enhancing organizational coordination (8% of the employees surveyed) with digitization process.

9) Although, at present, Twin Engineers has shown a definite progress towards 'exports' when compared with pre-digitization period, the number of countries to which the Company is exporting may be increased through 'achieving greater price competitiveness' and 'quality consciousness'.

10) Twin has just spent nearly 5 years' of 'digitization and customized ERP process application. In its long-run growth strategy it should spend more on R&D and achieve a much better diversification in the present range of products. This long-term strategy will help Twin Engineers achieve consistent and sustainable growth.

(6) Implications

This research has the following implications so far as Twin's day-to-day operational activities and policy for growth is concerned.

1) This research may turn handy for Twin to clearly segregate and better understand the operational efficiency scenario prior to digitization and post digitization.

2) Twin can strategize its future plan to enhance integration process of digitization in the case of those activities and departments where the present degree of digitization is less.

3) Twin can take definite steps to control its indirect costs and monitor better its competitive price policy and market expansion strategy.

4) This research may help Twin to take concrete steps to improve upon its 'organizational excellence' through improving human resource skills and imparting training.

(7) Limitations of Research

The following are some of the important limitations of this research.

1) The questionnaire used to conduct survey with 'focus group' is relatively a small sample and the responses to the questions are found to be very uniform.
2) The time series data used on such variables as 'turnover, total cost, direct and indirect costs, persons employed and machines dispatched are based on just 10 years' period. Such small time series does not produce robust statistical results.
3) Presently, this research has used 'turnover' as proxy for efficiency. If 'profitability' were used as proxy for efficiency, the results could have been marginally different from the present results.

References

1) Agrawal, Akash(2012).Customizing Materials Management Processes in SAP ERP.https://www.sap-press.com
2) Balance Sheets (2009 -2012 and 2012-2018) Twin Engineers.
3) Bansal, Veena(2013). Enterprise Resource Planning. Pearson India. ISBN 9789332524583.
4) Drucker, F. Peter(1985). Innovation and Enterprise, New York, Harper and Row.
5) Drucker, F.Peter(2006).The Practice of Management, www.amezon.com
6) Employees Survey (2012). Questionnaire prepared for employees of Twin Engineers.
7) Foley, J.Kevin (1999) "The Future of Quality Management in the contemporary Business Enterprise, Monash MT. Eliza Business Review, Vol.II, No. 1; pp58-71.
8) Garg, V.K.andVenkitakrishnan, N.K.(2003).Enterprise Resource Planning: Concepts and Practice.books,google.com
9) Gerald, I. White, Ashinpaul C.Sondhi, dov Fried (2006) Financial Statements, John Wiley and Sons.
10) Herzberg, F., Mausner, B. & Snyderman, B.B. (1959).The Motivation to Wor*k*. John Wiley. New York.
11) MacArthur, John(2006)The Book on Leadership,www.amezon.com
12) Madanhire, Ignatio and Mbohwa, Charles (2016).Enterprise Resource Planning in Improving Operational Efficiency.ELSEVIER.www.sciencedirect.com

13) Magal, Simha, R(2011).Integrated Business Processes with ERP Systems. Wiley,ISBN978-0-470-47844-8

14) Memuri, Vijay and PalviaShailendrathe(2006).“Improvement in Operational Efficiency Due to ERP Systems Implementation: Truth or Myth?" IJMR, Vol 19, Number 2, pp.18-36.

15) Madson, K.B. (1968).Theories of Motivation, Institute of General Psychology, The Royal Danish School of Educational Studies.

16) Maslow, A.H. (1943). A theory of Human Motivation. *Psychological Review, 50*(4), 370-96

17) McGregor, D. (1960). The Human Side of Enterprise, New York, McGraw-Hill.

18) Oakland,S.John(1999).Total Organizational Excellence, www.amezon.com

19) Personal Interview (2012, 2018) with M.D.Mr.Pradeep Bhalwankar, Twin Engineers.

20) ‘R’ software (Version 3.4.1) Causality Analysis

21) Schultz, Howard (2010). Leadership Inspiration.....Interview with Schultz, Howard, Harvard Business Review.

22) SPSS (17 Version) Regression Outputs

23) Survey (2018, Focus Group at Twin Engineers)

24) Twin Engineers (2018). Various documents such as turnover data, capacity utilization etc

25) Wallace S. Thomas and KremzarH.Michael(2001).ERP Making It Happen. John Wiley and Sons, Inc.

26) Westcott, T.Russel (2005)(Ed.) The Certified Manager of Quality/organizational Excellence, www.amezon.com

27) www, efqm.org (European Foundation Quality Management Model).

Annexure

(A) Tables

Table 1

a) Total Cost to Turnover Ratio (Cost Efficiency)

Pre-digitization Period

Year	Ratio
2009-10	0.9528
2010-11	0.9257
2011-12	0.9502
2012-13	0.9099

Source: Author's Calculation

Digitization Period

Year	Ratio
2013-14	0.9212
2014-15	0.9258
2015-16	0.8624
2016-17	0.8766
2017-18	0.9773

Source: Author's Calculation

Table 2

a) Proportion of Direct Cost to Turnover Ratio

Year	DC/Turnover Ratio
2009-10	0.81
2010-11	0.73
2011-12	0.71
2012-13	0.65
2013-14	0.72
2014-15	0.71
2015-16	0.68

2016-17	0.62
2017-18	0.66

Source: - Author's Calculation

b) Proportion of Indirect Cost to Direct Cost

Year	IC/DC Ratio
2009-10	0.16
2010-11	0.26
2011-12	0.33
2012-13	0.39
2013-14	0.27
2014-15	0.29
2015-16	0.25
2016-17	0.39
2017-18	0.31

Source: - Author's Calculation

Table 3

a) Rate of Growth in Total Revenue

Year	ΔTR/TR
2010-11	0.14
2011-12	0.0053
2012-13	0.22
2013-14	0.25
2014-15	0.0655
2015-16	0.0085
2015-17	-0.0236
2017-18	-0.0281

Source: Author's Calculation

b) Rate of Growth in Total Cost

Year	ΔTC/TC
2010-11	0.11

2011-12	0.0320
2012-13	0.17
2013-14	0.27
2914-15	0.0707
2915-16	-0.0605
2016-17	-0.0075
2017-18	-0.0274

Source: Author's Calculation

Table 4

Efficiency Index (Capacity Utilization = Actual Capacity/Installed Capacity *100)

Year	Efficiency Index
2015-16	0.88 (88.00%)
2016-17	0.87 (87.68%)
2017-18	0.77 (77.21%)

Source: - Author's Calculation

Table 5

Labour Efficiency Index (LEI)

(No. of machines dispatched / No. of persons employed)

Year	LEI
2009-10	1.11
2010-11	1.30
2011-12	1.41
2012-13	1.44
2013-14	1.83
2014-15	1.76
2015-16	1.83
2016-17	1.75
2017-18	1.50

Source: Author's Calculatio

Table 6

Efficiency of Time*

Sr No.	Department/Activities	Pre-digitization time required	Post-digitization time required	% Change
1	Design	25	7	72%
2	Procurement	7 (6hours)	4 (6 hours)	57
3	Stores	22	7 (6hours)	68
4	Sales and Marketing	12 (2 hours 40 minutes)	5 (2hours 40 minutes	58
5	HR and Admin.	22	12	45
6	Accounts and Finance	57	40	29

***** Time measured in terms of number of days required to complete specific activity

Source: Twin's Activity List and Author's Calculation

(B) Twin Data

Table 7

1) Quantitative Details

Year	Turnover	Direct cost	Indirect Cost	Total Cost	No. of Persons	No. of Machines Dispatched
2009-10	124106807	101179817	17074429	118254246	51	57
2010-11	142059255	103862463	27643533	131505996	52	68
2011-12	142825294	101872478	33843745	135716223	55	78
2012-13	175412806	114703659	44921658	159625317	58	84
2013-14	220273447	158636020	44299886	202935906	60	110
2014-15	234714580	167503106	49798953	217302059	65	115
2015-16	236713380	162712664	41429033	204141697	65	119
2016-17	231106340	145383281	57217363	202600644	70	123
2017-18	224596161	150092264	46956162	197048426	85	128

Source: Twin's Data Sheet on Quantitative Details

Table 8

Installed Capacity

Product Category	2015-16 Installed Capacity	2015-16 Actual Capacity	2016-17 Installed Capacity	2016-17 Actual Capacity	2017-18 Installed Capacity	2017-18 Actual Capacity
PACKAGING	60	56	60	36	60	48
MMD	27	16	29	25	36	28
FILLING	9	15	10	8	12	21
ROBOTIC	18	12	19	16	24	4
SPM	9	6	10	8	12	13
SCDM	9	10	10	25	12	7
PROJECT	2	4	2	3	2	1
TOTAL	134	119	138	121	158	122

Source: Twin's Data Sheet on Installed Capacity

Table 9

Activity List

Sr.No.	Department	Name of the Activity	No.of Days Pre-digitization Time Required	No.of Days Post Digitization Time Required
1	Design	Design Calculation	0.50	0.25
		DAP document	2.00	1.00
		Drawing 3D	8.00	3.00
		Drawing 2 D	8.00	2.00
		File Release	4.00	0.50
		RPO Release	2.00	0.25
2	Procurement	Study the requirement	1.00	1.00

		Verify the availability	1.00	0.25
		Floating requirement in the market	1.00	0.25
		Costing, comparison negotiation	1.00	0.25
		Release of P.O.	0.25	0.10
		Follow, D/W/M	1.00	1.00
		Updation of the receipt	1.00	0.25
		Payment to vendor	1.00	1.00

Source: Twin Engineers Activity List

(C) Regression Outputs

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.996[a]	.992	.985	5717336.132	2.814

a. Predictors: (Constant), Indirect Cost, Persons, Direct cost, Machines

b. Dependent Variable: turnover

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.688E16	4	4.220E15	129.096	.000[a]
	Residual	1.308E14	4	3.269E13		
	Total	1.701E16	8			

a. Predictors: (Constant), Indirect Cost, Persons, Direct cost, Machines

b. Dependent Variable: turnover

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	1103815.017	2.502E7		.044	.967
	Persons	-253437.982	543076.229	-.058	-.467	.665
	Machines	718848.406	521957.588	.412	1.377	.240
	Direct cost	.812	.255	.496	3.182	.033
	Indirect Cost	.689	.410	.183	1.679	.168

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.996[a]	.992	.985	5717336.132	2.814

a. Predictors: (Constant), Indirect Cost, Persons, Direct cost, Machines

a. Dependent Variable: turnover

(D) Causality Results through "R"

Granger causality test

Model 1: PER ~ Lags(PER, 1:1) + Lags(TR, 1:1)

Model 2: PER ~ Lags(PER, 1:1)

Res.Df Df F Pr(>F)

1 5

2 6 -1 2.0726 0.2095050

3 7 -1 42.9364 0.0006046 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

>grangertest(PER,TR,Order=1)

Granger causality test

Model 1: TR ~ Lags(TR, 1:1) + Lags(PER, 1:1)

Model 2: TR ~ Lags(TR, 1:1)

Res.Df Df F Pr(>F)

1 5

2 6 -1 0.0306 0.868071

3 7 -1 34.2434 0.001099 **

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(E) Paired Sample 'T'Test(Design and Procurement)

T-Test

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Design	4.0833	6	3.23136	1.31920
	Design	1.1667	6	1.11430	.45491

Paired Samples Correlations

	N	Correlation	Sig.

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Design & Design	6	.891	.017

Paired Samples Test

		Paired Differences				
					95% Confidence Interval of the Difference	
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper
Pair 1	Design - Design	2.91667	2.29492	.93690	.50829	5.32504

Paired Samples Test

		t	df	Sig. (2-tailed)
Pair 1	Design - Design	3.113	5	.026

Paired Samples Statistics (Procurement)

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Procurement	1.8333	12	2.18812	.63166
	Procurement	.6875	12	.54486	.15729

Paired Samples Correlations

		N	Correlation	Sig.

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Procurement & Procurement	12	.867	.000

Paired Samples Test

		Paired Differences		
		Mean	Std. Deviation	Std. Error Mean
Pair 1	Procurement - Procurement	1.14583	1.73683	.50138

Paired Samples Test

		Paired Differences	
		95% Confidence Interval of the Difference	
		Lower	Upper
Pair 1	Procurement - Procurement	.04231	2.24936

Paired Samples Test

	t	df	Sig. (2-tailed)

Paired Samples Test

		t	df	Sig. (2-tailed)
Pair 1	Procurement - Procurement	2.285	11	.043

(F) Wilcoxon Signed Rank Test

Ranks

		N	Mean Rank	Sum of Ranks
Design after digitization - Design pre-degitization	Negative Ranks	6[a]	3.50	21.00
	Positive Ranks	0[b]	.00	.00
	Ties	0[c]		
	Total	6		

a. Design after digitization < Design pre-degitization

b. Design after digitization > Design pre-degitization

c. Design after digitization = Design pre-degitization

Test Statistics[b]

	Design after digitization - Design pre-degitization
Z	-2.201[a]
Asymp. Sig. (2-tailed)	.028

a. Based on positive ranks.

Ranks

		N	Mean Rank	Sum of Ranks
Design after digitization - Design pre-degitization	Negative Ranks	6[a]	3.50	21.00
	Positive Ranks	0[b]	.00	.00
	Ties	0[c]		
	Total	6		

a. Design after digitization < Design pre-degitization

b. Design after digitization > Design pre-degitization

b. Wilcoxon Signed Ranks Test

Sign Test

Frequencies

		N
Design after digitization - Design pre-degitization	Negative Differences[a]	6
	Positive Differences[b]	0
	Ties[c]	0
	Total	6

a. Design after digitization < Design pre-degitization

b. Design after digitization > Design pre-degitization

c. Design after digitization = Design pre-degitization

REVIEW OF ORGANISATIONAL CHALLENGES IN IMPLEMENTING KNOWLEDGE BASED ENGINEERING.

Praveen Patil

Aker Solutions, Pune, INDIA

Email ID: praveen2020@gmail.com

Contact No.: + 91 952 755 7800

Dr. Sandeep Pachpande

Chairman, ASM Group of Institutes, Chinchwad, Pune 19. INDIA.

Abstract

Knowledge-Based Engineering (KBE) is the use of advanced software techniques to capture and reuse product and process knowledge in an integrated way. In this competitive world, KBE is becoming the key product development technology to achieve competitiveness in the global marketplace. There is fierce competition among the Engineering companies to launch their products in the shortest time possible, with the best quality and at the most competitive price. In order to reduce the time to launch new products, currently, many companies are focusing on automating most of the mundane and repetitive tasks in the engineering process. But KBE goes beyond automation of these tasks and it focuses on incorporating methods for knowledge acquisition from different stakeholders across product lifecycle and re-uses it in new product development. Therefore, there is an increased focus on implementing KBE in Engineering organizations. Some of the Aerospace and Automotive organizations have already matured KBE system in place but there are many others which are trying to implement it. Some of these organizations are facing several challenges in implementing the KBE system due to organizational complexities. Thus, the objective of this paper is to understand the key challenges faced by organizations to implement Knowledge Based Engineering system. This paper discusses cultural, organizational and technological impediments in achieving the real benefits of the KBE.

Keywords: *Knowledge-Based Engineering, Product Development, KBE System, Automation*

1. Introduction

Knowledge management represent the key to competitiveness. with the company-specific product and process knowledge marking a unique position with respect to competition. Knowledge management (KM) is a process that deals with the development, storage, retrieval, and dissemination of information and expertise within an organization to support and improve its business performance. Organizations are realizing that knowledge is a crucial resource for organizations and it should be managed judiciously. Organizations need to harness knowledge not only to stay competitive, but also to become innovative. KM requires a major shift in organizational culture and a commitment at all levels of a firm to make it work. KBE facilitates new product development by automating repetitive design tasks through acquisition, capture, transform, retention, share, and (re-)use of product and process knowledge. The idea behind KBE is to store engineering knowledge once by suitable, user-friendly means and use it whenever necessary in a formal, well documented, repeatable and traceable process. Knowledge-Based Engineering has held great promise since its first applications. Despite great promise and associated reported advantages for organisations, KBE has not achieved convincing breakthrough, apart from major aerospace and automotive companies. [2] There is a much-used phrase in KBE circles: 'Seldom have new technological development been cited by so many and understood by so few'. KBE has not reached the position of being viewed as a global panacea to all business problems. [1] The reasons are varied and complex, there are cultural, organizational and technological impediments in achieving the real benefits of the KBE. The application of KBE to a design process does inevitably mean change. Change in working patterns also brings the change in the power structure of an organisation and any shift in power leads to problem for someone. Engineering technologies change more rapidly than ever before. To lock away today's knowledge would mean preserving something that in just few months might only have value as a museum piece. KBE has challenge of allowing knowledge to be held in a form that is accepted by most of the industry. This paper is an effort to review some of these challenges. To achieve these objectives apart from reviewing the literature, focus discussions and interviews with industry experts were carried out. A short survey was conducted to understand how industry looks at these challenges.

2. What is Knowledge-Based Engineering?

There are many definitions of the KBE. The one given by M Stokes [1] states that Knowledge-Based Engineering (KBE) is the use of advanced software techniques to capture and reuse product and process knowledge in an integrated way. An early definition originates in Sainter et al. [7], who asserted in 2000 that 'a KBE system can be regarded as a type of knowledge- based system that performs tasks related to engineering. KBE systems do not express designs with specific data instances, as ordinary CAD systems do, but with sets of rules that enable the design to apply to large classes of similar parts'. In this, Sainter et al. refers to the generative aspect of KBE systems, but no further KBE aspects are taken into account. A more involved definition can be found in Chapman & Pinfold [8], who indicate that 'KBE represents an evolutionary step in Computer-Aided Engineering (CAE) and is an engineering method that represents a merging of Object-Oriented Programming (OOP), artificial intelligence (AI) and Computer- Aided Design (CAD) technologies, giving benefit to customized or variant design automation solutions'. A comparable definition is that of Cooper et al. [3], who state that KBE is 'a particular type of knowledge-based system that is based upon an object-oriented programming language and is tightly integrated with a geometric modelling tool'. KBE enables 'generative modelling' that allows the near instantaneous generation of new design data and 'integrated modelling' that provides the means to automatically create views to support a wide range of product development activities [3]. Bermell-García & Fan [9] maintain that KBE is 'a special type of KBS with a particular focus on product engineering design activities such as analysis, manufacturing, production planning, cost estimation and even sales. The technology provides a high degree of design integration and automation in well-defined and complex design tasks'. Cooper & La Rocca [10] and Van der Lana [11] state that KBE can be defined as 'the use of dedicated software language tools (i.e. KBE systems) in order to capture and re-use product and process engineering knowledge in a convenient and maintainable fashion. The ultimate objective of KBE is to reduce the time and cost of product development by automating repetitive, non-creative design tasks and by supporting multidisciplinary integration in the conceptual phase of the design process and beyond'. Finally, Baxter et al. [12] define KBE in the following manner: 'Knowledge- Based Engineering is generally regarded as an umbrella term describing the application of knowledge to automate or assist in the engineering task'.

The concept of knowledge lies at the heart of KBE; it has received much attention, literally throughout the centuries; for a solid discussion of knowledge within the context of knowledge-based systems, please refer to Alavi & Leidner [13] and Schreiber et al. [14].

Methodological approaches to Knowledge-Based Engineering

A number of KBE methodologies are available to support the development of KBE applications and systems. By far the most well-known of these is the Methodology and software tools Oriented to Knowledge-Based Engineering Applications, or MOKA methodology. This methodology, based on six KBE life-cycle steps and expressed in accompanying case-specific informal and formal models, is designed to take a project from inception towards industrialization and actual use [1].

The informal model consists of so-called ICARE forms, where the acronym stands for Illustrations, Constraints, Activities, Rules and Entities. These forms can be used to decompose and store knowledge elements. Subsequently, these elements can be linked to create a structured web of knowledge elements that together make up a representation of the problem domain to which users from multiple viewpoints can relate.

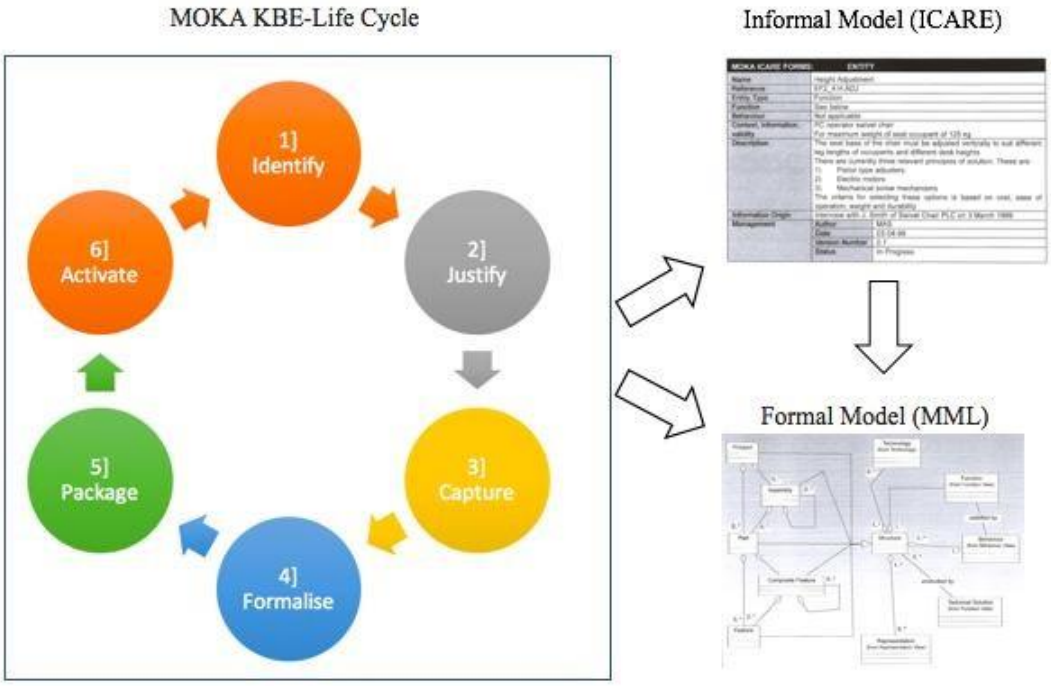


Fig No. 1: MOKA Methodology Element

When the problem knowledge has been converted into a structured representation, the next step is to formalize this knowledge in order to represent knowledge in a form that is acceptable to knowledge and software engineers and suitable for subsequent development of the KBE application. The formal model uses MML (MOKA Modelling Language, an adaptation of UML) to classify and structure the ICARE informal model elements, which are translated into formal Product and Process models.

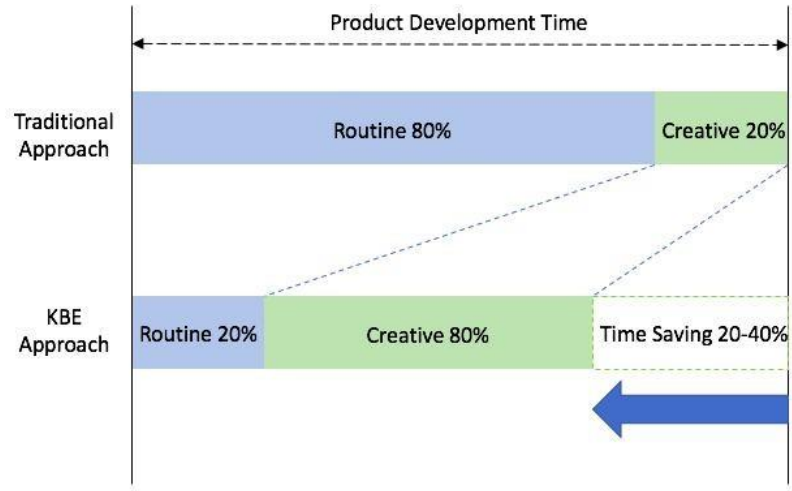


Fig No.2: KBE offers distinct advantage over the traditional methodology

Following are the roles in implementing the KBE.

Experts	These people are responsible for defining the domain knowledge to be applied in the KBE system by end users.
Knowledge Engineer	They structure and formalise the expert's knowledge in a consistent and unambiguous format. They should be familiar with the field. They build knowledge representation to describe the knowledge.
Developers	Developers transform the formalised knowledge into operational applications They write the code for a particular KBE platform.
End-Users	These people will use the final KBE application for creating specific product design.
Project Managers	Project Managers take care of the process of the building the KBE applications from beginning to end. They manage resources with them aim of generating the desired business benefits from the KBE system within the cost and time constraints.
General Managers	General managers are assumed to be those who make the initial decision to build KBE. They set the overall strategy of an organisation.

3. Advantages of the KBE

KBE provides major benefits to the business by improving the speed and effectiveness of the product development process. By automating the tedious and time-consuming parts of design, KBE frees up engineers for other more creative tasks. The integrated modelling capability ensures consistency, with each new design created subject to specified constraints, such as cost, legislation or manufacturing. Together, the generative and integrated modelling allow rapid feedback to the various members of the design team of the impact of their decisions. Used like this, KBE is a powerful concurrent engineering tool, helping to massively reduce rework and so cut the costs of both product development and the end product itself. At the end of the project, the company also benefits through having effectively captured the knowledge behind the product's design, which may then be reused on other projects

4. Areas where KBE is not useful.

It is important to realise that KBE is not suitable for all the design tasks. A number of authors note reasons for not adopting KBE [1,3,5,6]; the following as identified by Stokes [1] stand out:

- The design task is relatively straightforward and can be modelled and executed using less resources than a more demanding KBE approach.
- The organisation does not have the will, money or resources to introduce a KBE system. Nowadays, companies tend to move towards Commercial-Of-The-Shelf (COTS) solutions and tend to shy away from in-house software development, which is necessary in the case of KBE development.
- The design process consists of creative processes and products that are highly subject to change.
- The knowledge for the desired application is not available.
- The design process cannot be clearly defined; it is not possible to isolate and define particular stages in the design process.
- The technology in the design process is constantly changing.

5. Challenges in implementing KBE

Even more than three decades of existence, the KBE has not really become the main stream Engineering methodology apart from very few aerospace and automotive companies. There are number of areas where research is required to find out core issues and then find solutions to

implement KBE and achieve the real benefits of the technology offers. Objective of this paper was to uncover those challenges. As first step author conducted focus discussion within his organisation and within his professional network. Author reached out to experts from the industry who have spent more than decades in Engineering domain and especially implementing KBE or providing KBE services as a part of Engineering services offering. Most of the technical challenges are relatively easy to manage but author found that human factor plays critical role in success of the KBE. If you are introducing the KBE application in an organisation which is very familiar with KBE then the task is far easier. The objective is simply to explain the way that the new application fits into the existing KBE framework. If, however the organisation is new to KBE or if the application brings to a new area of the company then team needs to be very careful. Behind most organisational structures there exist unofficial hierarchies – based on power. The power base can arise for wide variety of the reasons but one of them is 'possessing technical expertise'. Once you extract the knowledge part of the individual into the system, power of that individual can be diminished. They would certainly perceive it in this way. Change of any kind shifts the unwritten power base, sometime in unexpected way.

The organisation in this case is a small Engineering organisation based out of UK. They had a very standard product in the market. They decided to implement the KBE for one of their product. This company did not have any product data management tool or PLM system. They were following simple folder structure to manage the product data. They developed a KBE application based on this folder structure. Entire KBE development process was managed by a senior designer along with a software developer. This KBE application was developed keeping the folder structure as basis. All stakeholders were happy with this application as it provided a good productivity gain for designer, where design and all manufacturing drawings were automated. This small company was acquired by a large corporation and they were undergoing integration process. This large organisation uses SAP-PLM system. When this organisation decided to move to SAP system, this KBE application became redundant and full benefits of the associated investment were not realised.

There are number of issues in this implementation of the KBE which are seen across industry where KBE is being implemented for the first time.

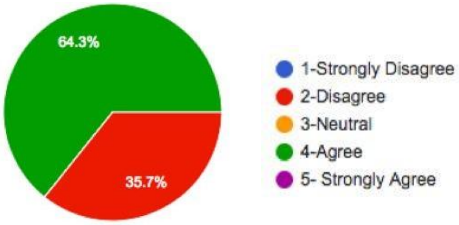
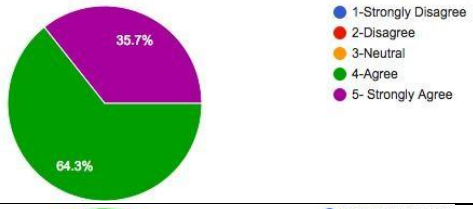
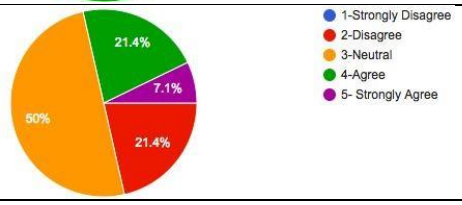
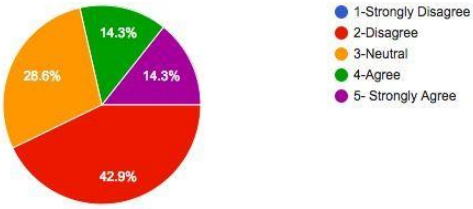
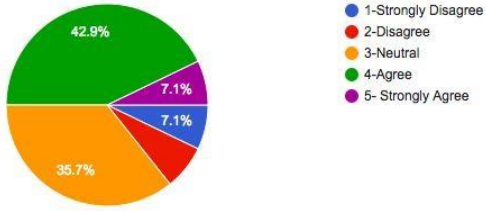
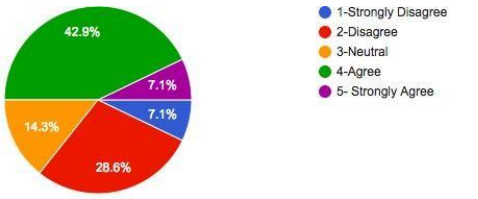
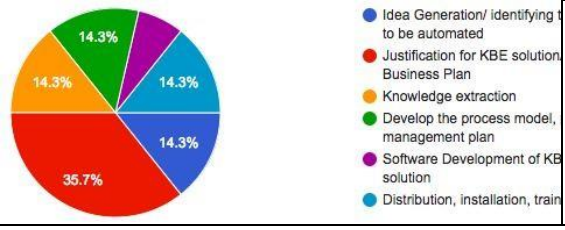
- Not all stakeholders were involved in implementing KBE. IT support is the key stakeholder in any software application development and maintenance, which was ignored in this case.
- KBE application's shelf life was not considered.
- Lack of documentation during KBE development
- Lack of overall KBE methodology. KBE was developed directly based on the raw knowledge collected by KBE developer.
- There was no knowledge engineer role in the system, all key roles were played by KBE developer.

A short survey was carried out as part of this paper to understand the pulse of the industry in implementing the KBE.

6. Survey Results and discussion

About the survey

12 questions were asked related to implementation of KBE and challenges faced during implementation. Survey was conducted across geography to get wider response. As there are few organisations who have matured the process of KBE implementation while many are still struggling. Received response from India, UK, Germany, Norway and United States. 40% of Engineers surveyed were not aware of what is Knowledge-Based Engineering(KBE) and how it is being used in the Industry. This is one of the challenge that Engineers are not exposed to KBE as tool. KBE is still not the thought process in first place in many Engineering organisations.Organisations where there is a clear documented KBE methodology tend to have Engineers' motivation to implement KBE.

	CAD Limitation – 64% of Engineers do think that limitation of the software tools (e.g. CAD) in automating the engineering process is one of the bottleneck in implementing KBE.
	Almost all Engineers surveyed believes that strong methodology framework plays an important role in successful implementation of KBE.
	When they were asked if their organisation has clear documented methodology in implementing KBE, answers were fragmented. Only 30% thinks that they have clear methodology in place.
	Small % of participants think that it would be difficult to implement KBE due to complexity of Engineering rules. Most think it is possible to implement KBE in their work area.
	~50% of Engineers have indicated that they have standardised product development process and have implemented KBE successfully in their organization.
	Where there is clear ownership for KBE then there is a clear Engineering strategy in implementing KBE and they have formulated clear methodology for KBE.
	Developing a business case for KBE is the most critical part for implementing KBE followed by knowledge extraction process and idea generation.

In many organisations where KBE is still not matured, it is observed that Engineering teams are not aware of the tools and techniques being used for implementing KBE. Engineering leaders don't give importance to the process part and KBE teams are under staffed. KBE developer plays all the roles.Due to lack of this understanding, a proper business case is missing for KBE.Many Engineering organisations are still people driven, this is major impediment in implementing KBE.Who would fund the KBE project is another issue in many organisations as there is clear distinct focus by project organisation to complete the project within cost and time, they have little motivation to take up KBE projects and Product organisation do not have budgets to take up KBE projects. Not involving right stakeholders complicates the KBE projects. Lack of multidiscipline engineers who have software development skills as well as engineering skills slows down adoption of KBE. Key requirement is missed due to missing stakeholders Stakeholder analysis is an important step which is missed in many KBE.First experience of KBE creates or kills the interest for next project.Successful implementation of KBE disrupts the old work processes and methods. There are Engineers who welcome this change and adapt to new methods. But there are some Engineers who would see it as threat and may not cooperate. There is also a possibility of that people impacted may create artificial challenges.

7. Conclusion

Clear understanding of the challenges involved in implementing the KBE would increase the pace and effectiveness of the KBE implementation. Study shows that there are soft factors apart from technical factors which play crucial role in successful implementation of the KBE. As survey results shows that there is a clear correlation between the success of KBE implementation and organisational factors. Engineers are used to work in traditional way and may find KBE as a threat to their job and career. This should be managed with good communication upfront with design teams and bringing in more awareness about the KBE followed by good training/reskilling of Engineers. KBE methodology plays a critical role in determining the success of the KBE implementation in the organisation. KBE should not be seen only as an automation method but more as knowledge management tool which would help organisations to create a competitive advantage over a period of time. There is a need to establish a correlation between implementation of Knowledge-based engineering within the product development process and benefits for the Engineering organisations.

References

1. Stokes, M. ed., 2001. Managing engineering knowledge: MOKA: methodology for knowledge based engineering applications. American Society of Mechanical Engineers.

2. Verhagen, W.J., Bermell-Garcia, P., van Dijk, R.E. and Curran, R., 2012. A critical review of Knowledge-Based Engineering: An identification of research challenges. Advanced Engineering Informatics, 26(1), pp.5-15.

3. Cooper, S., Fan, I.S. and Li, G., 1999. Achieving competitive advantage through knowledge-based engineering: a best practice guide. Prepared for the Dept. of Trade and Industry by Dept. of Enterprise Integration, Cranfield University.

4. Ferreira, F., Faria, J., Azevedo, A. and Marques, A.L., 2017. Product lifecycle management in knowledge intensive collaborative environments: An application to automotive industry. International Journal of Information Management, 37(1), pp.1474-1487.

5. P. Bermell-Garcia, I.S. Fan, Practitioner requirements for integrated knowledge-based engineering in product lifecycle management, International Journal of Product Lifecycle Management 3 (2008) 3–20.

6. D.S. Darai, S. Singh, S. Diswas, Knowledge Engineering - an overview, International Journal of Computer Science and Information Technologies 1 (2010) 230–234.

7. P. Sainter, K. Oldham, A. Larkin, Achieving benefits from Knowledge-Based Engineering systems in the longer term as well as in the short term, in: Proceedings International Conference on Concurrent Enterprising, Toulouse, France, 2000.

8. C.B. Chapman, M. Pinfold, The application of a knowledge based engineering approach to the rapid design and analysis of an automotive structure, Advances in Engineering Software 32 (2001) 903–912.

9. P. Bermell-Garcia, I.S. Fan, A KBE System for the Design of Wind Tunnel Models Using Reusable Knowledge Components, in: International Congress on Project Engineering, Barcelona, 2002.

10. D. Cooper, G. La Rocca, Knowledge-based Techniques for Developing Engineering Applications in the 21st Century, in: 7th AIAA ATIO Conference, AIAA, Belfast, Northern Ireland, 2007.

11. A.H. Van der Laan, Knowledge based engineering support for aircraft component design, in: Design of Aircraft and Rotorcraft, Faculty of Aerospace Engineering, Delft University of Technology, Delft, 2008, pp. 254.

12. D. Baxter, J. Gao, K. Case, J. Harding, B. Young, S. Cochrane, S. Dani, An engineering design knowledge reuse methodology using process modelling, Research in Engineering Design 18 (2007) 37–48.

13. M. Alavi, D.E. Leidner, Review: knowledge management and knowledge management systems: conceptual foundations and research issues, Mis Quarterly 25 (2001) 107–136.

14. G. Schreiber, H. Akkermans, A. Anjewierden, R. de Hoog, N. Shadbolt, W. Van de Velde, B. Wielinga, Knowledge Engineering and management: the CommonKADS methodology, MIT Press, Cambridge, MA, 1999.

LEVERAGE AND VALUE CREATION: EVIDENCE FROM ITALY'S FRAMEWORK

ROBERTA PACE

Associate Professor of Corporate Finance

University of L'Aquila – Department of Industrial and Information Engineering, and Economics

Via Giuseppe Mezzanotte - Località Acquasanta, 67l00 L'Aquila, Italy

Phone +39 0862434848 – Mobile +39 3471156579

E-mail id:roberta.pace@univaq.it

Abstract:

The aim of this paper is to analyse the evolution of the leverage in Italian micro enterprises over the last decade, in order to figure outhow the financial structure of these firms has been modified by the crisis that began in 2007.The startingpoint can be identified witha theoretical and empirical literature review on the main financial difficulties of micro firmsand on the real effects of financial crises; the next step is aimed at investigating the financial structure of Italy's micro firms, with a special emphasis on the level of their debt.Based on a survey of the balance sheets of a sample of Italian micro firms, this paper shows the trend of the leverage from 2008 to 2017 and assesses whether they have been able to create value during the crisis.

Keywords: *Leverage, Value creation, Micro firms, Crisis.*

1. Introduction

Micro firms[1] make up about 94% of the Italian entrepreneurial system and contribute to the creation of 29% of value added and to the employment of 46% of the workforce in this country[2]. These firms, and in general the subsystem including them andall Italian small and medium enterprises (SME), have always been subject to stringent financial constraints and their fragility has been exacerbated by the dynamics of the recent crisis.

Deep-rooted problems, such as those associated withhigh level of debt(Arcelli, 1994) and the equity gap(Gualandri e Schwizer, 2008; Bini, 1996), have combined with the lack of liquidity(Allen *et al*, 2007 e 2008) and the deterioration in profitabilitygenerated by the crisis, thus multiplying the difficulties in paying back debts and in accessing new finance, up to cause the bankruptcy of several firms.

In this context, itis important to investigate the trend of the leverage in micro firms and to verify if and

[1] According to the Commission Recommendation of 6 May 2003, a microenterprise is defined as an enterprise which employs fewer than 10 persons and whose annual turnover and/or annual balance sheet total does not exceed EUR 2 million.

[2]Data retrieved from*Scheda informativa SBA*, 2015, EuropeanCommission.

how they have been affected by the problem of the credit crunch and by the equity gap.

Furthermore, this study analyses the ability of the micro firms to create value, using the Economic Value Added model proposed by Bennet Stewart (1991) (from now on EVA).

This research work is organised as follow. Section 2 presents a literature review on the issues of financial constraints of micro and small business; section 3 introduces the empirical analysis carried out on a sample of over 29.000 Italian micro firms, highlighting the results in term of leverage and value creation over the past decade. The fourth section summarises conclusions based on the results and outlines issues for further discussion.

2. Literature review

Recentliterature reveals a significant relation between small size of the firm and difficulty in accessing funding channels(Ayyagari*et al*., 2006; Beck *et al*. 2005; Beck e Demirgüç-Kunt, 2006; Berger *et al*. 1998). First of all, especially in non-Anglo-Saxon countries, the access to capital markets is limited because of the so-called "financial gap" regarding both a supply gap and a knowledge gap (Holmes and Kent, 1991). As a result of the financial gap, the main long-term financial source for SMEs is internal fund, followed by bank loans.

The bank-firm relationship, often based on the relationship lending approach(Berger e Udell, 2002), has always been affected by the problem of information asymmetry. The prevailing view tends to shed light on an inverse relationship between firm size and the level of information opacity: when the company grows, opacity decreaseswhile disclosure increases.Due to insufficient information, a high number of profitable investment projects may not be financed or may not obtain funding at a reasonable cost.

Furthermore, empirical research shows that small and micro firms frequently resort to short-term debt, limiting the use of long-term debt due to the lack of assets to offer as collateral (Chittenden et al, 1996).

Another important financial constraint associated with SME financial structure is the equity gap, that deals with the low weight that equity has on the total sources of financing (Gualandri e Schwizer, 2008). The main determinants of the equity gap are: the corporate governance structure, often characterized by a clear coincidence between ownership and control and by the fear of the entrepreneur losing control of the company by allowing the entry of other shareholders; difficulties in accessing to financial markets because of the lack of requirements to going public and the high costs of listing(Berger e Udell, 1998).

The issue of financial constraintsof SMEs takes on an even more important meaning when analysed in a period of financial crisis like the one that has affected the world economy since 2007.

Empirical research shows that a banking crisistends to generate a contraction of the loans (credit crunch): there it follows that the economic sectors most dependent on external finance (of banking origin in particular) are more penalized by the crisis. This evidence confirms the presence of real effects produced by crisis and therefore the presence of a real cost of the banking crisis. In a context of crisis, it is physiological to expect an increase of information asymmetry between firms and banks and the latter are forced to revise

to quality, Bernanke *et al.*, 1996).

Signs of credit crunch inevitably lead to pay attention to other "side effects" for corporate finance: liquidity management and investment opportunities.Following the outbreak of the subprime mortgage crisis, many companies affected by financial constraints had problems both in accessing credit and in the renegotiation of credit lines (Campello*et al.*, 2009). Furthermore, these companies were forced to give up the implementation of investment projects with positive net present value precisely because of the difficulties encountered in accessing credit.

Within this theoretical framework, the research objectives of this study are the following:

- analyse the trend of the debt of the Italian micro companies during the last decade, to understand if it has been affected by the recent financial crisis;
- verifywhether the Italian micro companies were able to create value during the financial crisis.

3. The analysis

This empirical analysis is set to cover the period from 2008 to 2017 and has been conducted on balance sheets provided by the database AIDA (Bureau van Dijk), which includes financial and economic information for private corporation companies. The sample consists of 29.265micro non-financial firms, with a number of employees less than ten.

3.1. Results on leverage

The situation of Italian micro firms in terms of leverage has been investigated by analysing the evolution of the following indicators:

- *Leverage*, defined as the ratio of all the debts (financial and trade debts) over total assets. The balance sheets of micro firms often do not allow to highlight the different types of debt, due to the possibility of drawing up the financial statement in abbreviated form. This is why it has been impossible to use only financial debts, as suggested by the prevalent literature (Rajan and Zingales, 1995).
- *Composition of financial sources*, i.e. the weight of total debt on assets (*Leverage*, as defined above), compared to the weight of equity on assets. This information allows to verify the level of capitalization of the firms and the presence of the problem of equity gap.
- *Financial charges on EBITDA*, calculated as the ratio between total financial charges over the earning before interest, taxes, depreciation and amortization. This indicator shows the degree of absorption of economic resources by current operations by financial charges.

Table 1 presents the results obtained by applying the *Leverage* ratio to the selected sample. It shows a progressive reduction of the debt since 2008, in other words during the period of economic recession following the financial crisis.

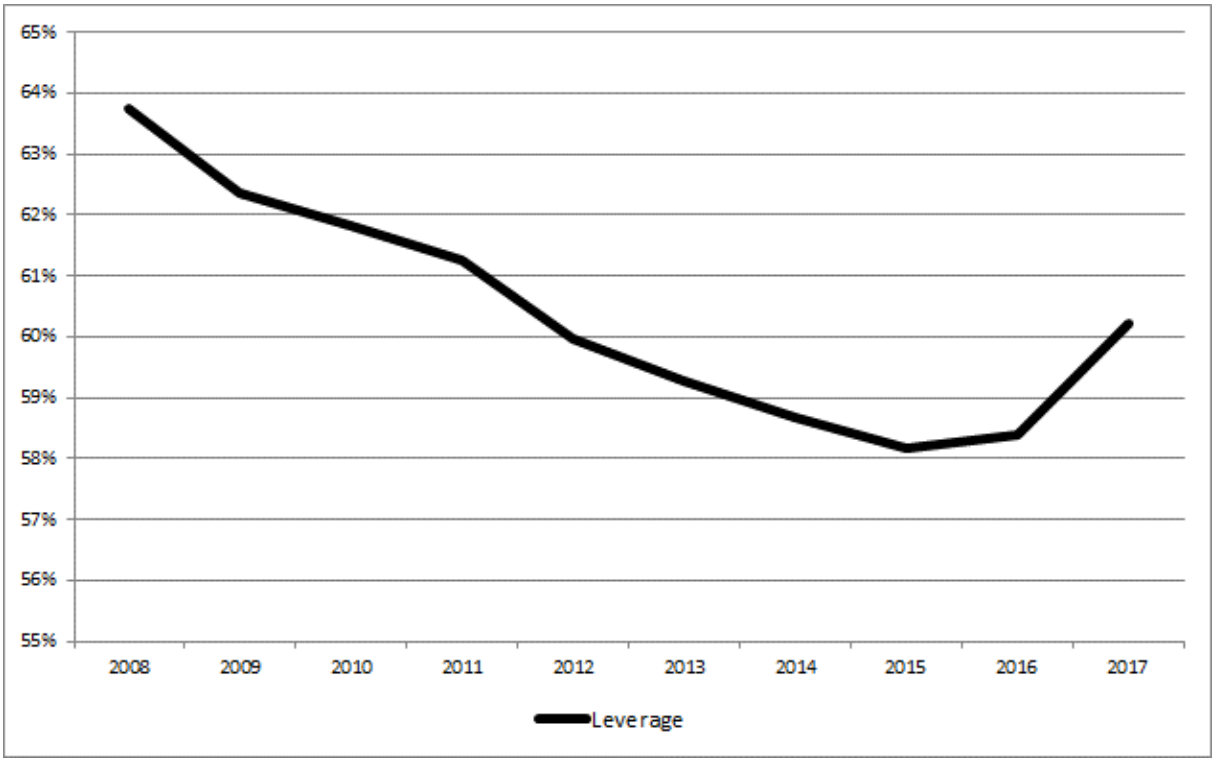
Table 1. The leverage of Italian micro firms (percentage values)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Average	63,74	62,37	61,83	61,25	59,97	59,27	58,69	58,18	58,39	60,23
Median	67,73	65,99	65,37	64,67	63,07	62,08	61,46	60,48	59,64	58,70

Results confirm the findings from theoretical and empirical literature and can be traced back to the topic of credit crunch, which mainly affected small business suffering fromfinancial constraints.Starting from 2015, data suggest an inversion of trend, with an increase of the level of debt, as it emerges more clearly from the Figure 1.

The decrease of leverage is also confirmed by the research carried out by De Socio and Finaldi Russo (2016) on a sample of Italian non-financial firms until 2013. These authors underline how, despite the reduction in leverage recorded by Italian companies, their recourse to debt stands at higher levels than comparable firms in other main European countries.

Figure 1. The evolution of leverage (average values)

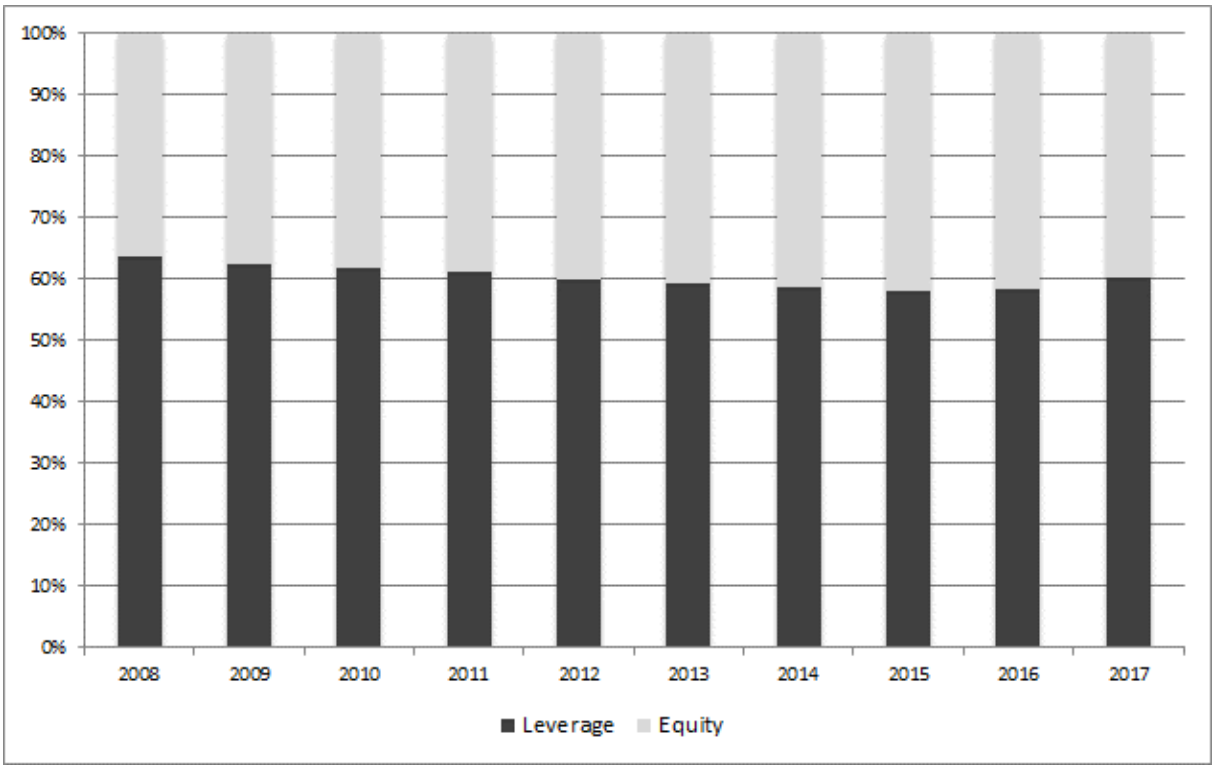


In terms of composition of financial sources, results indicate a greater weight of the debt in the financial structure compared to equity: at the beginning of the crisis under investigation, leverage was about twice the equity, confirming the empirical evidence on equity gap (Table 2, Figure 2).

Table 2. Composition of financial sources (average values, percentage values)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Leverage	63,74	62,37	61,83	61,25	59,97	59,27	58,69	58,18	58,39	60,23
Equity	32,26	37,63	38,17	38,75	40,03	40,73	41,31	41,82	41,61	39,77

Figure 2. Composition of financial sources



The analysis of the financial charges on EBITDA ratio presents median values – which in this case are more reliable and less distorted than average values – decreasing during the same period. This information too confirms the evidence of the theoretical and empirical literature regarding the contraction of the debt during a financial crisis.

Table 3. Financial charges on EBITDA (percentage values)

	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Average	29,72	17,63	39,74	4,13	14,95	0,32	3,50	96,7	17,63	2,66
Median	9,65	7,36	6,76	7,33	7,57	7,54	7,26	6,61	5,78	4,56

3.2. Results on value creation

The ability of Italian micro firms to create value has been assessed by applying the EVA model (Bennet

Stewart, 1991) to the companies in the sample. This model is expressed as follow:

$$EVA = NOPAT - (wacc \cdot CIN)$$

NOPAT = Net Operating Profit After Taxes

CIN = Net Invested Capital

wacc = weighted average cost of capital[3]

$$wacc = K_d(1-t)\frac{D}{D+E} + K_e\frac{D}{D+E}$$

$$K_d = Return\ on\ Debt = \frac{Financial\ charges}{Total\ Debts}$$

$$K_e = r_f + (\overline{r_m} - r_f)\beta$$

It seems appropriate to make a clarification regarding the calculation of the *wacc*, with special reference to the cost of equity. Due to the lack of data required for the calculation of systematic risk, summarized in the beta ratio, and following the approach used by Wald (1999) for the definition of default risk, in this work the beta has been replaced with the standard deviation of ROI (Return on Investments).

Table 4. Value creation (euro)

	2009	2010	2011	2012	2013	2014	2015	2016	2017
Average	-42.378	-7.801	-9.272	-19.882	-25.089	-23.081	-20.600	-9.376	-9.405
Median	6.674	7.823	7.329	3.947	4.009	4.581	6.417	5.821	6.196

Table 4 shows the average values always negative for the EVA for the whole period of reference, while the median values are positive, but low.

These data highlight the difficulties encountered by micro enterprises in creating an income (NOPAT) higher then the opportunity cost (*wacc* x CIN). Furthermore, these results confirm the financial suffering of small business during the crisis.

4. Conclusions

Italian micro enterprises have always been affected by several financial constraintsthat have led these firms, in the run-up of the crisis, to increase their use of debt. The financial crisis that started in 2007 and the consequent problem of credit crunchhave generated further financial difficulties for small business.

As a matter of fact, they had to face the lack of liquidity and the impossibility to replacing the debt with other forms of financing, first of all equity, because of the equity gap. Needless to say, this situation has contributed to worsen the economic and financial performance of the companies focused on and probably to

[3]The wacc is the average rate of return a company expects to pay to finance its assets. The weights are the fraction of each financing source in the company's capital structure.

scale down their investment policy.

Further thoughts should be devoted to the other side of the coin: there are reasons to believe that it would prove not less relevant to analyse the effects of the global crisis on corporate investments.

To sum up, the results of this research work suggest that some incentives should be promoted, in an attempt at encouraging a wider recourse to equity financing and a reduced use of debt. For example, it may sound convenient to replicate fruitful measures taken in some sectors, including limits to the amount of interest expense that could be deducted from income. This action is likely to reduce the level of leverage, increase the level of equity and bring about a more balanced financial structure.

References

1) Allen F.,Carletti E. (2008).*The Role of Liquidity in Financial Crises*. Available from:http://ssrn.com/abstract=1268367[Accessed: 12 December 2018].
2) Allen F., Gale D. (2007).*An Introduction to Financial Crises*, Wharton Financial Institutions Center, Working Paper, n. 7.
3) Arcelli M. (1994).*Il finanziamento delle piccole e medie imprese: situazione attuale e prospettive*, in «Economia Italiana», 34, pp. 291-307.
4) Ayyagari M., Demirgüç-Kunt A.,Maksimovic V. (2006), *How Important Are Financing Constraints? The Role of Finance in the Business Environment*, World Bank Policy Research Working Paper, n. 3820.
5) Beck T.,Demirgüç-Kunt A., Laeven L., Levine R. (2005).*Finance, Firm Size, and Growth*, World Bank Policy Research Working Paper, n. 3485.
6) Beck T.,Demirgüç-Kunt A. (2006).*Small and medium-size enterprises: Access to finance as a growth constraint*, in «Journal of Banking & Finance», 30, pp. 2931-2943.
7) Bennet Stewart (1991).*The Quest for Value*, New York, HarperCollins.
8) Berger A.N.,Udell G.F. (1998).*The economics of small business finance: The roles of private equity and debt markets in the financial growth cycle*, in «Journal of Banking & Finance», 22, pp. 613-673.
9) Berger A.N.,Udell G.F. (2002).*Small business credit availability and relationship lending: the importance of bank organizational structure*, in «The Economic Journal», 112, pp F32-F53.
10) Bernanke B.S.,Gertler M., Gilchrist S. (1996).*The Financial Accelerator and the Flight to Quality*, in «The Review of Economics and Statistics», 78, 1, pp. 1-15.

11) Campello M., Graham J.R., Harvey C.R. (2009).*The Real Effects of Financial Constraints: Evidence from a Financial Crisis*. Available from: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1318355[Accessed: 12 December 2018].

12) Bini M. (1996), *Finanza delle imprese minori. Caratteri e ipotesi di sviluppo*. in Atti del Convegno AIDEA, *Vitalità del capitale di rischio e fattori di sviluppo delle piccole e medie aziende*, Bologna, Clueb.

13) Chittenden F., Hall G.,Hutckinson P. (1996).*Small firm growth, access to capital markets and financial structure: review of issues and an empirical investigation*, in «Small business economics», 8, pp. 233-251.

14) De Socio A., Finaldi Russo P. (2016).*The debt of Italian non-financialfirms: an internationalcomparison*, Questioni di Economia e Finanza, Roma, Banca D'Italia.

15) Gualandri E.,Schwizer P. (2008).*Bridging the equity gap: il caso delle PMI innovative*, in «Studi e Note di Economia», 1, pp. 101-138.

16) Holmes S., P. Kent (1991). *An empirical analysis of the financial structure of small and large Australian manufacturing enterprises*, in «Journal of Small Business Finance», 1(2), 141-154.

17) Rajan R. G., Zingales L. (1995).*What do we know about capital structure? Some evidence from*

18) *international data*, The Journal of Finance, Vol. 50, n. 5, pp. 1421-1460.

19) *Scheda informativa* SBA (2015).EuropeanCommission.

20) Wald J. K. (1999).*How Firm Characteristics Affect Capital Structure: An International Comparison*, in The Journal of Financial Research, 22, 2, pp. 161–187.

Undermining the Myth about the IT-Innovation Nexus: IT Companies Turn Out not to be Superior to non-IT Firms in the Employee-Centered Innovation Model

Paulina Krystosiak, Institute of Computer Science of the Polish Academy of Sciences, Poland
(p.krystosiak@ipipan.waw.pl)

Serge Pukas, Institute of Computer Science of the Polish Academy of Sciences, Poland
(s.pukas@ipipan.waw.pl)

Abstract:

Innovation is widely perceived as one of the key drivers of company's growth. Nowhere it is more important than in the IT sector. Narratives about the Silicon Valley depicting its icon companies being the most innovative in the world abound. IT firms are also deemed to attract the lion's share of young talent. Therefore, it is only natural to expect the IT people to be the most inventive and ingenious. Is it really the case? This paper presents findings from research conducted in Poland and focusing on innovativeness measured by effectiveness of subordinate-supervisor communication in generation of new ideas. Innovation is a concept notoriously difficult to pinpoint. There are various approaches to appraising it. Using one of these approaches a series of interviews have been conducted which have shown a greater degree of innovativeness among firms from the cosmetics industry than from the IT sector. The paper ends up with possible explanations for the lower level of innovativeness in the IT companies.

Introduction

There is a famous saying by Alert Einstein asserting that "it is little short of a miracle that modern methods of instruction have not completely strangled the holy curiosity of inquiry." This sarcastic quote has a grain of truth in it. We still use the education system borrowed from the earlier XIX century. The challenges of the XXI century are not only mishandled but also interpreted wrongly.[1] Nevertheless our age may readily be called the age of innovation. It looks like our curiosity reigns uncurbed and people are as creative and entrepreneurial as never before. "Every year, hundreds of new innovation books are published with well-meaning and intriguing recommendations for managers and organizations. They tout such innovation success factors as a risk-taking culture, inspired leadership, and openness to outside ideas" (Seelos and Mair, 2012, p. 45).

A more tenable view is that people have always been innovative. They have been coming with inventions every time circumstances, legacies, levels of technology development, and acuteness of problems have allowed them to. The ancient and medieval times were abounding with novel changes converted into, what we would call today, a market success (the number zero, concrete, makeup, newspapers, paper money, wind mills, eyeglasses, mechanical clock, printing press - to name a few). It is hard to imagine the Industrial Revolution without the constant stream of (mostly technical, not scientific) breakthroughs. From the time of Francis Bacon and his celebrated quote "knowledge is power" the trial and error method of problem solving has increasingly been gaining popularity. The seventeenth century Scientific Revolution strengthened our reliance on experiment and mathematics (think of Isaac Newton sticking a needle in his eye to discover the laws of optic). The twentieth century saw people coming up with such ingenuous theories as general relativity, quantum mechanics or genetics. At the beginning of the XXI century advancements in information technologies promise to be highly fruitful.

The Boston Consulting Group's 2018 report on the most innovative companies in the world proudly states the following: "At leading innovators, R&D and new-product development have become digital endeavors. Eleven of the fifty companies named in BCG's 2018 ranking of the most innovative companies—including seven of the top ten—are digital natives and thus digital innovators by definition. Most, if not all, of the others on the list have built digital technologies into their innovation programs. The trend is pervasive across

[1] More about myths in education see in Zmuda, 2010.

industries, penetrating what were heretofore the most stolid and conservative businesses" (Ringel, 2018). Moreover, Apple is the world's first trillion-dollar public company (barring some oil companies like PetroChina whose valuations have never been reliable and subject to oil price flotation). Apple stands for the ultimate company in terms of innovation and IT despite the fact that it has invented none of the technologies it employs in its devices and can be credited only for (some may claim revolutionary) marketing innovativeness.[2]

Innovation has always been interrelated with entrepreneurship. It his famous analysis of these two concepts Peter Drucker writes as follows: "The husband and wife who open another delicatessen store or another Mexican restaurant in the American suburb surely take a risk. But are they entrepreneurs? All they do is what has been done many times before. They gamble on the increasing popularity of eating out in their area, but create neither a new satisfaction nor new consumer demand. Seen under this perspective they are surely not entrepreneurs even though theirs is a new venture. McDonald's, however, was entrepreneurship. It did not invent anything, to be sure. Its final product was what any decent American restaurant had produced years ago. But by applying management concepts and management techniques (asking, What is "value" to the customer?), standardizing the "product," designing process and tools, and by basing training on the analysis of the work to be done and then setting the standards it required, McDonald's both drastically upgraded the yield from resources, and created a new market and a new customer. This is entrepreneurship" (Drucker, 1993, pp. 21-22).

Among the enthusiasts of innovation one may hardly find a more prominent one than Clayton Christensen, the author of *The Innovator's Dilemma: Meeting the Challenge of Disruptive Change* and *The Innovator's DNA: Mastering the Five Skills of Disruptive Innovators*. He coined the term "disruptive technologies" and encouraged fostering the culture of startups: "With few exceptions, the only instances in which mainstream firms have successfully established a timely position in a disruptive technology were those in which the firms' managers set up an autonomous organization charged with building a new and independent business around the disruptive technology" (Christensen, 1997, p. 14).

His finding have not yet stayed uncriticized. In their paper entitled *How Useful Is the Theory of Disruptive Innovation?* Andrew A. King And Baljir Baatartogtokh have shown that

[2] Jean-Louis Gassee, a former executive of Apple, famously admitted that "Apple haven't invented anything". He went on stating that Apple was not an inventor but rather a master when it came to taking existing ingredients and whipping up a masterpiece.

despite being one of the most renowned and widely accepted doctrines in the business world and academia Christensen's disruptive innovation theory crumbles down if rigorously tested. Only 9% of cases listed by Christensen as archetypal of his theory actually correspond with the main tenets of his theory.

Some other writers have also warned us against the wholehearted embracing of contemporary talks about unprecedented blessings of innovation. Scott Berkut blatantly contends that "[t]he word innovation has fallen on hard times. There is no innovation superhero, flying around at innovative speeds, using innovative ninja moves to prevent abuse of the word. Simply saying something is great doesn't make it so, yet as the success of marketing and advertising demonstrates, this doesn't stop people from trying. The i-word is thrown around so frequently it no longer means anything" (Berkun, 2010, p. xvi).

This paper does not aim at taking stances in the debate between devotees of the concept of innovation and its doubters. We do believe that when talented and motivated people find themselves in the environment conducive to testing new ideas and solving pressing problems they may come up with useful solutions. The extensive publicity that the terms "innovativeness" and "innovation" boast today may have its disadvantages and may not be faithful to historical facts. None the less, if the focus on being innovative improves conditions in companies worldwide which help bring new ideas to matter, such publicity may be tolerated. The problem, however, is that it may not improve, i.e. posing to be innovative may not lead to actually being innovative.

It is universally believed that the IT sector in general and IT startups in particular are the most innovative firms compared their counterparts in all other branches of economy. There have been abundant reasons to think so: stories of the Silicon Valley's creativity and entrepreneurship changing lives of people in remote corners of our planet have been commonplace. Is it really the case that the IT companies are so innovative? Perhaps in the Silicon Valley they are, whereas in Poland the picture is more sobering.

In the present paper we discuss our research in which we chose one of the methods of measuring innovativeness and applied it to companies from the cosmetics industry and IT sector in Poland. Below we present our findings and venture conclusions stemming from our analysis.

Research and Findings

Innovativeness is notoriously difficult to measure. Moreover, since Joseph Schumpeter and his famous dictum that "innovation is the market introduction of a technical or organizational novelty, not just its invention", it is obvious that we are talking not only about technological breakthroughs but also (and mainly) about making these breakthroughs carry weight in the market, affecting both producers and customers. As maintained by Harpreet Singh Bedi "[t]he innovativeness construct could be studied at different levels from different perspectives. At individual level, innovativeness reflect the creativity of an individual and generally been derived by the personality, motivation and cognition ability of an individual (…). At Group level, innovativeness reflects the involvement of a team in idea generation, promotion, implementation and realization (…). At firm level, innovativeness represents those aspects of a firm's strategic posture - which reflect firm's readiness and capacity to question and abandon - existing or given environments, and to create room for creativity and experimentation. The objective is to think differently, which could manifest itself in advancement in existing processes, launch of new products, and exploration of new markets" (Bedi, 2016, p. 69).

Dalia Gamal in her monograph discusses five innovation dimensions: Innovation Strategy (with focus on innovation and implementation of strategy), Organization and Culture (with roles and responsibilities, organizational structure and climate), Innovation Life Cycle Process (with idea management, product or service development, continuous improvement), Enabling Factors (like project management, human resources, knowledge management), and Innovation Results (Gamal, 2011). Various measures of innovativeness also were discussed by Menold et al. in *A Critical Review of Measures of Innovativeness* (Menold, 2014).

In our research we did not focus on the number of innovations patented or measures of a similar type. Instead we opted to concentrate on the channeling of new ideas. The main question was whether the relations between subordinates and superiors allowed for effective and fruitful communication of new ideas. Using our contacts with Polish companies from the IT and cosmetics sectors within studies testing the practicability of Rudolf Moos's Social Climate and Group Environment Scales we managed to conduct a series of in-depth interviews indirectly targeting the quality of communication between workers and their managers in the context of conveying new ideas and problem solution proposals.

Both the IT and cosmetics sectors are among the vibrantly growing ones in Poland. Jennifer Lopez advertising products of the Polish Inglot company tells you volumes about the condition of the cosmetics industry. As to information technologies "[i]n the entire IT sector in Poland in 2014 400,000 people were employed. It is a market creating the largest number of new workplaces in the country" (Rokicki, 2017, p. 61). Still, in line with the Silicon valley stories one may expect that IP firms are definitely more innovative than firms from other branches of the economy, especially if it comes to the employee-supervisor communication (just think about the Google quarters with high ceilings and brightly colored open spaces designed to encourage inventiveness, about rooms full of beanbag chairs, ping-pong tables, shared games, brain-teasing puzzles, etc. intended to establish rapport between employees and managers). Our research showed, however, that the legendary easy-goingness and effectiveness of IT companies in channeling new ideas and practical solutions through the organizational units are to be reconsidered.

Over the spring and summer of 2018 we conducted interviews with managers and employees in 24 companies from the cosmetics industry and 22 from the IT sector. We located companies on the scale of how advanced they were in handling and transmitting new ideas and problem solving suggestions from the employee level to the managerial one. All the companies were grouped in three categories: low, medium and high (i.e. the level of advancement in channeling new ideas and practical solutions was low, medium or high). The results of our interviews are presented in Table 1.

Table 1. The level of advancement in channeling new ideas versus the type of a company

	Low	Medium	High
Companies form the cosmetics industry	4	6	14
Companies from the IT sector	10	7	5

To establish whether there is a relation between the type of a company (whether it belongs to the cosmetics industry or the IT sector) and the level of advancement in

communicating new ideas, hunches, opinions, conjectures, etc. we ran the chi-square test. The outcome of this test is showed below.

Table 2. The outcome of chi-square test for two variables: the company type and the level of advancement in channeling new ideas

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6,837[a]	2	,033
Likelihood Ratio	7,085	2	,029
N of Valid Cases	46		

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 6,22.

Since the value of Pearson Chi-Square is larger than 5,99 for df = 2 and statistical significance is lower than p = 0,05 the null hypothesis professing that there is no relationship between the given categorical variables (in other words, asserting that they are independent) should be rejected. Analyzing further our findings we may claim that we have established a relationship between the company type and the level of advancement in new idea channeling for the population of cosmetics and IT firms selected for the study. This relationship is the following: the companies belonging to the cosmetics industry demonstrate a higher level of advancement in communicating new ideas and practical solutions from employees to their managers as opposed to the companies from the IT sector.

The strength of this relationship was gauged by using the Cramer's V test the results of which are presented below.

Table 3. The results of Cramer's V test for association of the two variables: the company type and the level of advancement in channeling new ideas

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	,386	,033
	Cramer's V	,386	,033
N of Valid Cases		46	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

For the given degree of freedom the Cramer's V test value of 0,386 indicates the strength of the association between medium and high.

Conclusions:

If innovation is what it is generally claimed to be – namely, the process of ideation, evaluation, selection, development, and implementation of new or improved products, services, or programs, then the initial stage related to transmitting worthwhile and potentially rewarding ideas throughout an organization matters a great deal. Our research contributes to the study of how this stage could be improved. We looked at numbers of new ideas generated by a company, their quality, channels for their communication, effective routes to implementation of problem solving solutions, etc. What surprised us at first – that IT companies were not at all superior to non-IT companies in channeling new ideas and possible solutions – has become better understood later.

To work as a programmer, as an Internet site designer, as an auditor of computer systems, as a mobile application tester, etc. involves an incredible amount of routine. The employees of the IT companies that we visited appeared to get in a rut. They knew what they were doing, there was plenty to be done, and therefore their willingness to come up with something novel under the conditions of time pressure along with standardized and habitual activities was minimal. The employees of the cosmetics industry firms were also busy. Nevertheless they were more receptive to new challenges, managed to approach existing problems more creatively (not just Googling up how others fixed it as was typical among the IT people), and most importantly were by far more inclined to communicate their hunches, opinions and conjectures to their managers.

The above results need not be generalized. Moreover, in different countries the relationship between the company's category and its level of advancement in challenging new ideas may be different too. Further studies in the area are welcome. What our research has showed, however, is that such studies have to be approached open-mindedly, without unnecessary reverence (and possible bias) towards information technology companies.

References:

Bedi, Harpreet Singh (2016). "Firm Level Innovativeness: Antecedents and Consequences", *International Journal of Commerce and Management*, Vol. 10.

Berkun, Scott (2010). *The Myths of Innovation*, O'Reilly.

Drucker, Peter (1993). *Innovation and Entrepreneurship,* Perfect Bound.

Christensen, Clayton (1997). *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail*, Management of Innovation and Change Series.

Gamal, Dalia (2011). *How to Measure Organization Innovativeness,* TIEC.

King, Andrew A. and Baljir Baatartogtokh (2015). "How Useful Is the Theory of Disruptive Innovation?", *MIT Sloan Management Review*, Fall 2015.

Menold, J., K. Jablokow, S. Purzer, D. M. Ferguson and M. W. Ohland (2014). *A Critical Review of Measures of Innovativeness*, 121st ASEE Annual Conference and Exposition.

Ringel, Michael, Hadi Zablit, Florian Grassl, Justin Manly and Clemens Möller (2018). *The Most Innovative Companies 2018: Innovators Go All In On Digital*, BCG.

Rokicki, Tomasz (2017). "IT Market in Poland", *Information Systems and Management*, Vol 6 (1).

Seelos, Christian and Johanna Mair (2012). "Innovation Is Not the Holy Grail: It is time to move from innovation as an ideology to innovation as a process", *Stanford Social Innovation Review*, Fall 2012.

Zmuda, Allison (2010). *Breaking Free from Myths About Teaching and Learning: Innovation as an Engine for Student Success*, ASCD Member Book.

A Blessing or a Scourge: Artificial Intelligence from the Specialist and Non-specialist Perspectives

Paulina Krystosiak, Institute of Computer Science of the Polish Academy of Sciences, Poland (p.krystosiak@ipipan.waw.pl)

Serge Pukas, Institute of Computer Science of the Polish Academy of Sciences, Poland (s.pukas@ipipan.waw.pl)

Abstract:

Artificial Intelligence is often used in Poland as a catch-all concept covering such notions as Machine Learning, Big Data, Deep Learning or Neural Networks. Usually it also is regarded as standing behind such phenomena as automatization, robotization or even blockchain technology. Inspired by writings of Rey Kurzweil about approaching singularity many people hold enthusiastic expectations regarding AI. Others, startled and intimidated by existential risks listed by Nick Bostrom are full of reservations vis-à-vis deployment of AI-based programs and applications. This papers explores views on AI held by managers in IT related and non-IT related sectors. It aims to measure perceived dangers stemming from AI technologies and attitudes towards their further development. The research (examined by using Chi-square and V-Cramer's tests) shows that managers working in non-IT related sectors are significantly more apprehensive of AI than managers from IT companies. The paper concludes that exigent measures ought to be taken to exhort executives, supervisors and administrators from non-IT related sectors to learn more about algorithms and how they are used in new technologies.

Key words: *Artificial Intelligence, AI risks, IT and non-IT sector differences, management and new technologies*

Conceptualization of the Study

In the 80s Hans Moravec, an Austrian working in the US, formulated his famous paradox: contrary to traditional assumptions, high-level reasoning requires relatively little computation power, whereas low-level sensorimotor skills require enormous computational resources.[1] From the human perspective this paradox means that what is easy for us, people, is tremendously difficult for robots and what robots find effortless we treat as almost unsurpassable. Thirty years ago people were worried by encroaching pace of automation. However, the Moravec's paradox, among other things, provided them with a sense of safety: after all if computers and robots were never able to compete with a two-year old child if it came to moving in a smart way in your environment why should we be worried?

The situation is different now. It has turned out that fed with volumes of data the algorithms of machine learning may give us technologies that can do wonders. Deep Blue's victory in a chess match over world chess champion Garry Kasparov in 1997 looks quite impressive even today. What was achieved by this IBM computer pales, however, in comparison to another IMB's computer, called Watson, capable of answering questions posed in natural language and winning a game of Jeopardy! against legendary champions Brad Rutter and Ken Jennings (and cashing in a 1 million dollar prize), to self-driving vehicles developed by several companies[2], or to Sophia – a social humanoid robot developed by Hanson Robotics, the first robot to receive a citizenship (of Saudi Arabia). All these advances make us excited about future prospects of automation. They also make us apprehensive of possible dangers and threats that such robots may bring about. One of the most important concerns is that about the future of jobs. It is true that the so-called middle class jobs were disappearing already in the 80s before the dawn of the Internet, smartphones, ubiquitous sensors and AI based on neural networks. However, the steady intrusion of automation renders the depletion of the middle class in all developed countries even more prominent. As argued by Paul Davidson, "[b]ut now, a new threat is growing that will further hollow out the middle class and make an even more significant difference in the income distribution between the top 1 or 2 percent and the rest of society. This threat is automation - which may even be able to endanger service jobs that are usually

[1] Cf. Hans Moravec, 1988.

[2] Among those companies are Toyota, Audi, Volvo, Tesla, Google, Baidu, Mercedes-Benz, Samsung, Addison Lee, Huawei, Ford, General Motors, Apple, and BMW. About Lidar, a technology evolved from radar which is based on laser light rather than microwaves and used in self-driving cars, see Neff, 2018.

thought of as not capable of being outsourced or offshored."[3] The coming age of semi-self-directed robots is likely to cause low-skilled and high-skilled positions in the labor market increasingly valuable at the expense of all others in between. The enhanced productivity makes the whole picture more convoluted and not as straightforward as we may expect.[4] Still it is undisputable that major shifts are to be anticipated in the job market and people are justifiably concerned about the future of their living.[5]

With new technologies becoming ever more prominent in our everyday life people grow to be divided in their opinion about consequences of adoption of these technologies. It is both encouraging and scary to learn that Facebook can know us better than we do and suggest readings, shows, vacations even possible future friends specifically tailored to our needs and internal desires. As a result many people follow Ray Kurzweil, Kevin Kelly or Larry Page in their unbridled enthusiasm regarding the opening new frontiers (Kurzweil talks about the approaching singularity – an unprecedented age of almost instant innovation by machine intelligence being infinitely more powerful than human intelligence, Kelly believes that a superhuman AI is a myth, however he singles out twelve technological forces that radically alter our life in the next three decades, and Page tries to convince us that digital life is the necessary step in the development of life in the Universe and that without digital life the life on Earth would get extinct).[6]

There are also critics of our infatuation with algorithms and robots. Nick Bostrom write about existential threats to human existence stemming from the unregulated rise of AI machines. In fact Bostrom discusses not only AI but also biological cognition, brain-computer interfaces, collective superintelligence, and whole brain emulation. One of his most

[3] Davidson, 2013/2014, p. 382.
[4] See an interesting discussion on this issue in Acemoglu and Restrepo, 2018.
[5] On the topic of jobs in the future see for instance Ford, 2015, Kaplan, 2015, and Susskind and Susskind, 2015.
[6] "Over the last twenty years, I have come to appreciate an important meta-idea: that the power of ideas to transform the world is itself accelerating. Although people readily agree with this observation when it is simply stated, relatively few observers truly appreciate its profound implications. Within the next several decades, we will have the opportunity to apply ideas to conquer age-old problems—and introduce a few new problems along the way" (Kurzweil, 2005, p.21). "In this future scenario AIs don't get so smart that they enslave us (like evil versions of smart humans); rather AI and robots and filtering and tracking and all the technologies I outline in this book converge—humans plus machines—and together we move to a complex interdependence" (Kelly, 2016, p. 230). „Larry gave a passionate defense of the position I like to think of as digital utopianism: that digital life is the natural and desirable next step in the cosmic evolution and that if we let digital minds be free rather than try to stop or enslave them, the outcome is almost certain to be good. I view Larry as the most influential exponent of digital utopianism. He argued that if life is ever going to spread throughout our Galaxy and beyond, which he thought it should, then it would need to do so in digital form. His main concerns were that AI paranoia would delay the digital utopia and/or cause a military takeover of AI that would fall foul of Google's "Don't be evil" slogan" (Tegmark, 2017, p. 46).

disconcerting assertions is the following: "Before the prospect of an intelligence explosion, we humans are like small children playing with a bomb. Such is the mismatch between the power of our plaything and the immaturity of our conduct. Superintelligence is a challenge for which we are not ready now and will not be ready for a long time. We have little idea when the detonation will occur, though if we hold the device to our ear we can hear a faint ticking sound" (Bostrom, 2014, p. 297).

In her book entitled *Weapons of Math Destruction* Cathy O'Neil contends that much harm is already experienced by a variety of professions because of algorithms.[7] For example, we have delegated in an increasing number of cases our decision about job evaluation and career promotion to computerized machines. Even more scary we have allowed judges (in some cases enjoined them) to follow recommendations produced by algorithms while making decisions about paroles of prison inmates. Incarcerating people is a very serious issue. It is disquieting that robots would be settling it in the nearby future. Pedro Domingos, a professor of computer science and engineering at the University of Washington, asserts the following in *The Master Algorithm:* "Kurzweil argues that other technologies will take the place of semiconductors and S curve will pile on S curve, each steeper than the previous one, but this is speculation. He goes even further to claim that the entire history of life on Earth, not just human technology, shows exponentially accelerating progress, but this perception is at least partly due to a parallax effect: things that are closer seem to move faster. Trilobites in the heat of the Cambrian explosion could be forgiven for believing in exponentially accelerating progress, but then there was a big slowdown. A Tyrannosaurus Ray would probably have proposed a law of accelerating body size. Eukaryotes (us) evolve more slowly than prokaryotes (bacteria). Far from accelerating smoothly, evolution proceeds in fits and starts." (Domingos, 2015, p. 287-288).

The success of every technology depends upon us embracing it and trusting that it brings about more good than bad and generates more right than wrong actions. If we are not sure whether Artificial Intelligence would eventually turn out to be a blessing for the mankind we may not use it effectively. More importantly we may not use it to the benefit of all. Bronze, cast iron, triremes, harnesses, stirrups or gunpowder were used first for conquest, exploitation and social domination rather than for the betterment of human lives. If we constrain AI research it will go underground and may end up being wielded by rogue groups.

[7] O'Neil, 2016.

If we let it roam freely and unconditionally accept whatever comes out of it we may radically change our lives for worse without intending it. A well-balanced approach looks like a reasonable solution. However, it is achievable only when people are not negatively predisposed towards AI.

This paper tries to establish a degree of enthusiasm or fear expressed towards AI and related technologies by IT and non-IT specialists. Our hypothesis is that the level of apprehension vis-à-vis AI technologies is considerably higher among those who do not work in the IT sector as opposed to those who do. People are not usually welcoming towards things that threaten to undermine their living and generate a new world in which they may not realize themselves fully. The recent accelerated technological development has brought plenty of benefits. However, it has also contributed to increased and bitterly felt inequality, rife uncertainty, particularly in the area of new investments and finance, reshuffled unemployment, and reassessment of many social and individual values (e.g. family values). How these perspectives on AI are linked to what people do professionally is the subject of our study.

Research design

The aim of our research was to establish how much people are afraid of AI. In other words, we intended to measure perceived dangers stemming from AI technologies and attitudes towards further developments of these technologies held by people working in the IT sector and those who have not direct experience with computers and programmes. The research was based on in-depth interviews carried out with the help of a scandalized scenario. The participants of this study were chosen among the students of the MBA program taught by the Institute of Computer Sciences of the Polish Academy of Sciences with support of the Woodbury School of Business Utah Valley University (USA).

The MBA program in question enrolls students with significant business experience. The program itself is not a specialized one. As a result people of varied background study in it. Since the MBA program focuses on Innovations and Data Analysis it attracts quite a few candidates from the IT sector. Usually in any given cohort there are about a third of enrolled students directly related to information and computer technologies and the rest coming from

all other possible branches of the economy (logistics, public administration, manufacturing, finance, etc.).

Although students enrolled in the MBA program came from many different countries our research design presupposed selection of respondents of Polish origin only. We were set to determine what attitudes towards AI were most prevalent in Poland. An additional reason for focusing on Poles was related to interpretation of our findings. Any qualitative study involving interviews relies on deciphering the verbal and non-verbal information and meaning handed over by the chosen interlocutors. This process of decoding runs into increased difficulties when a given group is ethnically and culturally contrasting.

Altogether there were 84 respondents taking part in the interviews over the period of the last two years. Their gender and IT sector affiliation are presented below.

Table 1. Gender and IT sector affiliation of interviewees

	Working in the IT sector	Working in a non-IT sector
Females	11	24
Males	21	28

Our study aimed at establishing whether there was a connection between the IT-sector affiliation and attitudes and stances that the interviewees took vis-à-vis developments of AI and technologies associated with it. The sample of respondents we were dealing with was quite homogeneous in terms of age and level of education. There was, however, one variable which we thought might affect the respondents' beliefs about artificial intelligence, machine learning, neural networks, automatization, robots, etc. This variable was gender. Below we present attitudes that women and men held towards AI.

Table 2. Gender of the respondents and their attitudes towards AI and technologies it brings about

	Apprehensive attitude	Neutral attitude	Enthusiastic attitude
Females	16	11	8
Males	18	12	19

The chi-square test for independence was run to evaluate the above findings. The results are presented below.

Table 3. The outcome of the chi-square test for the variable "Gender of the respondents" and the variable "Attitude towards AI and technologies it brings about"

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2,375[a]	2	,305
Likelihood Ratio	2,431	2	,296
N of Valid Cases	84		

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 9,58.

The results of the interviews measuring the respondents' stance towards new technologies induced by recent developments in AI and their affiliation to the IT sector are shown in the table below.

Table 4. Attitudes towards AI and technologies it brings about versus the IT sector affiliation of the interviewees

	Apprehensive attitude	Neutral attitude	Enthusiastic attitude
Respondents from the IT sector	7	9	16
Respondents from non-IT sectors	27	14	11

The above data were analyzed by means of a chi-square and Cramer's V tests. The results are displayed in the tables below.

Table 5. The result of the chi-square test for the variable "IT sector affiliation" and the variable "Attitude towards AI and technologies it brings about"

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	9,557[a]	2	,008
Likelihood Ratio	9,778	2	,008
N of Valid Cases	84		

a. 0 cells (0,0%) have expected count less than 5. The minimum expected count is 8,76.

Table 6. The outcome of the Cramer's V test for the variable "IT sector affiliation" and the variable "Attitude towards AI and technologies it brings about"

Symmetric Measures

		Value	Approx. Sig.
Nominal by Nominal	Phi	,337	,008
	Cramer's V	,337	,008
N of Valid Cases		84	

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

Discussion

The most important hindrance in the process of carrying out interview sessions was time pressure. Our respondents were busy people attending MBA program modules which were tightly scheduled and therefore time constraints mattered a great deal. One may say that qualitative studies hate being conducted in a hurry. The need to have ample time for an interview explains why the research had to last for about two years. At the same time, the most important advantage during the interviews was the degree of rapport we managed to achieve. It was very high. It smoothed communication, allowed for better interpretation, and determined unequivocal classification.

As Table 3 shows we do not have a reason to refute the null hypothesis which states that there is no statistical connection between "Gender of the respondents" and "Attitude towards AI and technologies it brings about". The value of Pearson Chi-Square is too low: 2,375 and the statistical significance is higher than 0,05 (p=0,305). As a result we may assert that there is no influence of gender on what stances the respondents took towards AI and new technologies.

The opposite conclusion is to be drawn from Table 5. The Pearson Chi-Square value is well above 5,99 (for 2 degrees of freedom, df=2) and statistical significance p is below 0,05 (p=0,008). This gives us a substantial reason to reject the null hypothesis affirming that knowing whether people come from the IT sector or a non-IT one does not help you to predict the level of their anxiety, misgivings and reservation vis-à-vis AI and technologies stemming from it.

Consequently, we have to admit that the variable "IT sector affiliation" and the variable "Attitude towards AI and technologies it brings about" are not independent.

How much the above two variables are connected is determined by the results of the Cramer's V test shown in Table 6. For df*=1 (which is not the same as df) the value of Cramer's V equal to 0,337 can be interpreted in the following way: there is a medium / fairly strong correlation between the variable "IT sector affiliation" and the variable "Attitude towards AI and technologies it brings about".[8] In other words, we have established a relationship between people's familiarity with information and computer technologies and the degree of apprehensiveness towards these technologies. Moreover, this relationship is quite strong.

The above finding can be explained by pointing out that the interviewees were mostly concerned by the effect of new technologies on the labor market. Some people were worried about potential job losses, particularly in the manufacturing sector. Others were disturbed by uncertainty and incoming changes in their companies or organizations: even if you occupy a managerial position such changes may not bode well for you. If the steam and internal combustion engines caused disappearance of many physical labor jobs the widespread introduction of AI may lead to closing white collar and managerial professions. A great many respondents were also afraid of being monitored, screened and profiled by AI related devises during various activities they were to engage into. Improved medical services due to pattern recognition qualities of AI were deemed as an advantageous development,

[8] Cf. Cohen, 1988, p. 222 and Gravetter and Wallnau, 2016, p. 586.

whereas a possibility of Facebook knowing us much better than we know ourselves stirred discomfort and unease.[9] The fact that specialists from the IT sector may count on easier job prospects in the economy dominated by information and computer technologies (for instance by writing programmes and creating apps) than those from non-IT sectors may possibly account for the results of our study. Additionally, those who work in the IT sector realize that it is still people who write computer codes and operate those machines and robots and, therefore, they are less susceptible to exaggerated dystopian visions of our near future.

It would, therefore, be conducive for balanced assessment of AI and its greater social acceptance if specialists from non-IT related sectors could learn more about algorithms, computer programs and their applications. We are not talking about schooling people in C++ or Python languages. We are encouraging, however, popular discussions of all of the 12 technologies listed by Kelly in his *The Inevitable: Understanding the 12 Technological Forces That Will Shape Our*

Future (Kelly, 2016). People have the right to know what AI may bring about and build their life plans accordingly. Moreover, those who have thought about consequences of the AI age have the obligation of sharing their informed conjectures and surmises with the others.

References:

Acemoglu, Daron and Pascual Restrepo (2018). "Low-Skill and High-Skill Automation", *Journal of Human Capital*, Summer 2018, Vol. 12 Issue 2, pp. 204-232.

Bostrom, Nick (2014). *Superintelligence: Paths, Dangers, Strategies*, Oxford. Cohen, J.

(1988). *Statistical Power Analysis for the Behavioral Sciences*, Routledge.

Davidson, Paul (2013/14). "Income inequality and hollowing out the middle class", *Journal of Post Keynesian Economics*, Winter2013/2014, Vol. 36 Issue 2, pp. 381-384.

Domingos, Pedro (2015). *The Master Algorithm: How the Quest for the Ultimate Learning Machine Will Remake Our World*, Basic Books.

[9] There were various other concerns regarding AI, in particular the fact that the United Arab Emirates launched the first Artificial Intelligence (AI) strategy, marking a new level of innovation built on Smart Government, was a source of restlessness for several respondents.

Ford, Martin (2015). *Rise of the Robots: Technology and the Threat of a Jobless Future*, Basic Books.

Gravetter, Frederick J. and Larry B. Wallnau (2016). *Statistics for the Behavioral Sciences*, Cengage Learning.

Kaplan, Jerry (2015). *Humans Need Not Apply: A Guide to Wealth and Work in the Age of Artificial Intelligence*, Yale University Press.

Kelly, Kevin (2016). *The Inevitable: Understanding the 12 Technological Forces That Will Shape Our Future*, Viking.

Kurzweil, Raymond (2005). *The Singularity Is Near: When Humans Transcend Biology*, Viking.

Moravec, Hans (1988). *Mind Children: The Future of Robot and Human Intelligence*, Harvard University Press, Cambridge MA.

Neff, Todd (2018). *The Laser That's Changing the World: The Amazing Stories behind Lidar, from 3D Mapping to Self-Driving Cars*, Prometheus Books.

O'Neil, Cathy (2016). *Weapons of Math Destruction: How Big Data Increases Inequality and Threatens Democracy*, Crown.

Susskind, Richard and Susskind, Daniel (2015). *The Future of the Professions: How Technology Will Transform the Work of Human Experts*, Oxford University Press.

Tegmark, Max (2017). *Life 3.0: Being Human in the Age of Artificial Intelligence*, Knopf.