KNOWLEDGE MANAGEMENT, OPEN INNOVATION AND *e*-MARKETING & *e*-BUSINESS AS KEY FACTORS OF DEVELOPMENT OF THE INFORMATION AND COMMUNICATION TECHNOLOGY SECTOR

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Contenido

Introduction

Knowledge Management, Open Innovation and e-Marketing & e-business as Key Factors of Development of Information and Communication Technology Sector, is aimed to compile a selection of papers published during the period of 2015-2016 & 2017 by professors of the Phd Management Sciences, of the University of Guadalajara, to show how is proposed the design of their interaction and what were the first meaningful findings for the information and communication technologies sector located in Jalisco, Mexico.

For instance, the first article where the information and communication technologies is the principal source of producing new and innovative forms of teaching-learning process, the research is aimed to unveil an empirical model for mobile learning and their determinants factors. This research applied a documentary study to select the variables with specialists in m-Learning using Analytic Hierarchy Process (AHP) determining the final Factors: Technology (T); Contents & Teaching-Learning Management (C&TLM); Teacher Student Rol (TSR); and 60 Variables. The study was applied on: 20 teachers and 800 students both participating in social sciences courses, from 7 Universities located at Metropolitan Zone of Guadalajara, México (UMZG) during the period 2013-2014.The data of the questionnaires, were analyzed by structural equations modeling (SEM), using EQS 6.1 software. The final results suggest reinforce 9 variables to improve the interaction with mL model at UMZG.

The second study tell us how the Innovation is a key factor to increase the competitive advantage for business. When the Innovation is improved by the Knowledge Management, it does in the Firms based on the sense of information: for, from and about the customers and is called: Customer Knowledge Management. So, the aim of this study is to solve: which are the latent factors between Innovation and Customer Knowledge Management relationship? To achieve it, a questionnaire was designed and applied to the 500 Chief Executive Officers from the Small & Media Enterprises Software Sector

in Guadalajara, Mexico, that are part of the value chain, involving: designers, manufacturers and suppliers. The study applied the Structural Equations Model as a quantitative method to discover the underlying relationships amongst the most relevant variables between Innovation on Customer Knowledge Management, as: Driver of Innovation; Support; other Sources of Knowledge, Satisfaction, Experience and Performance with a total of 15 indicators.

The third project, shows how the Knowledge Management (KM) in Innovation process (INNOV), is a powerful engine that drives the company towards competitiveness (INSEAD, 2014; WEF, 2014); however, many small and media enterprises (SMEs) in México, ignore it. So, the aim of the present study is to discover the key factors of KM that are involved in the INNOV, prevailing in the field of software sector SMEs in Guadalajara (SSG), Mexico. This research is based on a documental study about KM and how is related as driver on the INNOV; to achieve this, it was designed a questionnaire divided in two parts: the first one, corresponding to KM that involved (5) factors: KM Leadership (KMLD); KM Capture and Acquisition (KMCA); KM Training and Mentoring (KMTM); KM Policies and Strategies (KMPS); KM Communications and Rewards (KMCR) with 23 total indicators as variables. The second one, INNOV that involved (6) factors: Innovation Value Added (IVADD); Innovation Input Items (IIIT); Innovation Process (INPROC); Innovation Output Items (IOIT); Innovation Performance (IPERF) and Innovation Feedback (IFEED) with 39 total indicators as variables. It was designed a questionnaire (62 variables), as a measurement instrument based on Likert Scale (1to 5 interval) in order to determine the degree of agreement with well Cronbach's Alpha confidence (0.8432). It proceeded to do a survey to the total 200 CEOs belonging to the SMEs from SSG. The results were analyzed using Structural Equations Modeling (SEM) to find validity and reliability of the structure to discover by the system equations, the underlying variables and their interrelationships. Finally, it was found most representative KM variables to drive the INNOV, were: KMCA (0.9095); KMCR (0.8845); KMTM (0.8815); KMLD (0.8780); KMPS (0.8235). Finally were solved the (5) hypotheses finding the relationship between the KM factors and INNOV have significant positive effects. The originality and value of this research lied

in the design of a construct that identify the underlying KM factors and variables sized according an exploratory and multi-correlational study to drive the INNOV. All the factors and variables were collected from the principal theories about both subjects and jointed in a solid set by SEM to find their respective correlations. The practical implications shall serve to the SSG to identify what variables and factors from KM, are able to drive the INNOV and get a better place for competitiveness.

The fourth work describes how at the beginning of the XXI century, several authors affirm that open business models (OBM) enable an organization to be more effective in creating as well as capturing value and are a prerequisite for successful co-development partnerships. As a result of both trends, the rising development costs and shorter product/service lifecycles, companies are finding it increasingly difficult to justify investments in innovation. The OBM solve both trends, underscoring the terms: *"industry ecosystem"* and/or *"collaborative business model"*. Not only it changes the innovation process but it also modifies organizations themselves by reconfiguring value chains and networks. For the firms, it creates a heuristic logic, based on the current business model and technology to extend them with strategy, to the development of innovation to create value and increasing revenues and profits. It emphasizes the external communities with governance as valuable resources with several roles that promote corporate competitiveness. So, for a specialized sector with high technology such as the information technologies sector of metropolitan zone of Guadalajara (ITSMZG), it was posed the next research question: Which are the determinant factors of the OBM as an empirical model to be applied at the ITSMZG? This was a documentary study to select the main variables among specialists in ITSMZG practicing the OBM process using analytic hierarchy process (AHP) and Delphi's Panel to contrast the academic terms with the specialist experience. It's a descriptive, exploratory, correlational, cross-sectional, qualitative-quantitative study to obtain a final questionnaire in Likert scale, with reliability tested through a pilot survey (Cronbach's Alpha>0.75), applied during Jan. 2015-May 2016 to the total population asked: 600 specialists of ITSMZG (150 IT teachers and 150 representatives of consulting firms as *"consultant part"*; 290

IT SME CEO and 10 IT LE CEO as the *"decision-making part"*, since 1 year in the market, 80% with bachelor degree, 20% with postgrad, 20% women and 80% men). It was designed a first-order structural equation modeling (SEM) as a confirmatory factor analysis (CFA) technique, using the EQS 6.1 software to analyze the OBM underlying variables, to determine a final empirical model. The result is an empirical OBM based on 5 main factors: business management BMG (10 variables/76 indicators), strategy (STR, 3 variables/14 indicators), technology (TEC, 3 variables/24 indicators), new entrepreneurships (NWE, 3 variables /7indicators) and open innovation orientation (OIO, 3 variables/18 indicators), empirically proved for the ITSMZG. Although the final empirical OBM has a significant positive effect among its variables, also showed different levels of factor loadings, meaning opportunities to improve the model for the ITSMZG.

The fifth article is aimed to disclose an empirical model of Open Innovation (OIN) in the Information Technologies Sector of Metropolitan Zone of Guadalajara, Mexico (ITSMZG) to achieve a useful model to be used. The variables for the theoretical framework were determined using Delphi's focus group panel and Analytic Hierarchy Process (AHP) obtaining academic and expert visions. The was a descriptive, exploratory and a cross-sectional study, with a final Likert scale questionnaire, tested for reliability and validity with survey applied to 400 ITSMZG specialists (Jan-2017-Jun-2017). The results of OIN model were analyzed using exploratory factor analysis (EFA) by SPSS 20 IBM, obtaining 3 underlying variables: knowledge management (KMG), open business models (OBM), innovation ecosystem (IEC), with 26 dimensions/64 indicators.

The sixth project is aimed to disclose how Digital Broadband (DBD) is affecting the practice of Open Innovation (OIN) in the Information Technologies Sector of Metropolitan Zone of Guadalajara, Mexico (ITSZMG) to achieve a model, for the improvement of relationships. It is a descriptive, exploratory, correlational, cross-sectional, qualitative-quantitative research. As a qualitative study, it is based on a deep literature review after which, it was used Delphi Panel with Analytic Hierarchy Process (AHP), determining the main factors: DBD (1 factor/ 6 variables/43 indicators) and OIN (3 factors/23 variables/161 indicators) in a questionnaire Likert scale, involving

600 ITSZMG specialists at 200 SMEs. The survey was on the period of September-December 2016. As a quantitative study, it applied Confirmatory Factor Analysis using EQS 6.2 software. The value of this study, is to propose a generalized model involving the relationship between DBD-OIN for ITSZMG, and identify the underlying variables and their relationships to make suggestions about how to be more innovative, among the firms in the sector. The final results: 5/6 DBD variables have significant positive effect on 18/23 OIN variables. This implies opportunities to develop the model. It was obtained an empirical model capable of identifying its own DBD-OIN relationships in order to be, a more innovative firm in the ITSZMG.

The seventh article shows how the Innovation (INNOV) process is considered as a driver to increase the competitiveness in the Digital Marketing (DM) sector; however, many firms ignore how their own DM resources and capabilities affect the INNOV process. So, through a DM-INNOV proposed conceptual model, the aim of this study is to determine which are the main factors of INNOV are affected from DM, in Guadalajara, México. The design is based on INNOV process model, construct published previously by Mejía-Trejo et al. (2014) and complemented with the DM model construct proposed here, with variables which are tested for validity and reliability through a pilot survey in order to get the final model. The study subjects were the most important customers of Monster Online (a mexican company, specialized in DM) and analyzed by inferential statistics determining the Cronbach's Alpha reliability in a pilot test and multiple linear regression (MLR) based on Stepwise Method using SPSS 20 program. The methodology is proposed as a descriptive, exploratory, correlational and a transversal study, based on documentary research to obtain a final questionnaire using the Likert scale applied to the total population: 900 Monster's Online relevant CEO clients. So, it proposed:

1. For DM: Web integration (WBI); Web Experience (WBE); Web Strategy (WBS) and Technological Resources (TRS)
2. For INNOV process by Mejía-Trejo's et al. (2014) conceptual model with: Innovation Value Added (IVADD); Innovation Income Items (IIIT); Innovation Process (INPROC); Innovation Performance (IPERF); Innovation Feedback Items (IFEED); Innovation Outcome Items or Results of Innovation (IOIT).

The approach is based on the importance to relate the DM on INNOV process to determine their main factors that are affected and generate more innovation in the DM sector. This article is aimed to determine the main factors that drive the DM on INNOV process to get more, about this, by mean of original theoretical models as a product of the principal related theories about DM and INNOV process. The Value of the study, is to obtain a first settlement for a generalized model able to be applied in other sectors in Mexico. The results obtained, will allow measuring the level of correlation amongst the variables in study, and discover how the main factors of INNOV process are influenced for DM components.

The eight article tell us how to build a construct relating the national competitiveness model (NCM) with the proposition of digital marketing innovation model (DMIM), for a digital campaign design. The methodology is based on a literature review using Delphi Panel with Analytic Hierarchy Process (AHP) among 200 (100 professors and 100 CEO) digital marketing specialists located at Guadalajara, Mexico. The results pointed out to a final questionnaire supporting a construct with 8 main variables of the NCM and 10 main variables involved into the DMIM for a Digital Campaign Design.

The ninth work, is aimed to propose a construct relating the national competitiveness model (NCM) with our proposition of digital marketing innovation model (DMIM) for a digital campaign design. The design is a final questionnaire in Likert scale, applied during Jan. Apr. 2017 to the total population: 200 specialists (100 professors/100 CEOs) of digital marketing campaign designers in Guadalajara, México (called specialists). The methodology is based on a documentary research to determine the variables related into NCM-DMIM. As a qualitative study, the variables obtained were analyzed by 10 specialists using Delphi Panel and Analytic Hierarchy Process (AHP). The results were two visions, among academics (professors) and the experts (CEOs) vision (called conceptual evidence) with different rates of importance and order of appearance of each determined variables of the NCM-DMIM construct. As a quantitative study (the empirical evidence), we practiced correlation and multiple linear regression techniques to determine the most important variables and their relationships in such construct. As a finding, it is the first settlement for

a generalized model able to explain the variables involved in the relationship between NCM-DMIM construct. The research limitations: there are no previous models relating the main NCM-DMIM variables. The social and practical implications are aimed to the marketing sector recommending improvements of NCM-DMIM relationships as a measuring tool. The originality is based on the empirical disclosing of the main NCM-DMIM variables using an original theoretical model adapted to the context.

Finally, the tenth project is aimed to determine a construct of electronic business (e-business) innovation (eBIM). This study is based on a documentary research to determine the main variables of the eBIM as academic vision and based on a focused group of e-Business experts using the Delphi Panel method and the Analytic Hierarchy Process we obtained the expert vision of the eBIM, as a general conceptual model. Based on both visions it was obtained the 19 variables and 3 factors to be included in the final eBIM proposal, which: 9/19 variables are according to the both visions, 6/19 are suggested by expert vision and 4/19 are suggested by academic vision. The conceptual eBIM obtained has the potential to be used. Further studies regarding the eBIM, are: an exploratory factor analysis to verify the grouping of such variables; a confirmatory factor analysis to disclose the underlying variables and factors relationships and a multiple linear regression to determine how is the correlation amongst these variables.

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To all of them, Thanks

Empirical Model for Mobile Learning and their Determinants Factors, in Mexico

ABSTRACT. The information and communication technologies (**ICT**) are producing new and innovative forms of teaching-learning process, so our research question is: **Which is the Empirical Model for Mobile Learning and their Determinants Factors, in México**? This research is aimed to respond it, based on documentary study to select the variables with specialists in m-Learning using Analytic Hierarchy Process (**AHP**).
The final **Factors**, were **3:** Technology (**T**); Contents & Teaching-Learning Management (**C&TLM**); Teacher Student Rol (**TSR**); and **60 Variables**. The study was applied on: **20** teachers and **800** students both participating in social sciences courses, from **7** Universities located at Metropolitan Zone of Guadalajara, México (**UMZG**) during the period **2013-2014**.The data of the questionnaires, were analyzed by structural equations modeling (**SEM**), using **EQS 6.1 software**. The final results suggest reinforce **9 variables** to improve the interaction with **mL** model at **UZMG**.
Keywords: Mobile Learning, Determinant Factors, Analytic Hierarchy Process.

RESUMEN. Las tecnologías de información (**IT**) están produciendo nuevas formas en el proceso de enseñanza-aprendizaje, por lo que nuestra pregunta de investigación, es**: ¿Cuál es el Modelo Empírico del Aprendizaje Móvil y sus Factores Determinantes en México?** Así, esta investigación se orienta a responderla y se basa en un estudio documental para seleccionar las variables con especialistas en m-Learning mediante el uso del Proceso Analítico Jerárquico (**AHP**). Los factores finales fueron **3**: **Tecnología** (**TECH**); Contenidos y Administración de la Enseñanza-Aprendizaje (**C&TLM**); Rol Estudiante-Profesor (**TSR**) y **60 Variables.** El estudio fue aplicado en: **20 profesores** y **800 estudiantes** de ciencias sociales, pertenecientes a **7** Universidades localizadas en la Zona Metropolitana de

Guadalajara, México (**UMZG**), durante el período **2013-2014**. Los datos de los cuestionarios fueron analizados por modelización de ecuaciones estructurales (**SEM**), usando el software **EQS 6.1**. Los resultados finales señalan reforzar **9 variables** para mejorar la interacción con el modelo **mL** en las **UMZG**.
Palabras Clave: Aprendizaje Móvil, Factores Determinantes, Proceso Analítico Jerárquico.

Introduction

The projected growth of education supported by **IT**, responds immediately to resolve problems of geography, time and demand. Unfortunately, it has also drawbacks, such as: low intensity on interactivity between teacher-student; feedback tends to be very slow; It presents difficulties error correction materials, assessments; there are more dropouts than face teaching; etc. (Gallego and Martínez, 2002). E-learning or online, is defined by the Fundación para el Desarrollo de la Función Social de las Comunicaciones (FUNDESCO) as: *a system for delivery of distance learning, supported by **ICT** which combines different pedagogical elements: classical training (classroom or self-study), practical, real-time contact (in person, video or chat) and deferred contacts (tutor, forums discussion, email)* (Marcelo, 2002). In the second decade of this century, due to technological advances, we have a growing number of mobile devices, from smartphones to notebooks, notepads, iPads, tablets in general, etc. even stopping the development of the PC. According Forrester Research Portal (2015), a third of the tablets sold in 2016, will have serious purposes for business use (Kaganer et al, 2013).

Problem and Rationale of Study

According Hernández-Sampieri (2010) we have our research question (**RQ**) as: **Which is the Empirical Model for Mobile Learning and their Determinants Factors, in México?** thus, our general objective (**GO**), is to propose factors and variables to discover the determinants

from (**mL**) as a Conceptual Empirical Model for Mobile Learning and their Determinants Factors, in México. Hence, we propose, the next specific questions (**SQ1**): ¿Which are the factors and variables describing the general conceptual model?; (**SQ2**): ¿What about the relationships amongst them?; (**SQ3**); ¿What are the most relevant variables in the conceptual model?. A final General Hypothesis (**GH**) is proposed: All the relevant variables have significant positive effect over **mL**.

Methodology

This study is aimed to discover and discuss the Empirical Model for Mobile Learning and their Determinants Factors, in México. It is empirical, correlational and longitudinal study in time because it was applied during the period of **2013-2014**. It is based on documentary study and, by means of the Analytic Hierarchy Process (**AHP**) with specialists in m-Learning we discover the main **3** final **Factors**, such as: Technology (**T**); Contents & Teaching-Learning Management (**C&TLM**); Teacher Student Rol (**TSR**). The study was applied on: **20** teachers and **800** students both participating in social sciences (**mL**) courses, from **7** (**UMZG**). The data of the questionnaires, were analyzed by structural equations modeling (**SEM**), using **EQS 6.1 software**, to respond the **RQ** and **GH.**

Theoretical Framework

AHP. We made a documentary study of factors (**mL**), among more than **100** works in this regard, proceeding to detect all the variables what are more often mentioned, and by means of AHP (Saaty, 1997) technique, we asked to 5 specialists in m-Learning to select the most important variables to use in our conceptual model. **See Table 1**.

Table 1
AHP or Saaty's Theorem

Objective	*Mobile Learning (mL)*			
	Variable		*Frequency*	*AHP weighing*
Alternatives	1	Technology	28	0.23
	2	Contents & Teaching Learning Management	16	0.22
	3	Teacher	12	0.19
	4	Student	10	0.13
	5	Innovation	9	0.07
	6	Assessing	8	0.06
	7	Policies	7	0.04
	8	Learning Management	3	0.02
	9	Web Learning	4	0.01
	10	On Line Communities	1	0.01
	11	Multimedia Learning Objects	1	0.01
	12	Augmented Reality for learning	1	0.01
Total			**100**	**1.00**

Source: own.

Learning Management. There are several theories that attempt to explain how people learn. Over **50** theories are online; however, most of them are variations of the **3** main lines*: behaviorism (behavior), cognitivism (mind and brain) and constructivism (construction of knowledge)*. New theories that support the m-Learning are: *connectivism (network connections)* and *enactivism (actions based on the body and senses,* Woodill, 2011).

m-Learning. Since the focus has shifted in recent years due to technological advances, so does its definition; **see Table 2.**

Table 2
m-Learning Descriptions

Author	*Description*
Brazuelo y Gallego, 2011	"*…The educational model that facilitates the construction of knowledge, problem solving learning and development of skills or different skills autonomously and ubiquitous thanks to the mediation of portable mobile devices*".
Traxler & Kukulska, 2005	"*…Any educational process where the only dominant and prevailing technology is provided by equipment type: handheld or palmtop …"*
Keegan, 2005	"…m-Learning should be restricted to devices based learning where anyone can carry in their pockets"
O'Malley et al, 2005	"*…Any sort of learning that happens when the student is not fixed, or at a predetermined place... well, is learning happens when students take advantage of the learning opportunities offered by mobile technologies*"

Source: several authors by own adaption

Consultant or teacher tells the students what to do in their learning; in other words, they become in *facilitators* that make the student achieves higher levels of knowledge (Woodwill, 2011).

The Contents. People perceive e-learning as a formal course, and not as a tool and an attitude towards lifelong learning to keep the own learning suggests about to get better perceptions of mLearning innovation with new didactic materials, improvements in their presentation on a large scale, (Cabero, 2012) as shown in **Table 3.**

Table 3
Differences between Learning Centered in: Content and Activities

Learning Centered Content	*Learning Centered activity*
The student is usually reactive and passive, waiting for what the teacher says or decides.	Students have an active involvement in their learning, without waiting for the teacher to decide for them;
Decision space student, is small.	Wide freedom for students and space for own decisions as important elements of their learning.

Learning Centered Content	*Learning Centered activity*
Individual learning is promoted	Learning is promoted in collaboration with colleagues; students have opportunities to be independent in their learning.
Students do not have many opportunities to learn independently.	Process-related skills, with a focus on results, and the search, selection and management of information.
Memory replication of content and skills. Personal and professional education often is limited to certain periods of life	Personal and professional education throughout life.

Source: Cabero, 2012, by own adaption.

According to Cabero (2012), an important design aspect is that, there are several types: ranging from the methodologies and strategies that will be used in the virtual action (training design), the type of navigation that allows within materials (navigation design), the chances of students, professor relationship (interaction design); graphic forms in which present the information (navigation design), different evaluation strategies to be permitted and used in the training (evaluation design), and ways of presenting content with forms of construction (design of content).

The Student. This topic takes into account, the cognitive, memory, prior knowledge, emotions and possible motivations. The student will assume the commitment with his own learning process and will find out, in the self evaluation the key to discover his own progress, to make choices. (Montoya, 2008); **see Table 4.**

Table 4
Variable: Student Requirements

Variable	*Example/Description*	*Comments*	*Source*
Previous Knowledge	Tacit and explicit knowledge stored in memory with conditions to be applied in the teaching-learning process	This impacts in how the students are understanding new concepts	Driscoll (2005); Tirri (2003)
Memory	Techniques to successfully encoded with use of signals such as: categorization, mnemonic, tactile, auditory, sensory, etc.	It involves, how multimedia actively encourage the students in their learning	
Context & Transference	Static Knowledge vs Dynamic Knowledge	It involves, how to make students use what they learn to strengthen the memory, understanding and transfer the concepts to different contexts.	Carroll & Rosson, (2005); Driscoll (2005)
Learning by Discovering	Application procedures and concepts to new situations; case study	It involves, how to encourage students to develop skills to filter, select and recognize relevant information in various situations	Tirri (2003)
Emotions & Motivations	Student's feelings to perform a task; reasons for their achievement.	Student inclination or ability to adopt an attitude that prepares your emotional state or desire to accomplish a task.	Carroll & Rosson, (2005) ; Tirri (2003)

Source: several authors, by own adaption

Hence, it described how students use, what they already know and how the information is encoded, stored and transferred; It covers theories about the transfer of knowledge and discovery learning (Ca-

rroll and Rosson, 2005). The experience and prior knowledge, affect learning as does the atmosphere of the student. So their application is under the *experiential memory* (Driscoll, 2005). So, it is important the teaching style of teachers. They are, explicitly or implicitly, using observation techniques, try to *know their* students (Gallego & Martínez, 1999), discovering *learning styles*. **See Table 5.**

Table 5
Learning Styles

Learning Styles	*Description*
Activist	Students are fully and without prejudice involved in new experiences. They are grown to the challenges and get bored with long maturities. They are people very group who engage in the affairs of others and focus around all activities
Reflexive	Students learn the new experiences but do not like to be directly involved in them. Collecting data, analyzing them carefully before reaching any conclusions. Enjoy watching the actions of others, listening but not intervene until they have taken over the situation.
Theoretical	Students learn best when they are taught about things that are part of a system, model, concept or theory. They like to analyze and synthesize. For them. if something is logical, it is good.
Pragmatic	Students apply and practice their ideas. They tend to be impatient when people who theorize

Source: Honey y Mumford (1992), by own adaption

The Teacher (D). The concept of Vygotsky (Moll, 1993) having greater recognition and applicability in the educational field is the zone of proximal development (**ZPD**). This concept *means the individual's actions that he can perform successfully start only in interaction with others, in communication with them and with their help, but can then play in totally autonomous and voluntarily* (Matos, 1995). They are responsible for designing strategies that promote intensive interaction (**ZPD**), taking into account the previous level of knowledge of students, from the culture and the meanings they have in relation to what they will learn (Onrubia, 1998). The process, is established where a group of teachers together: design, teach, observe, analyze, and review one class lesson. **See Table 6.**

Table 6
Teacher Requirements

Indicators	*Example/Description*	*Comments*	*Source*
Informatic Culture	Permanent update of information by using of technology	Attitude and intuitive ability to learn the use of technological resources	Ng & Nicholas (2013); Cabero, 2012
Lection Cycle	Groupal planning / experimental lection/ individual reflection / groupal reflection/ lection reformulated	Teaching based on enactivism	
Cognitive Objectives	Bloom's Digital Taxonomy	Association with the enactive cognitive objectives, such as teaching: knowledge; comprehension; the application; analysis-synthesis and evaluation.	Bloom, 2012

Source: several authors by own adaption

The Technology. This aspect is described into the OSI (ISO / IEC7498 Open System Interconnection, 1994) model developed by the International Organization for Standardization (ISO) in the 1980. It is a framework for defining interconnection architectures communications systems, consisting of seven layers: *physical, link, network, transport, session, presentation and application.* So, consider the equipment intrinsic features such as: *ergonomics, portability, weight, size, weight, design, speed of access to the telecommunications network, processing, storage, capacity growth of the* equipment and the *equipment extrinsic* based provider of telecommunications services such as: *coverage, price, speed of access, availability, compatibility of protocols* among other features (Shneiderman and Plaisant, 2005).

Policies & Assessing. In order to guarantee the continuity and implementation of **mL** technology, is necessary to develop institutional policies to provide direction and enough resources to achieve it, included an assessment system to verify since the participation until the activities and quality of the teaching actions and course contents (Garrison & Anderson, 2003).**See Table 7.**

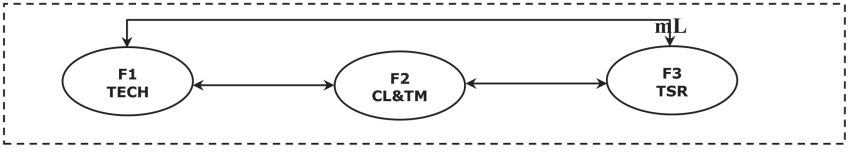
Table 7
Topics that a policy document and strategic plan should Include

1. Vision: – understand background– define core values– describe strategic goals
2. Needs and risk assessment:– identify issues– identify challenges – identify best practices
3. Educational principles and outcomes described
4. Implementation initiatives and strategy: – link to institutional priorities– create a steering committee – identify communities of practice
5. Infrastructure: – design multimedia classrooms– describe administrative processes
6. Infostructure: – design institutional connectivity– create a knowledge management system– provide digital content– create standards
7. Support services: – provide professional development– provide learner support
8. Budget and resources
9. Research and development framework
10. Benchmarking: – establish success criteria– assess progress– communicate direction and accomplishments
11.Assessing

Source: Garrison & Anderson(2003), with own adaption.

So, our determinant factors model is showed in **Figure 1.**

Figure 1
General Conceptual Model for Mobile Learning and their Determinants Factors, in México



Notes: F1. Technology (TECH); F2.Contents & Learning-Teaching Management (CLT&M); F3.Teacher Student Rol (tsr).
Source: own

Results

Table 11 shows the Final Questionnaire with: **3 Factors, 13 Dimensions** and **60 Independent Variables** grouped, according the principal authors to describe **mL.**

Table 11
Final Questionnaire

Personal Background		
If you are a STUDENT: -Name of the (**mL**) course; -What is your occupation? Manager/Employee non-technical/ Employee technical/Teacher or trainer/ Student; -How old are you? 24 or younger /25-29 /30-40 /41-50 / over 50; -Gender? Female / Male; -What is your level of education? High school matriculation/ One to three years of post-secondary education / Four or more years of post-secondary education; -Personal Digital Assistant (PDA) ownership – Do you own? Smartphone/Lap/Palmtop/Other; - Where did you study the mobile learning course? At home/ At the office or work/ While travelling/ Other. **If you are a TEACHER:** -Name of the (**mL**) course;**-**What kind is your assignment? Social Sciences/ Engineering; -Are you: Instructor/ Assistant Professor/ Associate Professor/ Professor;-How old are you? 24 or younger /25-29 /30-40 /41-50 / over 50;-Gender? Female / Male; -What is your level of teaching? High School/ Undergraduate/ Postgraduate/ ;-Personal Digital Assistant (PDA) ownership – Do you own? Smartphone/Lap/ Palmtop/Other;-Where did you study the mobile learning course? At home/ At the office or work/ While travelling/ Other		
Factor	*Variable (measured by Likert Scale: Strongly agree/ Agree/ Uncertain / Disagree/ Strongly disagree)*	*Author(S)*
F1. TECHNOLOGY (TECH)	D1.Technology Friendliness (TFRN)	
	V1.I need a special training to use my PDA	Ng & Nicholas (2013)
	V2.The screen on the PDA makes it difficult to do my school work.	
	V3. Writing with a PDA is easier than writing by hand on paper	
	V4. With a PDA it is easy to take my school work home.	
	V5.I would recommend mobile learning as a method of study to others	Keegan (2005)
	D2.Technology-Synchronous Communication (TSYC)	

F1. TECHNOLOGY (TECH)	V6-Chat in mlearning is very useful is better than PC	Keegan (2005)
	V7. IP telephony functions are very well with the mlearning course.	
	V8.The sending of SMS is very useful	Ng & Nicholas (2013)
	D3.Technology Asynchronous Communication (TASY)	
	V9. Communication and sending assignments for submission with the students (or tutor) by e-mail functioned well.	Keegan (2005); Ng & Nicholas (2013)
	V10. Writing messages to the Forum functioned well	Keegan (2005)
	V11.Answering assignments for submission applying the mlearning functioned well.	
	V12.Accessing to notes and reading text functioned well.	
	D4.Technology Multimedia (TMMD)	
	V13.Accessing to sound, video and graphical materials functioned well	
	V14.Activities/assignments involving manipulation of graphical materials functioned well	
	D5.Social Media (TSME)	
	V15. To learn (or teach), I tend to be in different networks, in permanent interaction and collaboration	Woodill (2001)
	V16. To learn (or teach), I tend to participate in : gaming, simulations and/or virtual worlds	
	V17.To learn (or teach), I feel I spend a lot of time connected in different networks with scarce results	
F2. CONTENTS & -TEACHING LEARNING MANAGEMENT (C&TLM)	D6.Teaching-Learning Management (CTLM)	
	V18. Accessing course content was easy	Keegan (2005)
	V19.Communication with and feedback from the student (or tutor) in this course was easy.	
	V20.Mobile learning is convenient for communication with other course students (or teachers)	

F2. CONTENTS & -TEACHING LEARNING MANAGEMENT (C&TLM)	V21. PDAs help me learn (or teach) my subjects better	Ng & Nicholas (2013)
	V22.There are no disadvantages in using PDAs in the classroom.	
	V23.PDAs make learning (or teaching) more interesting.	
	V24. PDAs help me organize my time better.	
	V25.I feel my learning (or teaching) process is more willing to punishment-reward cycle	Woodill (2001)
	V26.I feel my learning (or teaching) process is more willing to the individual internal brain processes such as: memory, attitude, motivation, self-reflection.	
	V27.I feel my learning (or teaching) process is more willing to "learn how to learn" and I select and decide about how they affordable information responds to my needs when I require it.	
	V28.I feel my learning (or teaching) process is more willing to the sensation to be connected everywhere, every time to the internet affordances	
	V29. I feel my learning (or teaching)process is more willing to respond to the perception of the environment and my actions, through experiencing and doing.	
	D7.Teaching-Learning Styles (CTLS)	
	V30. As a student, (or teacher), I feel that the contents are enough to motivate me to: create new forms of knowledge. You are more Reflexive	Cabero (2012); Bloom (2009); Gallego & Martínez (1999); Honey& Mumford (1992)
	V31. As a student, (or teacher) I feel that the contents are enough to motivate me to: evaluate the knowledge acquired. You are more Reflexive.	
	V32. As a student, (or teacher) I feel that the contents are enough to motivate me to: analyze knowledge acquired. You are more Reflexive.	
	V33. As a student, (or teacher) I feel that the contents are enough to motivate me to: apply the knowledge acquired. You are more Pragmatic	

F2. CONTENTS & -TEACHING LEARNING MANAGEMENT (C&TLM)	V34. As a student,(or teacher) I feel that the contents are enough to motivate me to: comprehend the knowledge acquired. You are more Reflexive.	Cabero (2012); Bloom (2009); Carrol&Rosson (2005); Gallego & Martínez (1999); Honey& Mumford (1992)
	V35. As a student, (or teacher) I feel that the contents are enough to motivate me to: memorize the knowledge acquired. You are more Pragmatic.	
	V36.As a student, (or teacher) I feel the contents are well designed considering: text, context, colors, PDA's formats, accessibility, etc.	Montoya (2008)
F3. TEACHER STUDENT ROL (TSR)	D8.Teacher-Student Perception Feasibility(TSPF)	
	V37. I am motivated about using a PDA for mlearning, because is easy to use and I learn (or teach) better with it.	Ng & Nicholas (2013); Driscoll (2005)
	V38.When I use a PDA I am very intuitive using my memory and my senses	Driscoll (2005)
	V39. Navigation through the mobile learning course was easy.	Keegan (2015); Moll, (1993); Woodill (2011)
	V40. For mobile learning (or teaching) to be effective it is necessary to use graphics and illustrations	Keegan (2015);
	V41. Evaluation and questioning in the mlearning course was effective	
	V42. The use of PDAs have more advantages than a desktop computer.	Ng & Nicholas (2013)
	V43.The PDA that I use has a good relation among hardware, software and connectivity network.	ISO/IEC7498; Shneiderman y Plaisant, 2005; Woodill, 2001
	D9.Teacher-Student Perception Value/Cost (TSPVC)	
	V44. mlearning increases access to education and training. It is still expensive.	Keegan (2005)
	V45.The cost of accessing the mobile course materials was acceptable.	
	V46. The cost of communicating in the mobile learning course with the tutor and other students was acceptable.	
	D10.Teacher-Student Assessing Participation (TSAP)	

F3. TEACHER STUDENT ROL (TSR)	V47.Effectively encourage others to learn?	Garrison & Anderson (2003)
	V48.Contribute regularly, at each important stage of the unit?	
	V49.Create a supportive and friendly environment in which to learn?	
	V50.Take the initiative in responding to other students?	
	V51.Seek to include other students in their discussions?	
	V52.Successfully overcome any private barriers to participation?	
	V53.Demonstrate a reflective approach?	
	D11.Teacher-Student Assessing Activities (TSAA)	
	V54.Each of the activities and strategies employed to assess student learning has methodological and epistemological shortcomings.	
	V55.All the student products are stored in a Database of learning products	
	V56.The assessment is based on using problem-based learning (PBL) activities in m-learning education.	
	D12.Teacher-Sudent Assessing Quality (TSAQ)	
	V57.As a Student (or Teacher) I evaluate the course objectives, activities, contents, technology affordances are aligned and congruent with the tutoring (or goals) of the course.	
	V58.As a student I evaluate the knowledge acquired vs the initial expectations (If you are a teacher: Do you evaluate the knowledge acquired vs the initial expectations of each student?)	Garrison & Anderson (2003); Woodill (2001)
	D13.Teacher-Student Policies (TSPO)	
	V59.I'm informed (If I'm a Teacher: inform to the students), the security and support policies	
	V60. I'm informed (If I'm a Teacher: inform to the students, the educational principles and outcomes described	

Source: Own.

Validity and Reliability of the Model

We show the **Table 12** with a summary of the test and values used in this research.

Table 12
Technical Research Data, Test and Values used in this Research

Technical Research Data		
Features	*Survey*	
Universe	20 teachers and 800 students both participating in social sciences courses, from **7 UMZG,** México during the period 2013-2014.	
Scope	Metropolitan Zone of Guadalajara, México	
Sample Unit	**7** Universities	
Collection Method of Data	e-Mail/ Inquiry	
Scale	Likert 5	
Date of Fieldwork	January-2013-December 2014	
Total e-Mail/Inquiry completely answered	**680**	
Test used in this Research	**Value /Description**	**Author**
Ratio NC/VoQ= Number of cases (**NC**) & Variables Of Questionnaire (**VoQ**)	**NC/VoQ = NC** (20 teachers + **680** students (>=100 and <=1000, according Hair et al.,2010) / 60 **VoQ = 11.66>10** (it is **>10** recommended by Hair, 2010)	
CFA (Confirmatory Factorial Analysis) by Maximum Likelihood Method, and Covariance Analysis by **EQS 6.1** software	To verify the Reliability and the Validity of the Measurement Scales	Bentler, (2005); Brown, (2006); Byrne, (2006)

Technical Research Data		
Features	*Survey*	
Cronbach's Alpha (**CHA**) and Composite Reliability Index (**CRI**)	**ChA (Per Factor Via SPSS) & CRI>=0.7** / Reliability of the Measurement Scales	Bagozzi & Yi, (1988); Nunnally & Bernestain, (1994); Hair et al., (2010)
Mardia's Normalized Estimate.(**M**)	**M>5.00** / Distributed as a unit normal variate such that large values reflect significant positive kurtosis and large negative values reflect significant negative kurtosis. Bentler (2005) has suggested that in practice, values >5.00 are indicative of data, that are non-normally distributed	Bentler (2005); Byrne, (2006)
The Satorra–Bentler scaled statistic (**S-Bχ2**)	**SBχ2.** By specifying ME=ML, ROBUST, the output provides a robust chi square statistic (**χ2**) called. This is to minimize the outliers and achieve goodness of fit	Satorra & Bentler, (1988)
Normed Fit Index **(NFI)**	**NFI>=0.8 and <=.89.** / Index used for more than two decades by Bentler and Bonett's (1980) as the practical criterion of choice, as evidenced in large part by the current "classic" status of its original paper (Bentler, 1992; and Bentler & Bonett, 1987, cited by Byrne, 2006). However, **NFI** has shown a tendency to underestimate fit in small samples,	Bentler & Bonnet, (1980); Byrne (2006)
Comparative Fit Index **(CFI)**	**CFI>=0.8 and <=.89.** Bentler (1990, cited by Byrne, 2006) revised the **NFI** to consider sample size and proposed the Comparative Fit Index (**CFI**). Values for both the **NFI** and **CFI** range **from zero to 1.00** and are derived from comparison between the hypothesized and independence models, as described previously. As such, each provides a measure of complete covariation in the data. Although a **value >.90** was originally considered representative of a well-fitting model (see Bentler, 1992, cited by Byrne, 2006), a revised cutoff value close to 0.95 has been advised (Hu & Bentler, 1999, cited by Byrne, 2006). Although both indexes of fit are reported in the EQS output, Bentler (1990, cited by Byrne,2006) suggested that the **CFI** should be the index of choice	Bentler & Bonnet, (1980); Byrne (2006)

Technical Research Data		
Features	*Survey*	
Non-Normed Fit Index **(NNFI)**	**NNFI>=0.8 and <=.89.** It is a variant of the **NFI** that takes model complexity into account. Values for the **NNFI** can exceed those reported for the **NFI** and can also fall outside the zero to 1.00 range.(Byrne, 2006)	
Root Mean Square Error of Approximation **(RMSEA)**	**RMSEA>=0.05 and <=0.08** / The **RMSEA** considers the error of approximation in the population and asks the question, "How well would the model, with unknown but optimally chosen parameter values, fit the population covariance matrix if it were available?" (Browne & Cudeck, 1993, pp. 137-8, cited by Byrne, 2006). This discrepancy, as measured by the **RMSEA**, is expressed per degree of freedom, thus making it sensitive to the number of estimated parameters in the model (i.e., the complexity of the model). Values less than.05 indicate good fit, and values as high as.08 represent reasonable errors of approximation in the population (Browne & Cudeck, 1993, cited by Byrne, 2006). Addressing Steiger's (1990, cited by Byrne, 2006) call for the use of confidence intervals to assess the precision of **RMSEA** estimates, EQS reports a 90% interval around the **RMSEA** value. In contrast to point estimates of model fit (which do not reflect the imprecision of the estimate), confidence intervals can yield this information, thereby providing the researcher with more assistance in the evaluation of model fit.	Hair et al, 2010; Byrne, 2006; Chau, 1997; Heck, 1998
Convergent Validity (**CV**)	All items of the related factors are significant (**p < 0.01**), the size of all standardized factorial loads are exceeding **0.60** (Bagozzi & Yi, 1988) the extent to which different assessment methods concur in their measurement of the same trait (i.e., construct)—ideally, these values should be moderately high (Byrne, 2006)	Bagozzi & Yi, 1988; Byrne, 2006;

Technical Research Data		
Features	*Survey*	
Variance Extracted Index (**VEI**)	**VEI > 0.50** / In all paired factors as constructs. In a matrix representation, The diagonal represents the (**VEI**), while above the diagonal part presents the variance (the correlation squared); below the diagonal, is an estimate of the correlation of factors with a confidence interval of 95%. See the Table. *Discriminant validity of the theoretical model* mentioned below.	Fornell & Larcker, 1981
Discriminant Validity (**DV**)	**DV** / It is the extent to which independent assessment methods diverge in their measurement of different traits—ideally, these values should demonstrate minimal convergence.(Byrne, 2006). **DV** is provided in two forms: First, with a 95% interval of reliability, **none of the individual elements of the latent factors correlation matrix contains 1.0** (Anderson&Gerbing,1988). Second, **VEI** between the each pair of factors is higher than its corresponding **VEI** (Fornell&Larcker,1981). Therefore, based on these criteria, different measurements made on the scale show enough evidence of reliability, **CV** and **DV**. See the Table. *Discriminant validity of the theoretical model* mentioned below.	Byrne, 2006; Anderson & Gerbing, 1988; Fornell & Larcker, 1981
Nomological Validity (**NV**)	It is tested using the chi square, through which the theoretical model was compared with the adjusted model. The results indicate that no significant differences are good theoretical model in explaining the observed relationships between latent constructs	Anderson & Gerbing, (1988); Hatcher, (1994)

Author: several authors, by own adaption

Discussion

The **CFA** results are presented in **Table 13** and suggests that the model provides a good fit of the data (**S-BX ^{2} = 335.879; df = 180; p = 0.0004; NFI = 0.909; NNFI = 0.905; CFI = 0.933; RMSEA = 0.052**). According **Table 12,** as evidence of the *convergent validity*, the **CFA** indicates that all items of the related factors are significant

(*p <0.001*) and the magnitude of all the factorial loads are exceeding **0.60** (Bagozzi & Yi,1988). All the values of the scale exceeded the value recommended **0.70** for the *Cronbach's Alpha* and **CRI**, which provides evidence of reliability and justifies the internal reliability of the scale of the business competitiveness (**>= 0.70**), recommended by Nunnally & Bernestain (1994) and Hair (et al., 2010) and the *Variance Extracted Index* **VEI(>=0.5**) was calculated for each pair of constructs, resulting in an **VEI** more than 0.50 (Fornell & Larcker, 1981).

Table 13
Internal Consistency and Convergent Validity of the Theoretical Model

Factor	*Variable*	*Factorial Load*	*Robust t-Value*	*Loading Average*	*Cronbach's Alpha (>=0.7per Factor via SPSS)*	*CRI >=0.7*	*VEI >=0.5*
F1 TECH	**V13**	0.890***	1.000a	**0.912**	**0.865**	**0.750**	**0.5**
	V15	0.923***	5.720				
	V17	0.924***	8.543				
F2 C&TLM	**V27**	0.923***	1.000a	**0.914**	**0.823**	**0.751**	**0.502**
	V30	0.890***	19.350				
	V35	0.930***	17.560				
F3 TSR	**V37**	0.956***	1.000a	**0.915**	**0.790**	**0.753**	**0.506**
	V40	0.899***	21.453				
	V44	0.841***	17.312				

S-BX ^{2} = 335.879; df = 180; p = 0.0004; NFI = 0.909; NNFI = 0.905; CFI = 0.933; RMSEA = 0.052
a. Parameters constrained to the value in the identification process.
***= p < 0.001
Source: Own

According the same **Table 12**, with the evidence of the convergent validity, discriminant measure is provided in two forms as we can see in **Table 14**. *First*, with a **95%** interval of reliability, none of the individual elements of the latent factors correlation matrix contains **1.0** (Anderson&Gerbing,1988). *Second*, extracted variance between the two constructs is greater than its corresponding **VEI**

(Fornell&Larcker,1981). Based on these criteria, we can conclude that the different measurements with the model show enough evidence of discriminant validity and reliability.

Table 14
Discriminant validity of the theoretical model.

Factors	*TECH*	*C&TLM*	*TSR*	*CHI Square Differences Test (Values <VEI)*
tech	**0.5**	0.462	0.336	
c&tlm	0.270, 0.410	**0.502**	0.487	
tsr	0.323, 0.581	0.496, 0.758	**0.506**	

Interval Confidence Test (<1.0)

Note: The diagonal represents the Variance Extracted Index (**VEI**), while above the diagonal part presents the variance (the correlation squared); below the diagonal, is an estimate of the correlation of factors with a confidence interval of 95%.

Source: Own

To obtain the statistical results of the research hypotheses, we applied the **SEM** as a quantitative method with the same variables to check the *structure model* and to obtain the results that would allow the hypotheses posed, using the software **EQS 6.1** (Bentler, 2005; Brown, 2006; Byrne, 2006) Furthermore, the *nomological validity* of the theoretical model was tested using the *chi square*, through which the theoretical model was compared with the adjusted model. The results indicate that, the no significant differences in the theoretical model are good in explaining the observed relationships between latent constructs (Anderson & Gerbing,1988; Hatcher, 1994). Taking in account only the **Factors** described and using again **EQS 6.1**, we obtained the **Table 15** to demonstrate our Hypotheses**.**

Table 15
Results of hypothesis testing the theoretical model

Hypotheses	*Structural Relation*	*Standardized Coefficient*	*t Value*
H1. A high level of **TECH** generates a high level **C&TLM** of **mL** model at the **UMZG**.	**TECH C&TLM** of **mL** model at the **UZMG**	**0.710*****	19.631
H2. A high level of **C&TLM** generates a high level of **TSR** in **mL** model at the **UMZG**	**C&TLM** → **TSR** of **mL** model at the **UZMG**	**0.856*****	27.600
H3. A high level of **TSR** generates a high level of **TECH** in **mL** model at the **UMZG**	**TSR** → **TECH** of **mL** model at the **UZMG**	**0.890*****	38.853

S-BX ^{2} = 182.655; DF = 104; P = 0.0005; NFI = 0.931; NNFI = 0.901; CFI = 0.923; rmsea = 0.065***
p < 0.001
Source: Own.

The Hypotheses results obtained after applying the **SEM** method, are showed in **Table 16**.

Table 16
Hypotheses Results

Hypotheses	*Description*
H1	(β = **0.710**, p <0. 001), the relationship between **TECH** and **C&TLM** in **mL** model has significant positive effect.
H2	(β = **0.856**, p < 0.001), the relationship between **C&TLM** and **TSR** in **mL** model has significant positive effect.
H3	(β = **0.890**, p < 0.001), the relationship between **TSR** and **TECH** in **mL** model has significant positive effect.

Source: Own.

Summarizing, we can conclude that all the variables involved are positive and significant over the empirical **mL** model.

Conclusions

We confirmed that **3 Factors**, such as: **TECH, C&TLM, TSR** are involved into the **mL** process, with **13 Dimensions** and **60 Variables** as Indicators so, we solved the **SQ1** by mean to have proposed as theoretical framework what is showed in **Table I, Figure I,** and **Table 11** as a main questionnaire; using **SEM**, we obtained **Table 13** to solve **SQ2** and **Table 14** to justify the enough validity to solve **SQ3.** To prove the Hypotheses, by the results obtained in **Table 15,** where ***GH**: all the relevant variables have significant positive effect to **mL model*** is **affirmative**. In fact, **H3:** A high level of **TSR** generates a high level of **TECH** in **mL** model at the **UMZG** shows the most relevant latent factor. So we solved the **RQ** at **100%.**

However, ¿how the latent variables are interacting? to answer this, we applied the **SEM** as a quantitative technique and we can see how the underlying variables are interacting amongst them at the same time of multiple regressions are in progress. We found **9/60 independent variables as most important on mL** indicators, to reinforce the model. In order to get it, we have:

F1.TECH: Technology
This factor representing a great opportunity to the **UMZG** to increase the **INNOV over the mL** for students and teachers because, we have to get better technologies and friendliest around Multimedia (**TMMD**) issues, in other words: *accessing to sound, video and graphical materials must work, pretty well* (**V13**)(Keegan,2005). The social media (**TSME**) is already present and with a great potential, for analyze the benefits on learning, when the student or teacher perceives*: To learn (or teach), I tend to be in different networks, in permanent interaction and collaboration* (**V15**). Hence it is very important, minimize the sensation of: *To learn (or teach), I feel I spend a lot of time connected in different networks with scarce results* (**V17**) (Woodill, 2001).

F2.C&TLM: Contents & Teaching-Learning Management
This factor reveals the **mL** potential to the UMZG through the Teaching-Learning Management (**CTLM**) when the student or teacher, perceives: *I feel my learning (or teaching) process is more willing to*

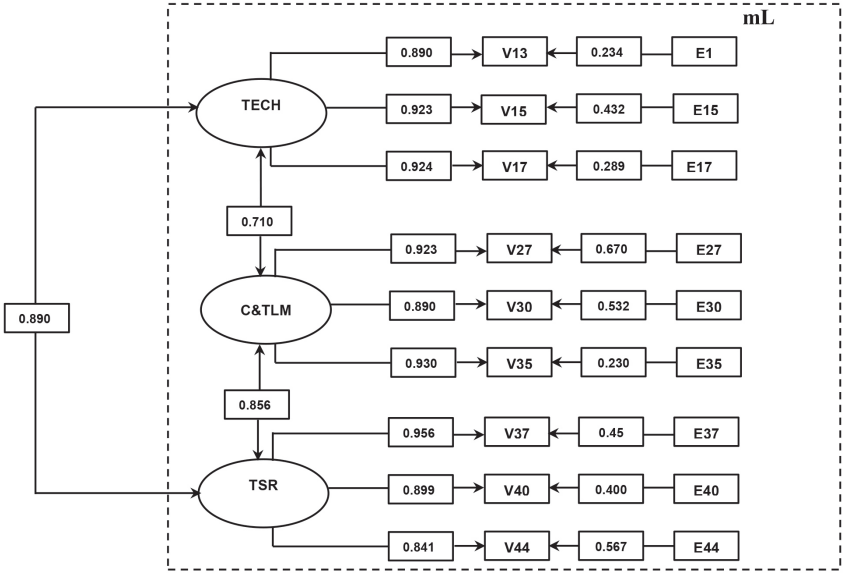
"learn how to learn" and I select and decide about how they affordable information responds to my needs when I require it (**V27**) (Woodill, 2001); the teaching-learning process becomes, from more *reflexive: As a student, (or teacher), I feel that the contents are enough to motivate me to: create new forms of knowledge. You are more Reflexive* (**V30**) (Cabero, 2012; Bloom, 2009; Gallego & Martínez,1999; Honey& Mumford, 1992), To more pragmatic: *As a student, (or teacher) I feel that the contents are enough to motivate me to: memorize the knowledge acquired. You are more Pragmatic.* (**V35**) (Cabero, 2012; Bloom, 2009; Carrol&Rosson,2005; Gallego & Martínez,1999; Honey& Mumford, 1992). Both states of knowledge, pretty significant in the teaching-learning process.

F3. TSR: Teacher-Student Rol

Teacher-Student Perception Feasibility (TSPF) must increase the future contents and design devices around the intuitive senses, when both: student and/or teacher, perceive: *I am motivated about using a PDA for mlearning, because is easy to use and I learn (or teach) better with it.* (**V37**) (Ng & Nicholas, 2013; Driscoll, 2005) and *be effective it is necessary to use graphics and illustrations.* (**V40**) (Keegan, 2005) Enactive education processes have a great chance to be explored and implemented here (Woodill, 2001). Unfortunately, about the *cost/ value perception* where ***mL*** *increases access to education and training It is still expensive* in México. (**V44**). We have to expect the rate of prices to broadband access, be lower in the near future for the **UMZG.**

The Final SEM is showed in Figure 2.

Figure 2
Hypothesized Model of First-Order Factorial Structure for Empirical Model of How Innovation Improves the Mobile Learning in México



Source: Own.

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The Customer Knowledge Management and Innovation. *An Empirical Study Using Structural Equations Model*

ABSTRACT. Innovation is a key factor to increase the competitive advantage for business. When the Innovation is improved by the Knowledge Management, it does in the Firms based on the sense of information: for, from and about the customers and is called: Customer Knowledge Management. So, the aim of this study is to solve: which are the latent factors between Innovation and Customer Knowledge Management relationship? To achieve it, a questionnaire was designed and applied to the 500 Chief Executive Officers from the Small & Media Enterprises Software Sector in Guadalajara, Mexico, that are part of the value chain, involving: designers, manufacturers and suppliers. The study applied the Structural Equations Model as a quantitative method to discover the underlying relationships amongst the most relevant variables between Innovation on Customer Knowledge Management, as: Driver of Innovation; Support; other Sources of Knowledge, Satisfaction, Experience and Performance with a total of 15 indicators.
Keywords: Innovation Stages, Customer Knowledge Management, Business.

RESUMEN. La Innovación es factor clave para incrementar la ventaja competitiva de los negocios. Cuando la innovación es mejorada por la Administración del Conocimiento, lo hace en las Firmas basados en el sentido de la información: de, desde y acerca de los consumidores y es llamado: Administración del Conocimiento del Consumidor. Así, el propósito del presente estudio es resolver: ¿cuáles son los factores latentes de la relación, entre la Innovación y la Administración del Conocimiento? Para lograrlo, un cuestionario fue diseñado y aplicado a 500 Directivos de empresas medianas y pequeñas del Sector del Software de Guadalajara, México que son parte de la cadena

de valor, involucrando: diseñadores, manufactura y proveedores. El estudio aplicó el Modelo de Ecuaciones Estructurales como método cuantitativo para descubrir las relaciones de las variables subyacentes más relevantes entre la Innovación sobre la Administración del Conocimiento del Consumidor como: Conducción de la Innovación; Soporte; otras Fuentes de Conocimiento, Satisfacción, Experiencia y Desempeño con un total de 15 indicadores.
*Palabras Clave***:** Etapas de innovación, Administración del Conocimiento del Consumidor, Negocios.

Introduction

In this moment, are considered as important key factors to develop competitiveness in business: Innovation (**INNOV**, Chesbrough, et al., 2006) and the Customer Knowledge Management (**CKM,** Garcia-Murillo & Annabi, 2002). So, this study is aimed to identify the **CKM** variables, factors and indicators that are influenced by **INNOV** of the 500 Chief Executive Officer (**CEO**) from the Small & Media Enterprises (**SME**) belonging to the Software Sector in Guadalajara, Mexico (**SSG**) considered as one of the most successful industrial sectors in the creation of innovation. This work is presented for explanation in: 1) contextual reference, problem, research questions, hypotheses and rationale for the study; 2) the theoretical framework, which is a collection of concepts about **INNOV** and **CKM**, closing with the design of the questionnaire; 3) Methodology; 4) Results; 5) Analysis of Results, Discussion and finally, 6) Conclusions. One sector, that is considered successful, fast-growing and highly dependent on value creation and innovation generation is the **SSG**. According to INEGI (2013), in Guadalajara City located in **Jalisco** state, there are around 500 firms that are directly or indirectly related with **SSG**, which have opportunities to develop them into the **Digital Creative City** program. This program, was officially announced on January 30, 2012 by President Felipe Calderon to enable 1000 acres, with an investment close to 1000 million USD looking for create 20,000 jobs in 10 years. Disney, Pixar Studios and Disney already have shown interest in joining to the ***Jaliwood*** concept of Mexico. The Global Innovation Index Report (INSEAD, 2013) ranked our country on site 63/142, with direct

consequence on its competitiveness level, which is located on site 55/144 according to The Global Competitiveness Report 2013-2014 (WEF, 2014). Hence, the importance for identifying and promoting in a systematic way, the major factors such as the relation between **CKM** influenced by **INNOV** to get more and new competitive advantage.

Problem, research questions, rationale for the study

So, our problem is described in a General Question (**GQ**), as: *Which are the latent factors in **CKM** influenced by **INNOV** relationship?* The rationale of the study is due the interest of **SSG** companies to identify such latent factors, to be more competitive. The Specific Questions (**SQ**), were: **SQ1.***Which are the factors, variables and indicators of the general conceptual model?;* **SQ2.** *Which are the relationships of the **CKM** latent factors influenced by **INNOV**?;* **SQ3.***Which are the most relevant **CKM** latent indicators influenced by **INNOV** model?.*

Literaure review

The Innovation and Customer Knowledge Management as Leverage of Competitive Advantage

The competitiveness recognizes the potential of the **CKM** influenced by **INNOV** (Loudon & Loudon, 2012). Many authors have tried to identify different senses of **CKM** information, like: *for, from, about and to co-create* customer (Nambisan, 2002; Desouza, Awazu, Jha, Dombrowski, Papagari, & Baloh, 2007; Nicolai, Keld & Pedersen, 2011). Even more, there are efforts to determine the negative side effects of Customer Integration (Gassmanna, Kausch & Enkel,2012) in **CKM**. The importance of how the knowledge can be supported by means of the human resources, the exchange amongst them, the rewards (Nicolai; Keld & Pedersen, 2011; OECD, 2003; Gebert, Geib, Kolbe, & Riempp, 2013; Gloet & Samson, 2013) and the influence of the Information and Communication Technologies (**ICT,** Laudon & Laudon,2012) is evident to boost the innovation stages. The Firm must keep special care about the internal and external sources of

information and how to extract them for **CKM** process (Garcia-Murillo & Annabi, 2002; Gebert, Geib, Kolbe, & Riempp, 2013, Chi & Foguel, 2014). The results of all these information sources are very remarkable around the terms of satisfaction, experience and performance, being representatives as principal indicators of the **CKM** (Garcia-Murillo & Annabi, 2002).

Innovation (INNOV) and their components

The competitiveness recognizes the potential of the **INNOV** (OCDE, 2005; Loudon & Loudon, 2012; Chesbrough, 2006; McKinsey, 2008) and their different stages (Rothwell,1994; Rogers, 1984). According to DRAE (2014), the word innovation comes from the latin *innovatio,-ōnis* and means: 1. f. Action and effect to innovate, and 2. f. Creating or modifying a product. For the Oslo Manual (OECD, 2005) innovation is: the introduction of a new or significantly improved product (good / service), process, a new marketing method, or a new organizational method in the internal business practices, the workplace organization or external relations, so it is not just limited to the field of technology, product or services. Also, OECD (2005) recognizes the process of creative destruction, enunciated by Schumpeter, whom classifies two types of innovations: the *radicals* that contribute to major changes in the world and, the *incremental*, happening on an ongoing change process. In this sense, we quote *The Rogers Innovation Bell* (1984), that divides the innovation market in: a.*the innovators* (they are very careful to use the latest in technology, and very important to communicate and spread); b. *early adopters* (people considered as *opinion leaders* and influence their environment but are very careful to suggest and / or use the latest innovations); c.*early majority* (conservative people, but open to technological change with some level of careful to adopt it); d. *late majority* (consumers particularly skeptical to the use of innovations until a large number of his acquaintances, has adopted it); 5.*the laggards* (very traditional people maintaining the old forms; they hardly accept any changes and adapt to them until they become a habit even.). Other effort to define different innovation stages, is the proposal of Rothwell (1994), determining different *Innovation Models*, such as: a) *First Generation:* Technology-Push; b) *Second Generation:* Market-Pull; c)

Third Generation: Coupling Model; d) *Fourth Generation:* Integrated Innovation Process; e) *Fifth Generation:* System Integration and Networking.

The Innovation Model

The other one additional attempt to explain and predict how works the innovation in the industrial sectors such as the **SSG,** is the model of Innovation Stages (**INNOV**), proposed by Mejía-Trejo et al. (2013b); briefly the conceptual model involves 6 variables:

A. (IVADD). *Innovation Value Added* or the real proposal of intention, where several agents, beside the customer are in interaction, such as: the shareholder, the Firm, the sector, the society, cost & risk of decisions (Bonel, J. I., Bonel, F. J., & Fontaneda; 2003). An attempt to get the relation value-price (Pica, 2014), we consider models which relate: the customer emotions and desires to identify the attributes of products and services (Chaudhuri,.2006; Mejía-Trejo, J. & Sánchez-Gutiérrez, J., 2013a). One of the latest model, that involves clearly the value added aimed to the client, is the Business Model Generation created by Osterwalder & Pygneur (2010), with 9 stages to identify: customer segment; value proposition; channels; customer relationships; revenue streams; key resources; key activities; key partnerships and cost structure.
B. (IIIT). *Innovation Income Items*, or the igniting process, where is considered the early innovation, describing: opportunities, analysis, idea generation, idea selection and the concept definition (Kausch, C., Gassmanna, O., & Enkel, E. 2012). By the hand of the facilities for innovation we have: Shipp (2008) and McKinsey (2008) defining the scope of Research & Development (R&D) staff and tangibles to support the innovation. As an intangible asset to the process of innovation we take the efforts to use and generate patents, create and improve databases, to improve the organizational processes through the knowledge and skills to increase their risk capabilities (Canibano, 1999; Shipp, 2008; Lev, 2001; Howells, 2000). The efforts to discover new market knowledge (Popadiuk & Wei-Choo, 2006), is considered too.

C. (INPROC). *Innovation Process* or motor of the model. Take in account the concepts around actions to improve the existing processes of Research & Development + Innovation (Shipp, 2008; McKinsey, 2008; OECD, 2005), studies about product lifecycle (Pica, 2014). The design is a special issue, and includes actions to improve the existing design (OECD, 2005) and the employee influence based on its own autonomy to make opinions and decisions (Nicolai; Keld & Pedersen, 2011). The *open innovation concept* is considered (Chesbrough et. al 2006) due to the chances to discover at the same time R&D and new markets. The results of innovation are around on prototypes and conceptual models that tend to improve the actual production process (OECD, 2005; Chesbrough, et al. 2006; McKinsey, 2008).
The *diffusion of innovation* (and very related with lifecycle products, Pica, 2014) is important for marketing due the prevision of obsolete products, the changes in the market, the early adopters, the early majority, the late majority and the laggards, described all above by mean of *Rogers's Diffusion Innovation Model* (1983). The onset and end of a technology is included as a market study that influences the innovation (Chesbrough, et al.2006).

D. (IOIT). *Innovation Outcome Items*, or qualification stage of innovation, which makes a revision of products and services obtained. It detects the projected level of revenues generated by innovation (Shipp, 2008), the projected customer satisfaction level generated by innovation (McKinsey, 2008), the projected sales percentages levels generated by innovation (Lev, 2001), the level of the number of launches of new products/services in a period and the net present value of its portfolio of products / services in the market generated by the innovation (McKinsey, 2008).

E. (IPERF). *Innovation Performance* or the quantification stage of innovation, makes different weightings about the results to determine different levels, such as Bermúdez-García, (2010), proposes:
   - *Triple Helix Politics* = The relationship among university- government- industry (Smith & Leydesdorff, 2010), to develop a policy of innovation.
   - *Generation Ideas Rate* = Generated Ideas/Market Knowledge Opportunities x Total Contributors in the Process;

- *Opportunities Index for Collaborative Innovation* = Innovation Identified Opportunities / Total Contributors in the Process
- *Effectiveness of Idea Generation* = Number of Approved Ideas / Number of Generated Ideas
- Implementing Effective Prototyping = Number of Correct and Timely Prototype Terminated/ Total Prototyping Approved;
- *Cost-Benefit of Innovation* = Innovation income / Investment in Innovation;
- *Innovation Generation Rate* = Number of Generated Innovations / Identified Innovation Opportunities.
- *Index not Successful Innovations* = Number of Unsuccessful Innovations Implemented / Total Innovation, or other similar to quantify the final results. And,

F. (IFEED). *Innovation Feedback Items* or alarm set of innovation stage, makes different analyses aimed to improve a particular subject versus their marginal profits. It involves: the intellectual capital dedicated to innovation (Lev, 2001; Shipp, 2008; Nicolai, et al., 2011); the processes, the product/service, marketing, technology, organization: structure and functions, type of innovation (radical, incremental), (OECD, 2005), value added (Bonel, et al. 2003; Osterwalder & Pygneur, 2010; Pica, 2014), and type of leadership (Gloet & Samson, 2013; Mejía-Trejo, et al.,2013b)

The Customer Knowledge Management (CKM)

CKM creates new knowledge sharing platforms and processes between companies and their customers (Garcia-Murillo & Annabi, 2002) The evidence indicates that is a potentially powerful competitive tool, contributing to improved success in both senses: companies and their customers. It is a continuous strategic process by which companies enable their customers to move from passive information sources and recipients of products and services to empowered knowledge partners (Gassmann, et al., 2012). It incorporates principles of knowledge management and customer relationship management, but moves decisively beyond it to a higher level of mutual value creation and performance (Gibbert & Probst, 2002). Customer input has become a valuable component of the innovation process. The integration of customer

knowledge into the early innovation phase requires special types of customers and methods and entails specific risks according to each stage (Gassmann, et al., 2012). The notion that firms can improve their innovativeness involving users and customers for knowledge has become prominent in innovation studies. Specifically, Firms that attempt to leverage user and customer knowledge in the context of innovation must design an internal organization appropriate to support it (Nicolai, et al., 2011).

To complement our proposed model with **INNOV**, we did a revision and analysis of literature review about authors and their works about **CKM**. Briefly, the results (by previous **EFA** or *Exploratory Factorial Analysis*) are described in 4 variables:

G. (CKMADI). ***CKM*** *as a Driver of Innovation* (Gassmann, et al., 2012), or how to handle the innovation where is considered the sense of information: *for, from, about customer* (Nambisan, 2002; Desouza, et al., 2007; Gibbert & Probst,2002; Garcia-Murillo & Annabi, 2002) *and customer as a co-creator* (Nicolai et al., 2011; Desouza, et al., 2007; Gibbert & Probst, 2002) all of them, making *prosumerism* to get more interaction with the customer knowledge. Even more, the negative side effects of Customer Integration such as the warning of the Firm, respect of: customer's personality, experience, points of view, the likelihood to choose a wrong customer, and the risk to incorporate him into the relationship to the Firm (Kausch, et al., 2014; Nicolai, et al., 2011) takes it at all into the model.

H. (CKMS). ***CKM*** *as a Support*, or basis of knowledge consists in knowledge incentives, respect of: the salary associated with the ability and willingness to share knowledge (Nicolai et al., 2011; OECD 2003); it includes the salary determined by willingness to improve skills and upgrade knowledge; the tolerance to failure, rewards and recognition (Gloet & Samson, 2013; Campeanu-Sonea, et al. 2014). By other hand, we considered the fact of how the knowledge flows, through exchange it between employees across departments, communication among employees and management.

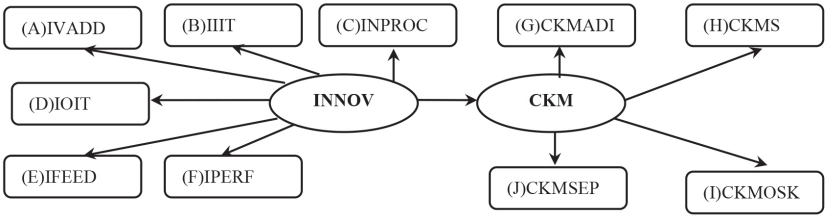
I. (CKMOSK). ***CKM*** *other Sources of Knowledge,* or different sources of knowledge is a strategic tool, in the **ICT** as an infrastructure

to support. **CKM,** is a powerful driver to boost the internal sources of knowledge from the environment (Laudon & Laudon, 2012; Mejía-Trejo & Sánchez- Gutierrez, 2013a), such as: technical services, engineering, R&D, production, marketing and sales and purchasing and supply, belonging to the Firm's departments (Garcia-Murillo& Annabi, 2002) and other employees (Murillo & Annabi,2002). As a complement, we decided the introduction of the external sources of knowledge, that involves: suppliers, scientists, universities, patents, technology exhibitions, distributor agents, consultants (Garcia-Murillo & Annabi, 2002) and competitors.

J. (CKMSEP). ***CKM, Satisfaction, Experience And Performance*** or satisfaction with knowledge; one important issue that we considered essential to be determined, is the type of paradigm practiced by the Firm for **CKM** (Garcia-Murillo & Annabi, 2002). We found 3 paradigms to solve about satisfaction and experience: a) If Only We Knew What We Know (**KM**) as a Customer Retention; b) Retention is Cheaper than Acquisition (**CRM**) as a Customer Satisfaction; c)If We Only Knew What Our Customer (**CKM**) Knows as a Customer Experience and Creativity. About performance, we determined 3 types: a) Performance against budget and Customer retention rate. b) Performance in terms of customer satisfaction and loyalty; c) Performance against competitors in innovation and growth; Contribution to customer success (Gibbert & Probst, 2002; Garcia-Murillo & Annabi, 2002)

Finally, as a result of the documentary analysis we obtained the

Figure 1
General conceptual model



Notes: **(A)**Innovation Value Added (**IVADD**); **(B)**.Innovation Income Items (**IIIT**); **(C)**. Innovation Process (**INPROC**); **(D)** Innovation Outcome Items (**IOIT**); **(E)**. Innovation Performance (**IPERF**); **(F)**. Innovation Feedback Items (**IFEED**); **(G)**. CKM as a Driver of Innovation (**CKMADI**) ; **(H)**. CKM Support (**CKMS**); **(I)**. CKM other Sources of Knowledge (**CKMOSK**); **(J)**. CKM, Satisfaction, Experience And Performance (**CKMSEP**).
Source: Own.

About the components belonging to **CKM** and **INNOV** our proposed conceptual model is showed through the **Table 1** (see Appendix) with **10 factors, 45 variables and 110 indicators**, with Likert scale of 5 positions: 1 = strongly disagree, 3= not agree/not disagree and 5 = complete agreement as limits

Hypotheses

As a consequence of the results mentioned above, we proposed the following Hypotheses:

H1. A high level of CKMADI generates a high level of INNOV in the SSG.

H2. A high level of CKMS generates a high level of INNOV in the SSG.

H3. A high level of CKMOSK generates a high level of INNOV in the SSG.

H4. A high level of CKMSEP generates a high level of INNOV in the SSG.

Methodology

This is a research based on documentary studies, to design a conceptual model and questionnaire to get several groups of variables, factors and indicators that involves a relationship between **CKM** and **INNOV** process (an early model proposed by Mejía, et al., 2013b), with: **6 variables/ 33 Factors/ 77 Indicators**. The factors and indicators under study, are all from the **CKM** variable, as such: **CKMADI=** 9 Indicators in 5 Factors.; **CKMS=** 7 Indicators in 3 Factors.; **CKMOSK=** 11 Indicators in 2 Factors.; **CKMSEP=** 6 Indicators in 2 Factors. The subjects of the study were the managers from 680 **SMEs** with 15 to 20 persons in the **SME** of the **SSG**; they were interviewed by mean the sending of email where 80 of them were eliminated because they were incomplete, **and finally we received 500 questionnaires**. Thus, we obtained a response rate of 74% and error rate below of 4%. It is noteworthy the intervention of **CANIETI CEO** members, based on Guadalajara City, which streamlined all the data collection. The results were analyzed through statistical inference tools like Structural Equations Model (**SEM**), to determine the underlying relationships amongst the variables in the model. All the items were measured on Likert scale with 5 degrees: 1 absolutely disagree and 5 absolutely agree. **Table 1,** summarizes the most relevant aspects of the research carried out.

Table 1
Technical Research Data

Features	*Survey*
Universe	680 Companies in the **SMEs** from **SSG** belonging most of them to **CANIETI ;** 500 answered **:** designers, manufacturers and suppliers
Scope	Local
Sample Unit	**SMEs** from **SSG** over 15- 20 employees
Collection Method of Data	Emails in collaboration with the **CANIETI CEO** members based in Guadalajara City
Scale	Likert 5
Date of Fieldwork	June-November 2014

Source: Own.

Validity and reliability of the model

Initial Conditions. About the validity of the measurement scales, it was used early *Exploratory Factor Analysis* (**EFA**) and in this document the *Confirmatory Factor Analysis* (**CFA**) by mean of the maximum likelihood method with **EQS 6.1** software (Bentler & Wu, 2005; Brown, 2006; Byrne, 2006). *Cronbach's Alpha* and *Composite Reliability Index* (**CRI**) (Bagozzi & Yi, 1988), were used as a techniques to prove the reliability of the measurement scales. All scale values exceeded the recommended value of **0.7** for *Cronbach's alpha* and the *Composite Rate Index* (**CRI**), which indicates that there is evidence and justifies internal reliability of the scales (Hair *et al.,* 2010). It represents the variance extracted from the group of the observed variables and the fundamental construct (Fornell & Larcker, 1981), particularly, values above **0.6** are desirable (Bagozzi & Yi, 1988).The settings used in this study were: the *Normed Fit Index* (**NFI**), the *Non-Normed Fit Index* (**NNFI**), the *Comparative Fit Index* (**CFI**) and the *Root Mean Square Error of Approximation* (**RMSEA**, Bentler & Bonnet, 1980; Byrne, 2006; Bentler, 1990; Hair et al. 2010; Chau 1997; Heck, 1998). Values of **NFI**, **NNFI** and **CFI** between **0.80 and 0.89** represent a reasonable fit (Hair, et al.,2010) and a value equal to or greater than **0.90** represents an evidence of a *good fit* of the theoretical model (Byrne, 2006). **RMSEA** values below **0.08** are acceptable (Hair et al., 2010).

The Results. The **CFA** results are presented in **Table 2** and suggests that the model provides a good fit to the data [Satorra–Bentler Scaled Statistic (**S-B**X^2) = 218.061; df = 96; p = 0.000; **NFI** = 0.907; **NNFI** = 0.928; **CFI** = 0.938; **RMSEA** = 0.060]. Additionally, *Cronbach's Alpha* and the **CRI > 0.70** are recommended by Hair (2010) and the *Rate of Variance Extracted* (**RVE**) was calculated for each pair of constructs, resulting in an **RVE>** 0.50 (Fornell & Larcker, 1981). As evidence of convergent validity, the results pointed out that all of the **CFA** items factor related are significant (**p <0.001**) and the magnitude of all the factorial charges is superior of **0. 60** (Bagozzi & Yi, 1988).

Table 2
CFA Results or internal consistency and convergent validity of the theoretical model

Factors	*Item*	*Indicator*	*Factorial Charge*	*t Value*	*Cronbach's Alpha*	*CRI*	*RVE*
CKMADI	**1**	**IFMC**	0.609***	1.000a	0.774	0.779	**0.505**
	2	**IABC**	0.710***	10.629			
	3	**IWIC**	0.709***	10.401			
	4	**NSEC2**	0.729***	9.264			
CKMS	**5**	**KI1**	0.701***	1.000a	0.834	0.836	**0.515**
	6	**KI2**	0.748***	14.093			
	7	**KF1**	0.706***	10.040			
	8	**KF2**	0.740***	12.311			
CKMOSK	**9**	**ISOK3**	0.741***	1.000a	0.734	0.765	**0.526**
	10	**ISOK5**	0.678***	13.090			
	11	**ESOK4**	0.773***	14.048			
CKMSEP	**12**	**PAR1**	**0.780*** **	1.000a	0.806	0.818	**0.536**
	13	**PAR2**	0.768***	14.250			
	14	**PAR3**	0.694***	11.500			
	15	**PER2**	0.710***	12.830			

S-B*X* ² (df=96)=218.061p<0.000); **NFI**=0.907; **NNFI**=0.928; **CFI**=0.938; **RMSEA**=0.060.
a. Parameters constrained to the value in the identification process.
***= p < 0.001
Source: Own.

According with the evidence from **Table 2**, discriminant measure is provided in two forms as we can see in **Table 3**. First, with a **95%** interval of reliability, none of the individual elements of the latent factors correlation matrix contains **1.0** (Anderson & Gerbing, 1988). Second, extracted variance between the two constructs is greater than its corresponding **RVE** (Fornell & Larcker, 1981). Based on these criteria, we can conclude that the different measurements with the model show enough evidence of discriminant validity and reliability.

Table 3
Discriminant validity of the theoretical model

Factors	*CKMADI*	*CKMS*	*CKMOSK*	*CKMSEP*	*Chi Square Difference Test (Values<RVE)*
CKMADI	**0.505**	0.137	0.181	0.141	
CKMS	0.280, 0.440	**0.515**	0.213	0.207	
CKMOSK	0.333, 0.521	0.366,0.558	**0.526**	0.287	
CKMSEP	0.305, 0.463	0.351, 0.539	0.431, 0.639	**0.536**	
	Interval Confidence Test (<1.0)				

Note: The diagonal represents the rate of variance extracted (**RVE**), while above the diagonal part presents the variance (the correlation squared).Below the diagonal, is an estimate of the correlation of factors with a confidence interval of 95%.
Source: Own.

Results

To obtain the statistical results of the research hypotheses, we applied the **SEM** as a quantitative method with the same variables to check the structure model and to obtain the results that would allow the hypotheses posed, using the software **EQS 6.1** (Bentler and Wu, 2012; Byrne, 2006; Brown, 2006). Furthermore, the nomological validity of the theoretical model was tested using the *chi square*, through which the theoretical model was compared with the adjusted model. The results indicate that no significant differences are good theoretical model in explaining the observed relationships between latent constructs (Anderson & Gerbing, 1988; Hatcher, 1994). Results of the application are presented in **Table 4.**

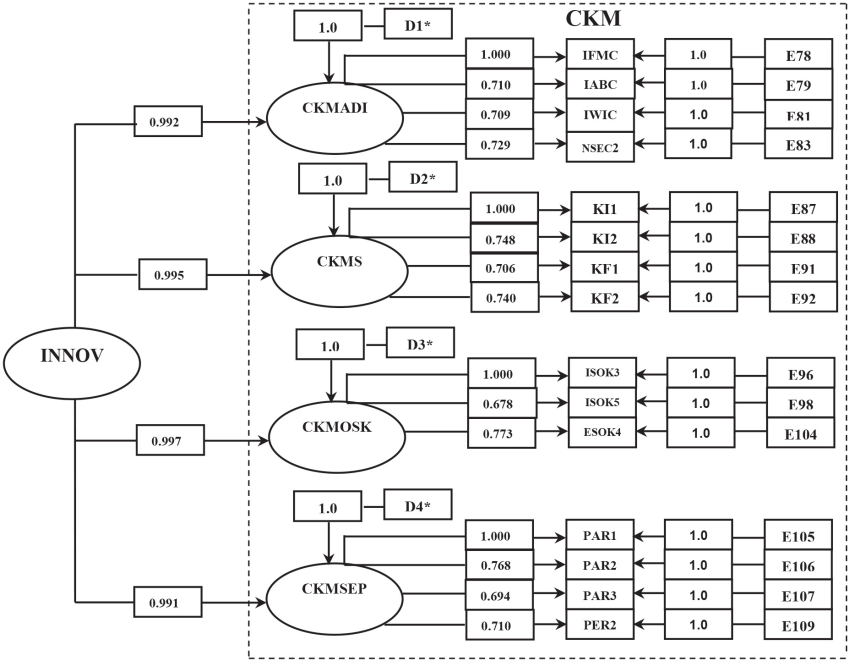
Table 4
Results of hypothesis testing of the theoretical model

Hypothesis	*Structural Relation*	*β Standardized Coefficient <0.001*	*t Value*	*The relationship has:*
H1. A high level of **CKMADI** generates a high level of **INNOV** in the **SSG.**	**CKMADI** → **INNOV**	0.992***	11.552	Significant positive effect
H2. A high level of **CKMS** generates a high level of **INNOV** in the **SSG.**	**CKMS** → **INNOV**	0.995***	13.759	Significant positive effect
H3. A high level of **CKMOSK** generates a high level of **INNOV** in the **SSG.**	**CKMOSK** → **INNOV**	0.997***	14.903	Significant positive effect
H4. A high level of **CKMSEP** generates a high level of **INNOV** in the **SSG.**	**CKMSEP** → **INNOV**	0.991***	11.258	Significant positive effect
S-B*X*² (df=94)=23,6169; p=0.000 ; **NFI**=0.910 ; **NNFI**=0.921 ; **CFI**=0.938; **RMSEA**= 0.078 ***= p < 0.001				

Source: Own.

Summarizing, we can conclude that the 4 variables measuring **CKM** influenced by **INNOV**, are positive and significant and are very similar in terms of the value that each brings. See **Figure 2.**

Figure 2
Hypothesized Second-Order Factorial Model of Customer Knowledge Management influenced by Innovation for ssg



Note: E(n).Error Disturbance; D(n).Variances of the disturbances. Because the estimation of all higher order factor loadings are typically of interest in second-order models, the variance of the single higher order factor (**CKMS**) has been constrained to 1.0; note also that the variances of the disturbances (the D's) are designated as freely estimated. Relatedly, their paths are automatically constrained to 1.0 by the program (Byrne, 2006)
Source: Own.

Discussion and conclusions

This section is divided in 2 parts:
Firstly, we propose to solve our **GQ, is 100% achieved**: *Which are the latent factors in CKM influenced by INNOV relationship?* with the findings of 4 variables: **CKMADI, CKMS, CKMOSK, CKMSEP** involved into

the **CKM** as determinant factors influenced by **INNOV** and showed in **Figure 1**. About to solve **SQ1, is 100% achieved:** *Which are the factors, variables and indicators of the general conceptual model?* We determined from previous model **INNOV**: **6 factors /33 variables/ 77 Indicators** related with our **CKM:** 4 **factors/ 12 variables/ 33 indicators**. Each of them, contained in a **Final Questionnaire** (located as **Appendix**). In the case of **SQ2 is 100% achieved:** *Which are the relationships of the CKM latent factors influenced by INNOV?* We applied **SEM** obtaining the **Table 2, Table 3 and Table 4** showing basically the *significant positive effect* of each latent factor: **CKMADI, CKMS, CKMOSK, CKMSEP** influenced by **INNOV** and solving at **100% achieved our Hypotheses H1**: *A high level of CKMADI generates a high level of INNOV in the SSG;* **H2***: A high level of CKMS generates a high level of INNOV in the SSG;* **H3***: A high level of CKMOSK generates a high level of INNOV in the SSG;* **H4***: A high level of CKMSEP generates a high level of INNOV in the SSG.***.** About to solve **SQ3, is 100% achieved:** *Which are the most relevant CKM latent indicators influenced by INNOV model?* Since **Table 2** we obtained **15 indicators,** being **PAR1:** *If Only We Knew What We Know (KM) as a Customer Retention* the indicator with most factorial charge (**0.780**).

Secondly, how the latent factors are interacting? To answer this, we applied the **SEM** as a quantitative technique to obtain a model and analyze how the underlying variables are interacting amongst them, due the property of this technique to do, at the same time, multiple regressions in progress. We found that only **15/33 latent indicators of CKMS** are influenced by **INNOV** process in **SSG** and we might to be thinking in how they are useful to increment the competitive advantage of all **SMEs** involved in **CANIETI** and **Digital Creative City program**. However, we need to do more studies to leverage the other **18/33** remaining **latent indicators of CKMS** on **INNOV.**

Final Recommendations

Based on **Figure 2** we proposed **3 groups** of recommendations for the **SMEs** located at the **SSG**, to increment their competitive advantages, such as:

a. Take advantage of the **15/33 latent indicators of CKMS**, no matter the order of importance, because all of them are very strategic issues being these:
   - **a.1** *Information from Costumer* (**IFMC**) from **CKMADI** is taken as an important factor because the customer is a resource of new product development ideation; in fact is treated just as a Customer Driven-Innovation (or *Innovation from Customers*) or *Mutual Innovation*. (Nambisan 2002; Desouza, et al., 2007; Gibbert, et. al, 2002).
   - **a.2** *Information about the Customer* (**IABC**) from **CKMADI** that means the use of the strategy in close collaboration with customers. It allows new concepts just like *the communities of creation* (Nambisan, 2002; Gibbert, et. al, 2002), most of them based on the Triple Helix relationship (Smith & Leydesdorff, 2010)
   - **a.3** *Information as a Customer Co-creator* (with) (**IWIC**) from **CKMADI** where the customer is an active agent who helps over new product development design and process. There are several concepts created around it: *Customer Centered Innovation* (or *Innovation with Customers*); *Prosumerism* (*producer and consumer at the same time*); the *Team-Based-CoLearning. Joint Intellectual Property*. (Nicolai, et al., 2011; Desouza, et al., 2007; Gibbert, et. al, 2002)
   - **a.4** *The firm is warned about the dependence on customer's experience* (**NSEC2**) from negative side effects of Customer Integration (**NSEC**) from **CKMADI**. In this case, the managers interviewed are only warned about the direct experience of the customer in new product development. However, they did not consider other additional key factors, such as: personality, point of view, the risk of the integration of the consumer or more than even, if it is a wrong consumer as a choice for the firm. (Kausch et al. 2014)
   - **a.5** *Salary associated with the ability and willingness to share knowledge* (**KI1**) and *Salary determined by willingness to improve skills and upgrade knowledge* (**KI2**) from Knowledge Incentives (**KI**) (Nicolai, et al., 2011; OECD, 2003). In this case, the managers appreciated these concepts, more than

others such as: tolerance of failure (**KI3**) or rewards and recognition (**KI4**) (Gloet & Samson, 2013).

a.6 *Exchange the knowledge between employees across departments* (**KF1**) and C*ommunication among employees and management* (**KF2**) from Knowledge Fluence (**KF**) (Nicolai, et al., 2011; OECD, 2003), from **CKMS**. These kind of values into the **SSG** are the most popular things among the Hitech environment.

a.7 *Research and Design Development* (**ISOK3**) and *Marketing and Sales* (**ISOK5**) from Internal Sources of Knowledge (**ISOK**) (Garcia-Murillo & Annabi 2002), all of them are considered as strategic resources but ignores *Technical Services* (**ISOK1**) *Engineering Department* (**ISOK2**) *Production* (**ISOK4**) *Purchasing and Supply* (**ISOK6**)) (Garcia-Murillo & Annabi 2002) and *Other Employees* (**ISOK7**) (Murillo & Annabi, 2002). It considers too, and *Competitor* (**ESOK4**) from *External Sources of Knowledge* (**ESOK**). All of them, from **CKM** others Sources of Knowledge (**CKMOSK**).

a.8 There are some statements that are shaping the mind of the customer and supplier: If *Only We Know What We Knew* (**KM**) as a *Customer Retention* (**PAR1**) by the way, with the most factorial charge in this study (**0.780**); *Retention is Cheaper than Acquisition* (**CRM**) as a *Customer Satisfaction* (**PAR2**); *If We Only Knew What Our Customer* (**CKM**) *Know as a Customer Experience and Creativity* (**PAR3**) from Paradigm (**PAR**). All of them being a part of **CKMSEP** (Garcia-Murillo & Annabi, 2002). **CKM** managers first and foremost focus on knowledge *from* the customer (i.e. knowledge residing in customers), rather than focusing on knowledge *about* the customer, as characteristic of customer relationship management. In other words, smart companies realize that corporate customers are more knowledgeable than one might think, and consequently seek knowledge through direct interaction with customers, in addition to seeking knowledge about customers from their sales representatives. Similarly, conventional knowledge managers typically focus only on trying to convert employees from egoistic knowledge hoarders into

altruistic knowledge sharers In contrast, with **CKM** *If only we knew what we know* turns into *if only we also knew what our customers know* (Gibbert & Probst, 2002).

a.9 Performance in terms of *Customer Satisfaction and Loyalty* (**PER2**) from Performance (**PER**) of **CKMSEP** (Gibbert & Probst, 2002; Garcia-Murillo & Annabi, 2002). So, the metrics and tools to measure the implementing are very valuable.

b. Take advantage of the **18/33 latent indicators of CKMS**, but we need to do more studies to determine the scope of the influence of these strategic issues, because their levels, in this study were considered not representative.

Further studies in the future, would be determine by **SEM** each one of the **INNOV** latent factors that are related with **CKMS** and propose a tool to measure directly their relationships.

Principal abbreviations

Code	*Meaning*
CANIETI	Cámara Nacional de la Industria Electrónica de Telecomunicaciones y Tecnologías de la Información.
CEO	Chief Executive Officer.
cfa	Confirmatory Factorial Analysis.
cfi	Comparative Fit Index.
CKM	Customer Knowledge Management. More details, please see Appendix.
CKMADI	CKM as a Driver of Innovation. More details, please see Appendix.
CKMOSK	CKM other Sources of Knowledge. More details, please see Appendix.
CKMS	CKM as a Support. More details, please see Appendix.
CKMSEP	CKM, Satisfaction, Experience And Performance. More details, please see Appendix.
CRI	Cronbach's alpha and composite reliability index.
CRM	Customer Relationship Management
ESOK4	Variable: External Sources of Knowledge (ESOK). Indicator: Competitor ESOK4. More details, please see Appendix.

F	Factor
GQ	General Question.
H(n)	Hypothesis(1), Hypothesis(2)…Hypothesis(n).
IABC	Information about the Customer. More details, please see Appendix.
ICT	Information and Communication Technologies.
IFEED	Innovation Feedback Items. More details, please see Appendix.
IFMC	Information from Costumer. More details, please see Appendix.
IIIT	Innovation Income Items More details, please see Appendix.
INNOV	Innovation. More details, please see Appendix.
INPROC	Innovation Process. More details, please see Appendix.
IOIT	Innovation Outcome Items. More details, please see Appendix.
ISOK3	Research and Design Development. More details, please see Appendix.
ISOK5	Internal Source of Knowledge: Indicator: Marketing and Sales. More details, please see Appendix.
IPERF	Innovation Performance. More details, please see Appendix
IVADD	Innovation Value Added. More details, please see Appendix.
IWIC	Information as a Customer Co-creator (with). More details, please see Appendix.
KF1	Exchange the knowledge between employees across departments. More details, please see Appendix
KF2	Communication among Employees and Management. More details, please see Appendix.
KI1	Salary associated with the ability and willingness to share knowledge. More details, please see Appendix.
KI2	Salary determined by willingness to improve skills and upgrade knowledge. More details. please see Appendix.
NFI	Normed Fit Index.
NNFI	Non-Normed Fit Index.
NSEC2	The firm is warned about the dependence on customer's experience. More details, please see Appendix .
PAR1	If Only We Know What We Knew (KM) as a Customer Retention .More details, please see Appendix.
PAR2	Retention is Cheaper than Acquisition (CRM) as a Customer Satisfaction.More details, please see Appendix.
PAR3	If We Only Knew What Our Customer (CKM) Know as a Customer Experience and Creativity.More details, please see Appendix.

PER2	Performance in terms of customer satisfaction and Loyalty.More details, please see Appendix.
RMSEA	Root Mean Square Error of Approximation.
RVE	Rate of Variance Extracted.
S-BX ^{2}	Satorra–Bentler Scaled Statistic.
SEM	Structural Equation Model.
SME	Small & Media Enterprises
SQ(n)	Specific Question1…Specific Question2…Specific Question.
SSG	Software Sector Guadalajara, Mexico.
t	t Value.

Source: Own.

Appendix

Final Questionnaire showing INNOV and CKM

Innovation stages				
F	*Variable*	*Indicator*	*Q*	*Author*
(A)	1) Emotions & Desires of Customer (**VAEDC**)	The innovation actions are aimed to increase the Emotions & Desire of the Customer	1	Chaudhuri (2006)
	2) Cost & Risk (**VACR**)	The Cost is the main constraint to increase the value (**VACR1**)	2	Bonel (et al.,2003)
		The Risk is the main constraint to increase the value (**VACR2**)	3	
	3) Customer (**VACUS**)	The innovation actions are aimed to increase the Customer value	4	
	4) Shareholder (**VASHO**)	The Innovation actions are aimed to increase the Shareholder value	5	
	5) Firm (**VAFRM**)	The innovation actions are aimed to increase the value of the Firm	6	
	6) Sector (**VASEC**)	The innovation actions are aimed to increase the value of the Sector	7	
	7) Society (**VASOC**)	The innovation actions are aimed to increase the value to the Society	8	

Innovation stages				
F	*Variable*	*Indicator*	*Q*	*Author*
(A)	8) Price Value Relation (**VAPVR**)	The innovation is introduced to the market considering the relation price-value added	9	Singh et al. (2014)
(B)	9) Early Innovation Phase (**EIPH**)	Opportunity Identification (**EIPH1**)	10	Kausch (et al. 2014)
		Opportunity Analysis (**EIPH2**)	11	
		Idea Generation (**EIPH3**)	12	
		Idea Selection (**EIPH4**)	13	
		Concept Definition (**EIPH5**)	14	
	10) Facilities for Innovation (Tangibles, **FFI**)	Provides the most sophisticated equipment to support innovation (**FFI1**)	15	Shipp (et al. 2008); McKinsey (2008)
		Invests in R&D+I (**FFI2**)	16	
		Assigns staff to R& D+I (**FFI3**)	17	
	11) Efforts for Innovation (Intangible assets, **EFFI**)	Makes efforts to use and / or generate Patents (**EFFI1**)	18	Canibano (1999); Shipp (et al. 2008); Lev (2001); Howells (2000); Chiu & Foguel (2014)
		Makes efforts to create and / or improve Databases (**EFFI2**)	19	
		Makes efforts to improve the organizational processes (**EFFI3**)	20	
		Makes efforts to use the most of knowledge and skills of staff (**EFFI4**)	21	
		Makes planned decisions to increase its availability to the risk (**EFFI5**)	22	
		Makes efforts to discover New Market Knowledge (**EFFI6**)	23	Popadiuk & Wei-Choo (2006)
		Makes efforts to study the Existing Market Knowledge (**EFFI7**)	24	
(C)	12).Research & Development + Innovation (**RDI**)	Makes actions to improve existing processes of Research & Development + Innovation (**RDI1**)	25	Shipp (et al.,2008); McKinsey (2008); OECD (2005)
		Makes studies about Product Lifecycle (**RDI2**)	26	Pica (2014)

Innovation stages				
F	*Variable*	*Indicator*	*Q*	*Author*
(C)	13). Design (**DSGN**)	Makes actions to improve the existing design (**DSGN1**)	27	OECD (2005)
		Employees have influence on their job (**DSGN2**)	28	Nicolai (et al., 2011); Pica (2014)
		Employees engaged in teams with high degree of autonomy (**DSGN3**)	29	
		The strategy is based on Open Innovation concepts (**DSGN4**)	30	Chesbrough (et. al 2006)
	14).Prototypes (**IPPFI**)	Makes actions to develop prototypes for improvement	31	Chesbrough (2006); McKinsey (2008); Pica (2014)
	15).Pre-Production (**IPPPIP**)	Makes improvement actions to pre-production	32	
	16).Market Research (**MR**)	Makes to investigate market needs of obsolete products (**MR1**)	33	Chesbrough (et. al. 2006); Rogers (1984): Loudon (2004)
		Makes to investigate the needs actions and / or market changes for innovators (**MR2**)	34	
		Makes to investigate needs and / or market changes for early adopters (**MR3**)	35	
		Makes to investigate needs and / or market changes for early majority (**MR4**)	36	
		Makes to investigate needs and / or market changes for late majority (**MR5**)	37	
		Makes to investigate needs and / or market changes for laggards (**MR6**)	38	
		Makes to investigate the onset of a new technology (**MR7**)	39	Chesbrough (et. al. 2006)
		Makes to investigate the term of a technology (**MR8**)	40	

Innovation stages				
F	*Variable*	*Indicator*	*Q*	*Author*
(C)	17).Novelty (**NOVY**)	Decides actions to improve or introduce new forms of marketing (**NOVY1**)	41	Lev (2001)
		Seeks to be new or improved in the World (Radical Innovation) (**NOVY2**)	42	OECD (2005);
		Seeks to be new or improved to the Firm (Incremental Innovation) (**NOVY3**)	43	
		Seeks to be new or improved in the region (Incremental Innovation) (**NOVY4**)	44	
		Seeks to be new or improved in the industry (Incremental Innovation) (**NOVY5**)	45	
	18).Training (**TRAI**)	Makes actions to train the staff continuously (Incremental Innovation)	46	
	19).Type of Innovation (**TOINN**)	Makes actions to innovate in technology (**TOINN1**)	47	
		Makes actions for innovation in production processes (**TOINNN2**)	48	
		Makes actions to improve or introduce new products forms (**TOINNN3**)	49	
		Makes actions to improve or introduce new forms of service (**TOINN4**)	50	
		Makes actions to improve or introduce new organizational structures and functions (**TOINN5**)	51	
		Innovation activities tend to be rather radical (**TOINN6**)	52	
		Innovation activities tend to be incremental (**TOINN7**)	53	

Innovation stages				
F	*Variable*	*Indicator*	*Q*	*Author*
(D)	20).New products/ and/ or services (**NPSD**)	Detects the projected level of revenues generated by innovation (**NPSD1**)	54	Shipp (et al. 2008);
		Detects the projected customer satisfaction level generated by innovation (**NPSD2**)	55	McKinsey (2008)
		Detects the projected sales percentages levels generated by innovation (**NPSD3**)	56	Lev (2001)
		Detects the level of the number of launches of new products/services in a period (**NPSD4**)	57	McKinsey (2008)
		Detects the net present value of its portfolio of products / services in the market generated by the innovation (**NPSD5**)	58	
(E)	21).Cost-Benefit of Innovation (**PCBOI**)	Do you use an indicator like: Innovation income / (Investment in Innovation) ?	59	Bermúdez-García (2010)
	22). Opportunities Index for Collaborative Innovation (**POIFCI**)	Do you use an indicator like: Innovation Identified Opportunities / (Total Contributors in the Process)?	60	
	23).Generation Ideas Rate (**PGIR**)	Do you use an indicator like: Generated Ideas / (Market Knowledge Opportunities x Total Contributors in the Process)?	61	
	24). Effectiveness of Idea Generation (**PEOIG**)	Do you use an indicator like: Number of Approved Ideas / (Number of Generated Ideas)?	62	
	25). Implementing Effective Prototyping (**PIEP**)	Do you use an indicator like: Number of Correct and Timely Prototype Terminated / (Total Prototyping Approved)?	63	

Innovation stages				
F	*Variable*	*Indicator*	*Q*	*Author*
(E)	26).Innovation Generation Rate (**PIGR**)	Do you use an indicator like: Number of Generated Innovations / (Identified Innovation Opportunities)?	64	Bermúdez-García (2010)
	27).Index not Successful Innovations (**pinsi**)	Do you use an indicator like: Number of unsuccessful innovations implemented / (Total Innovation)?	65	
	28).Triple Helix Politics (**PTHP**)	Does exist any relationship among : university- government- industry, to develop the innovation?	66	Smith & Leydesdorff, (2010)
(F)	29).Capital (**IFCAP**)	Based on the results identifies intellectual capital dedicated to innovation for its improvement	67	Lev(2001); Shipp (et al. 2008); Nicolai (et al., 2011)
	30).Product & Process (**IFPP**)	Based on the results identifies the stages of new or improved process for upgrading (**IFPP1**)	68	OECD (2005); Chesbrough (2006)
		Based on the results identifies attributes of new or improved product / service for its improvement (**IFPP2**)	69	
	31).Innovation (**IFINN**)	Based on the results identifies the stages of new or improved form of marketing for improvement (**IFINN1**)	70	
		Based on the results identifies the stages of new or improved technology for improvement (**IFINN2**)	71	
		Identifies the stages of the new or improved structure and functions of the organization to its improvement (**IFINN3**)	72	
		Identifies the type of innovation (radical or incremental) that has given best results (**IFINN4**)	73	

Innovation stages				
F	*Variable*	*Indicator*	*Q*	*Author*
(F)	32).Value Added (**IFV**)	Based on the results identifies the new or improved value proposition (benefits / costs) for its completion; relation value-price	74	Bonel (et al.,2003)
	33).Leadership and Innovation (**FLINNO**)	The type of leadership that drives innovation is Transactional (**FLINNO1**)	75	Mejía-Trejo (et al., 2013), Gloet & Samson (2013), Campeanu –Sonea, E., Sonea, A., Mitra-Crisan, C.
		The type of leadership that drives innovation is Transformational (**FLINNO2**)	76	
		The type of leadership that drives innovation is Passive (**FLINNO3**)	77	
		Customer knowledge		
(G)	34).Information from Costumer (**IFMC**)	Customer is a Resource of NPD ideation; Customer Driven-Innovation (Innovation from Customers). Mutual Innovation.	78	Nambisan (2002); Desouza (et al., 2007); Gibbert & Probst (2002); Chi & Foguel, (2014)
	35).Information about the Customer (**IABC**)	Strategy of close collaboration with customers. Communities of creation.	79	Nambisan (2002); Gibbert &Probst (2002)
	36).Information for Customer (**IFRC**)	Customer as a User collaborates intensively in the product testing and support. Customer Focused Innovation (Innovation for Customers)	80	Nambisan (2002); Desouza (et al., 2007)
	37).Information as a Customer Co-creator (with) (**IWIC**)	Customer as a Co-creator helps over NPD design and development; Customer Centered Innovation (Innovation with Customers); Prosumerism; Team-Based-CoLearning. Joint Intellectual Property	81	Nicolai (et al., 2011); Desouza (et al., 2007); Gibbert &Probst (2002)

Innovation stages				
F	*Variable*	*Indicator*	*Q*	*Author*
(G)	38).Negative side effects of Customer Integration (**NSEC**)	The firm is warned about the dependence on customer's personality (**NSEC1**)	82	Kausch (et al. 2014)
		The firm is warned about the dependence on customer's experience (**NSEC2**)	83	
		The firm is warned about the dependence on customer's point of view (**NSEC3**)	84	
		The firm is warned about to choose the wrong customer (**NSEC4**)	85	
		The firm is warned about the risk to integrate the customer to the company's side (**NSEC5**)	86	
(H)	39).Knowledge Incentives (**KI**)	Salary associated with the ability and willingness to share knowledge (**KI1**)	87	Nicolai (et al., 2011); OECD (2003)
		Salary determined by willingness to improve skills and upgrade knowledge (**KI2**)	88	
		Tolerance of Failure (**KI3**)	89	Gloet & Samson (2013)
		Rewards and Recognition (**KI4**)	90	
	40).Knowledge Fluence (**KF**)	Exchange the knowledge between employees across departments (**KF1**)	91	Nicolai (et al., 2011); OECD (2003); Chiu & Foguel,2014
		Communication among employees and management (**KF2**)	92	
	41).Knowledge and ICT (**KICT**)	ICT to support and control the Customer Knowledge Management	93	Laudon & Laudon (2012); Mejía-Trejo & Sánchez-Gutiérrez (2013)

Innovation stages				
F	*Variable*	*Indicator*	*Q*	*Author*
(I)	42).Internal Sources of Knowledge (**ISOK**)	Technical Services (**ISOK1**)	94	Garcia-Murillo & Annabi (2002)
		Engineering Department (**ISOK2**)	95	
		Research and Design Development (**ISOK3**)	96	
		Production (**ISOK4**)	97	
		Marketing and Sales (**ISOK5**)	98	
		Purchasing and Supply (**ISOK6**)	99	
		Other Employees (**ISOK7**)	100	Murillo & Annabi (2002)
	43).External Sources of Knowledge (**ESOK**)	Supplier (**ESOK1**)	1	Garcia-Murillo & Annabi (2002)
		Scientist, Universities, Patents, Exhibitions Technological Consultant (**ESOK2**)	2	
		Distributor Agents (**ESOK3**)	3	
		Competitor (**ESOK4**)	4	
(J)	44).Paradigm (**PAR**)	If Only We Knew What We Know (KM) as a Customer Retention (**PAR1**)	5	Gibbert & Probst (2002); García-Murillo & Annabi (2002)
		Retention is Cheaper than Acquisition (CRM) as a Customer Satisfaction (**PAR2**)	6	
		If We Only Knew What Our Customer (CKM) Knows as a Customer Experience and Creativity (**PAR3**)	7	
	45). Performance (**PER**)	Performance against budget; Customer retention rate.(KM) (**PER1**)	8	
		Performance in terms of customer satisfaction and loyalty (**PER2**)	9	
		Performance against competitors in innovation and growth; Contribution to customer success. (CKM) (**PER3**)	10	

Notes: Factor (**F**); (**A**).Innovation Value Added (**IVADD**); (**B**).Innovation Income Items (**IIIT**); (**C**). Innovation Process (**INPROC**); (**D**) Innovation Outcome Items (**IOIT**); (**E**). Innovation Performance (**IPERF**); (**F**). Innovation Feedback Items (**IFEED**); (**G**). CKM as a Driver of Innovation (**CKMADI**) ; (**H**). CKM Support (**CKMS**); (**I**). CKM other Sources of Knowledge (**CKMOSK**); (**J**). CKM, Satisfaction, Experience And Performance (**CKMSEP**).
Source: Own.

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An Empirical Study of How the Knowledge Management is a Driver of Innovation for Software Sector SMEs in México

ABSTRACT. Purpose – Knowledge Management (**KM**) in Innovation process (**INNOV**), is a powerful engine that drives the company towards competitiveness (INSEAD, 2014; WEF, 2014); however, many small and media enterprises (**SMEs**) in México, ignore it. So, the aim of the present study is to discover the key factors of **KM** that are involved in the **INNOV**, prevailing in the field of software sector **SMEs** in Guadalajara (**SSG**), Mexico.

Design/methodology/approach – This research is a documental study about **KM** and how is related as driver on the **INNOV**; to achieve this, it was designed a questionnaire split in two parts: the first one, corresponding to **KM** that involved (**5**) factors: ***KM Leadership*** (**KMLD**); ***KM Capture and Acquisition*** (**KMCA**); ***KM Training and Mentoring*** (**KMTM**); ***KM Policies and Strategies*** (**KMPS**); ***KM Communications and Rewards*** (**KMCR**) with **23** total indicators as variables. The second one, **INNOV** that involved (**6**) factors: ***Innovation Value Added*** (**IVADD**); ***Innovation Input Items*** (**IIIT**); ***Innovation Process*** (**INPROC**); ***Innovation Output Items*** (**IOIT**); ***Innovation Performance*** (**IPERF**) and ***Innovation Feedback*** (**IFEED**) with **39** total indicators as variables. So, we designed a questionnaire (**62** variables), as a measurement instrument based on ***Likert Scale*** (**1to 5 interval**) in order to determine the degree of agreement with well ***Cronbach's Alpha*** confidence (**0.8432**). We proceeded to do a survey to the total **200 CEOs** belonging to the **SMEs** from **SSG.** The results were analysed using Structural Equations Modelling (**SEM**) to find validity and reliability of the structure to discover by the system equations, the underlying variables and their interrelationships. Finally, we found most representative **KM** variables to drive the **INNOV**, were: **KMCA (0.9095); KMCR (0.8845); KMTM (0.8815); KMLD (0.8780); KMPS (0.8235).** Finally we solved the (**5**) hypotheses finding the

relationship between the **KM** factors and **INNOV** have significant positive effects.
Originality/value – It lies in the design of a construct that identify the underlying **KM** factors and variables sized according an exploratory and multi-correlational study to drive the **INNOV**. All the factors and variables were collected from the principal theories about both subjects and jointed in a solid set by **SEM** to find their respective correlations.
Practical implications –This study, shall serve to the **SSG** to identify what variables and factors from **KM**, are able to drive the **INNOV** and get a better place for competitiveness.
Keywords: Knowledge Management, Innovation, Competitiveness, Software Sector, México.

1. Introduction

In nowadays, are considered amongst others important key factor to develop competitiveness: **KM** (OCDE, 2003) and **INNOV** (OCDE, 2005; Chesbrough et al. 2006). Therefore, this study is aimed to identify the **KM** factors and variables that are predominant on the **INNOV** questioned to **200 CEOs** belonging to the **SSG SMEs**; this subject is considered as one of the most successful industrial sectors in the creation and intensive use of innovation in México. This work is divided in: 1) contextual reference, problem, research questions, hypotheses and rationale for the study; 2) the literature review, which is a collection of concepts about KM and INNOVS, closing with the general conceptual model, 3) Results, Discussion, Conclusions and finally, 4) References.

2. Contextual Reference

One sector that is considered successful, fast-growing and highly dependent on value creation and innovation generation is the **SSG** in México. According to INEGI (2014), in Guadalajara City located in Jalisco state, there are around **200** SME that are directly or indirectly related with **SSG**, which have opportunities to develop them into the

Digital Creative City program. The project, was officially announced on January 30, 2012 by President Felipe Calderon, to enable 1000 acres, with an investment close to 1000 million USD looking for create 20,000 jobs in 10 years. Disney, Pixar Studios and Disney already have shown interest in joining to the *Jaliwood* concept of Mexico.

The Global Innovation Index Report 2014-2015 (INSEAD, 2014) places México on site 66/143 that is reflected in its competitiveness level, which is located on site 61/144 according to The Global Competitiveness Report 2014-2015 (WEF, 2014). Hence the importance of identifying and promoting in a systematic way, the major factors such as the relation between **KM** and **INNOVS** to get more and new competitive advantages for **SSG.**

3. Problem, Hypotheses and Rationale of the Study

Our problem is described in a general question as **GQ**: ¿Which is the conceptual model that relates factors and variables, from **KM** to drive **INNOV**? The specific questions (**SQ**), are **SQ1**: Which is the scheme of the model?; **SQ2**: Which are the factors and variables?; **SQ3**: Which are the factors and variables more significant in the model?. The general hypothesis (**GH**) proposed is: the KM's factors have significant and positive effect, each one.

4. Literature Review

4.1 Knowledge Management (KM)

Several authors affirm that leadership is the base where the organisations can locate the liable personnel to steer the **KM's** mechanisms towards the **INNOV** process. Even more, we found suggestions for implementing actions that involve the stream between employees and managers, in vertical, horizontal or any sense. (Mageswari et al., 2015; Naveed, & Tahir, 2015; OECD, 2003). The relationship among the personnel from different areas (inside and outside the company) require to the **SME** be able to recognize, capture, storage and disseminate the knowledge by internal and external mechanisms (Hawkins

et al., 2014; OECD, 2003). To achieve this, is necessary to design and implement pretty clear policies to promote the knowledge sharing, strategies to ensure partnership alliances or worker retention programs (Mageswari et al., 2015; Solberg & Gerson, 2013; Bolis et al., 2012; OCDE, 2003). To ensure the continuity of KM, the personnel training and mentoring is a quality to pursue as a prerogative (Teng-Hu et al., 2015; Abd et al., 2013; OECD 2003). Finally, we found several suggestions to get a better communications by mean of the reward in many different forms including since the non- monetary acknowledgements, until complete monetary incentives criteria (Mageswari et al., 2015; Pitra & Zaušková, 2014); OCDE, 2003).

4.2 Innovation (INNOV)

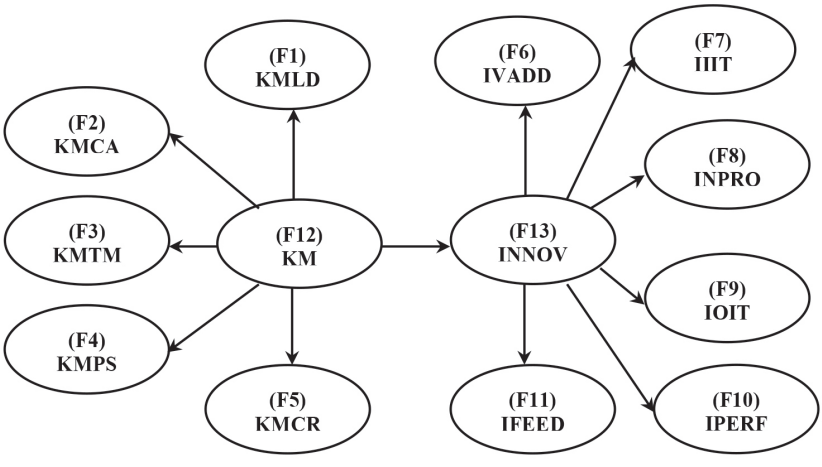
By other side, we have the **INNOV** as a matter of study in several stages that we have proposed like a system, involving: value added to several agents apart the customer (Bonel, et al. 2003) the relation value-price (Gale & Chapman, 1994), the customer emotions and desires to identify the attributes of products and services (Chaudhuri, 2006). The early phase of innovation that recognize the idea (Gassmanna, et al. 2012), the tangible (Shipp, 2008; McKinsey, 2008) and intangible resources (Afuah, 1997; Canibano, 1999; Shipp, 2008; Lev, 2000; Howells, 2000 Popadiuk & Wei-Choo, 2006) As part of the process, is important to consider the concepts like Research, Development and Innovation (R&D+i) (Shipp, 2008, McKinsey, 2008; OECD, 2005 Chesbrough, et al. 2006) and the lifecycle product (Gale & Chapman, 1994), the design, prototype and pre-production (Nicolai et al., 2011; Chesbrough, et al., 2006; Shipp,2008; McKinsey, 2008).

The cycle of customer since the early innovation until the obsolete state of a product, is described by Rogers Model (1983) and the efforts of the technology (Dussauge & Ramantsoa, 1992). The novelty, training and type of innovation are considered as primary prerogative (OECD, 2005; Afuah, 1997) to determine the attributes and characteristics in the new product and service development (Shipp, 2008; McKinsey, 2008; Lev, 2001; Dussauge & Ramantsoa, 1992). The results must be measured, by means of indicators (Bermúdez-García, 2010) aimed to reinforce the agreements amongst the government, the SME

and the universities (Smith & Leydesdorff, 2010). Like an autocontrolled system there must be an information feedback of innovation, by means of capital investment (Lev, 2001;Shipp (2008); Nicolai et al. 2011) the improvement to the SME due the product, service, process, marketing, organizational, technology, infrastructure and other aspects of the innovation (Dussauge, & Ramantsoa, 1992; OECD, 2005; Chesbrough et al., 2006; White & Bruton, 2011), value added (Bonel, et al.,2003; Gale & Chapman (1994) and the kind of leadership that boost the innovation (Mejía-Trejo, et al., 2013).

So, we obtained the **Figure 1.**

Figure 1
General Conceptual Model



Source: Own.

5. Results

5.1 The Questionnaire

We show on **Table 1**: (**5**) Independent Factors, (**23**) variables as **KM** descriptors, and (**6**) Dependent Factors, (**39**) variables as **INNOV** des-

criptors with their authors to prove the questionnaire's confidence and validity as a measuring instrument.

Table 1
Final Questionnaire

KM (F12)		
Factor	*Variables*	*Author (S)*
(F1) KM Leadership (KMLD)	V1.KM practices were a responsibility of managers and executives	Mageswari (et al., 2015); Naveed, & Tahir (2015); OECD (2003)
	V2.KM practices were explicit criteria for assessing worker performance	
	V3.KM practices were a responsibility of non-management workers (KMLD3)	
	V4.KM practices were responsibility of the knowledge officer or KM unit	
(F2) KMCapture and Acquisition (KMCA)	V5.SME captured and used knowledge obtained from other industry sources such as industrial associations, competitors, clients and suppliers	Nonaka & Takeuchi (2011); Hawkins (et al., 2014); OECD (2003)
	V6.SME captured and used knowledge from public research institutions, including universities and government laboratories	
	V7.SME dedicated resources to detecting and obtaining external knowledge and communicating it into the SME	
	V8.SME makes efforts to convert from the tacit to explicit knowledge	

KM (F12)		
Factor	*Variables*	*Author (S)*
(F3) Training and Mentoring (KMTM)	V9.SME encouraged experienced workers to transfer their knowledge to new or less experienced workers	Teng-Hu (et al., 2015) Abd, (et al., 2013); OECD (2003)
	V10.SME provided informal training related to KM	
	V11.SME encouraged workers to continue their education by reimbursing tuition fees for successfully completed work-related courses	
	V12.SME offered off-site training to workers in order to keep skills current	
	V13.SME provided formal training related to KM practices	
	V14.SME used formal mentoring practices, including apprenticeships	
(F4) Policies and Strategies (KMPS)	V15.Used partnerships or strategic alliances to acquire knowledge	Mageswari (et al., 2015); Solberg & Gerson (2013); Bolis (et al., 2012); OCDE (2003)
	V16.Policies or programs intended to improve worker retention	
	V17.Value system or culture intended to promote knowledge sharing	
	V18.Written KM policy or strategy	
(F5) Communications and Rewards (KMCR)	V19.Workers shared knowledge by preparing written documentation such as lessons learned, training manuals, good work practices, articles for publication, etc. (organizational memory)	Pitra & Zaušková (2014); OCDE (2003)
	V20. Workers shared knowledge by regularity updating databases of good work practices, lessons learned or listings of experts	
	V21. Workers shared knowledge in collaborative work by project teams that are physically separated (virtual teams)	
	V22.Knowledge sharing was rewarded with monetary incentives	Mageswari (et al., 2015); OECD (2003)
	V23. Knowledge sharing was rewarded with non-monetary incentives	

KM (F12)		
Factor	*Variables*	*Author (S)*
INNOV(F13)		

Factor	*Variables*	*Author (s)*
(F6) Innovation Value Added (IVADD)	V24.The innovation actions are aimed to increase the Emotions & Desire of the Customer	Chaudhuri (2006)
	V25.The Cost is the main constraint to increase the value	Bonel (et al.,2003)
	V26.The Risk is the main constraint to increase the value	
	V27.The innovation actions are aimed to increase the Customer value	
	V28.The innovation is introduced to the market considering the relation price-value added	Gale & Chapman (1994)
(F7) Innovation Input Items (IIIT)	V29.Opportunity Identification	Kausch (et al. 2014)
	V30.Idea Generation	
	V31.Invests in R&D+I	Shipp (et al. 2008); McKinsey (2008)
	V32.Makes efforts to use and / or generate Patents	Canibano (1999); Shipp (et al. 2008); Lev (2001); Howells (2000)
	V33.Makes efforts to discover New Market Knowledge	Popadiuk & Wei-Choo (2006)

Factor	*Variables*	*Author (s)*
(F8) Innovation Process (INPRO)	V34.Employees engaged in teams with high degree of autonomy	Nicolai (et al., 2011) Chesbrough (et. al. 2006);Rogers (1984)
	V35.Makes to investigate the onset of a new technology	Afuah (1997)
	V36.Decides actions to improve or introduce new forms of marketing	Lev (2001)); OECD (2005
	V37.Makes actions for innovation in production processes	Shipp (et al.,2008); McKinsey (2008); OECD (2005)
	V38.Makes actions to improve or introduce new products forms	
	V39.Makes actions to improve or introduce new forms of service	
	V40.Makes actions to improve or introduce new organizational structures and functions	
	V41.Innovation activities tend to be more incremental rather than radical	
(F9) Innovation Output Items (IOIT)	V42.Detects the projected level of revenues generated by innovation	Shipp (et al. 2008)
	V43.Detects the projected customer satisfaction level generated by innovation	McKinsey (2008)
	V44.Detects the projected sales percentages levels generated by innovation	Lev (2001)
	V45.Detects the level of the number of launches of new products/services in a period	McKinsey (2008); White &Brutton, 2011)
	V46.Detects the net present value of its portfolio of products per services in the market generated by the innovation	

Factor	*Variables*	*Author (s)*
(F10) Innovation Performance (IPERF)	V47.Do you use indicators to identify the Innovation income per Investment in Innovation?	Bermúdez-García (2010)
	V48.Do you use indicators to identify Innovation Opportunities per Total Contributors on the Process?	
	V49.Do you use indicators to identify Number of Approved Ideas per Number of Generated Ideas?	
	V50.Do you use indicators to identify Number of Generated Innovations per Innovation Opportunities detected?	
	V51.Does exist any relationship among : university- government- industry, to develop the innovation?	Smith & Leydesdorff, (2010)
(F11) Innovation Feedback (IFEED)	V52.Based on the results identifies intellectual capital dedicated to innovation for its improvement (IFEED1)	Lev(2001); Shipp (et al. 2008); Nicolai (et al., 2011)
	V53.Based on the results identifies the stages of new or improved process for upgrading (IFEED2)	OECD (2005); Chesbrough (2006)
	V54.Based on the results identifies attributes of new or improved product / service for its improvement (IFEED3)	
	V55.Based on the results identifies the stages of new or improved form of marketing for improvement (IFEED4)	
	V56.Based on the results identifies the stages of new or improved technology for improvement (IFEED5)	
	V57. Based on the results identifies the stages of the new or improved structure and functions of the organization to its improvement (IFEED6)	
	V58. Based on the results identifies the type of innovation (radical or incremental) that has given best results (IFEED7)	

Factor	*Variables*	*Author (s)*
(F11) Innovation Feedback (IFEED)	V59.Based on the results identifies the new or improved value proposition (benefits / costs) for its completion; relation value-price (IFEED8)	Bonel (et al.,2003)
	V60. Based on the results identifies the type of leadership that drives innovation is Transactional (IFEED9)	Mejía-Trejo (et al., 2013), Gloet & Samson (2013)
	V61. Based on the results identifies the type of leadership that drives innovation is Transformational (IFEED10)	
	V62. Based on the results identifies the type of leadership that drives innovation is Passive (**IFEED11**)	

Source: Own.

5.1 Validity and Reliability of the Structural Equation Model

Initial Conditions. About the validity of the measurement scales, it was used the ***Confirmatory Factor Analysis*** (**CFA**) by mean of the maximum likelihood method with **EQS 6.1** software (Bentler & Wu, 2012; Brown, 2006; Byrne, 2006). ***Cronbach's alpha*** and ***Composite Reliability Index*** (**CRI**) (Bagozzi, & Yi, 1988), were used as a techniques to prove the reliability of the measurement scales. All scale values exceeded the recommended value of **0.7** for ***Cronbach's alpha*** and the ***Composite Rate Index*** (**CRI**), which indicates that there is evidence and justifies internal reliability of the scales (Hair et al., 2010). It represents the variance extracted from the group of the observed variables and the fundamental construct (Fornell & Larcker, 1981), particularly, values above **0.6** are desirable (Bagozzi, & Yi, 1988). The settings used in this study were: the ***Normed Fit Index (NFI), the Non-Normed Fit Index*** (**NNFI**), the ***Comparative Fit Index*** (**CFI**) and the ***Root Mean Square Error of Approximation*** (**RMSEA**) (Bentler & Bonnet, 1980; Byrne, 2006; Bentler, 1990; Hair et al., 2006; Chau, 1997; Heck, 1998) Values of **NFI**, **NNFI** and **CFI** between **0.80 and 0.89** represent a reasonable fit (Hair et al., 2010) and a value equal to or greater than **0.90** represents an evidence of a good fit of the theoretical model (Byrne 2006). **RMSEA** Values below **0.08** are acceptable (Hair et al., 2010).

5.2 Analysis of Results

The **CFA** results are presented in **Table 2** and suggests that the model provides a good fit to the data (**S-B*X*² = 241.4946**; df = **174**; p = **0.00048**; **NFI = 0.883**; **NNFI = 0.912**; **CFI = 0.926**; **RMSEA = 0.060**). Additionally, ***Cronbach's alpha*= 0.8432** and the **CRI** (**>= 0.70**) recommended by Hair (et al. 2010) and the ***Rate of Variance Extracted*** **RVE**(**>=0.5**) was calculated for each pair of constructs, resulting in an **RVE** more than **0.50** (Fornell & & Larcker, 1981) As evidence of convergent validity, the results pointed out that all of the **CFA** items factor related are significant (p **<0.001**) and the magnitude of all the factorial charges must be superior of **0. 60** (Bagozzi, & Yi, 1988).

Table 2
Internal Consistency and Convergent Validity
of the Theoretical Model

Factor	*Variable*	*Factor Loading*	*Robust t-Value*	*Loading Average*	*Cronbach's Alpha (>=0.7per Factor via SPSS)*	***CRI >=0.7***	***RVE >=0.5***
(F1) KMLD	V1	0.856***	1.000a	0.8780	0.7990	0.7934	0.7714
	V2	0.900***	12.444				
(F2) KMCA	V7	0.920***	12.444	0.9095	0.8450	0.8404	0.8273
	V8	0.899***	10.859				
(F3) KMTM	V12	0.930***	1.000a	0.8815	0.8100	0.7998	0.7794
	V14	0.833***	27.666				
(F4) KMPS	V16	0.770***	28.774	0.8235	0.7345	0.7208	0.6810
	V17	0.877***	1.000a				
(F5) KMCR	V19	0.880***	26.763	0.8845	0.8120	0.8025	0.7824
	V23	0.889***	18.777				

S-BX ² = 987,618**; df =** 675**; p =** 0.00048**; NFI =** 0.883**; NNFI =** 0.912**; CFI =** 0.926**; RMSEA =** 0.060

a. Parameters constrained to the value in the identification process. ***= p < 0.001
Source: Own.

According with the evidence of the convergent validity, discriminant measure is provided in two forms as we can see in **Table 3**. First,

with a **95%** interval of reliability, none of the individual elements of the latent factors correlation matrix contains **1.0** (Anderson & Gerbing, 1988). Second, extracted variance between the two constructs is greater than its corresponding **RVE** (Fornell & & Larcker, 1981). Based on these criteria, we can conclude that the different measurements with the model show enough evidence of discriminant validity and reliability.

Table 3
Discriminant Validity of the Theoretical Model

Factor	*(F12)* KM	*(F13)* INNOV	*Chi Square Differences Test (Values <IVE)*
(F12) KM	0.7714	0.3125	
(F13) INNOV	0.293, 0.825	0.6130	
	Interval Confidence Test (<1.0)		

Note: The diagonal represents the index of variance extracted (**RVE**), while above the diagonal part presents the variance (the correlation squared); below the diagonal, is an estimate of the correlation of factors with a confidence interval at 95%..
Source: Own.

To obtain the statistical results of the research hypotheses, we applied the **SEM** as a quantitative method with the same variables to check the structure model and to obtain the results that would allow the hypotheses posed, using the software **EQS 6.1** (Bentler & Wu, 2012; Brown, 2006; Byrne, 2006). Furthermore, the nomological validity of the theoretical model was tested using the *chi square*, through which the theoretical model was compared with the adjusted model. The results indicate that no significant differences are good theoretical model in explaining the observed relationships between latent constructs (Anderson & Gerbing, 1988; Hatcher, 1994). **Taking in account only the 10 Factors** described, and running again **EQS 6.1**, we obtained the **Table 4.**

Table 4
Results of hypothesis testing the theoretical model

Hypothesis	*Structural Relation*	*Standardized Coefficient*	*t Value*
H1. A high level of **KMLD** generates a high level of **INNOV** in the **SSG**.	**KMLD→INNOV**	0.300***	23.552
H2. A high level of **KMCA** generates a high level of **INNOV** in the **SSG.**	**KMCA→INNOV**	0.420***	25.788
H3. A high level of **KMTM** generates a high level of **INNOV** in the **SSG**.	**KMTM→INNOV**	0.398***	18.876
H4. A high level of **KMPS** generates a high level of **INNOV** in the **SSG**.	**KMPS→INNOV**	0.250***	14.258
H5. A high level of **KMCR** generates a high level of **INNOV** in the **SSG**.	**KMCR→INNOV**	0.400***	10.890
S-B*X*²= 989,2447; **df**=345; p=0.0005 ; **NFI**=0.862 ; **NNFI**=0.888 ; **CFI**=0.905; **RMSEA**= 0.067 ***= p < 0.001			

Source: Own.

The results obtained after applying the **SEM** quantitative method, were:

H1 ($\beta = 0.300$ p <0. 001), the relationship between **KMLD** and **INNOV** has significant positive effect.

H2 ($\beta = 0.420$, $p < 0.001$), the relationship between **KMCA** and **INNOV** has significant positive effect.

H3 ($\beta = 0.398$, $p < 0.001$), the relationship between **KMTM** and **INNOV** has significant positive effect.

H4 ($\beta = 0.250$, p <0. 001), the relationship between **KMPS** and **INNOV** has significant positive effect.

H5 ($\beta = 0.400$, p <0. 001), the relationship between **KMCR** and **INNOV** has significant positive effect.

Summarizing, we can conclude that the **KM (5)** factors driving **INNOV**, are positive and significant and are very similar in terms of the value that each brings.

6. Discussion and Conclusion

We confirmed that the **KM (5) Factors**, such as: **KMLD, KMCA, KMTM, KMPS, KMCR** with **23 Variables** as Indicators are involved into the **INNOV** with **39** variables as indicators, solving the **SQ1** by meaning the conceptual model that is showed in **Figure 1**. **SQ2** is responded with the questionnaire showed in **Table 1.** To solve **SQ3**, we showed **Table 2**, supported by **Table 3** using **SEM**. To prove the Hypotheses, we finally showed **Table 4,** where **H3.** *A high level of **KMCA** generates a high level of **INNOV** in the **SSG*** shows the most relevant latent factor. So we solved the **GH** at **100%.**

However, ¿how the latent variables are interacting? to answer this, we applied the **SEM** as a quantitative technique and we can see how the underlying variables are interacting amongst them at the same time of multiple regressions are in progress. We found that only **10/23 KM** variables were important. In order of importance, we see for the **SME** at **SSG**:

Factor: (F2) KMCA: V7, V8. The KM capture is well done through actions to detect the externalities and the efforts to do the KM: tacit to explicit. However, is important to do formal relationship among the: the industry, the government and the university.

Factor: (F5) KMCR; V19,V23. The KM sharing is a robust feature but is based on monetary incentives. However, are remarkably lagging: the virtual collaboration and the database updating.

Factor: (F3) KMTM; V12, V13. The KM mentoring is ensured by formal training, but is necessary to lead additional actions to incorporate more tacit KM transference.

Factor: (F1) KMLD; V1,V2. The KM leading is only carry out as a clear responsibility for managers and executives, although there is a great chance to involve the rest of the employees.

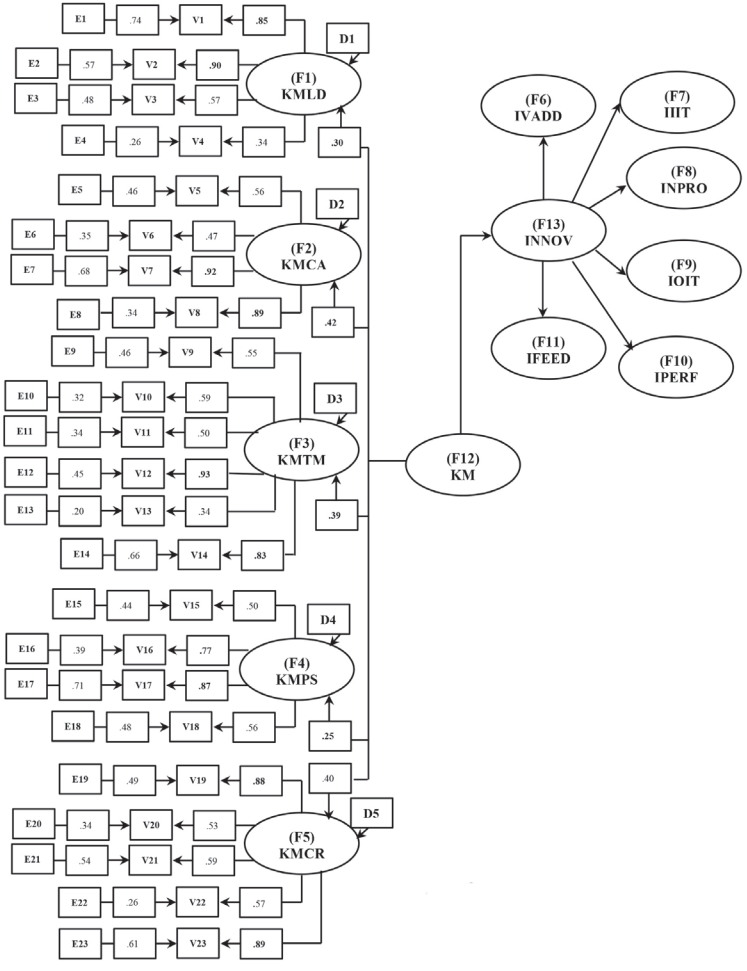
Factor (4) KMPS; V16,V17. It is evident, the existence of policies and strategies to improve the KM process, but it is necessary to do it in a systematic way, with a clear definition of actors, responsibilities, their rights and obligations.

Finally, we conclude that there is a great chance to apply the other **13/23 KM** variables to improve the **INNOV** Process. Other further

study to show in the future is the direct relationship among the **KM** factors and variables, with their similarity with INNOV.

The Final SEM is showed in Figure 2.

Figure 2
Hypothesized Second Order Model SEM, KM on INNOV



Source: Own.

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The Determinant Factors of Open Business Model

ABSTRACT. **Introduction**: Since the beginning of the XXI century, several authors affirm that open business models (**OBM**) enable an organization to be more effective in creating as well as capturing value and are a prerequisite for successful co-development partnerships. As a result of both trends, the rising development costs and shorter product/service lifecycles, companies are finding it increasingly difficult to justify investments in innovation. The **OBM** solve both trends, underscoring the terms: "*industry ecosystem" and*/or "*collaborative business model*". Not only it changes the innovation process but it also modifies organizations themselves by reconfiguring value chains and networks. For the firms, it creates a heuristic logic, based on the current business model and technology to extend them with strategy, to the development of innovation to create value and increasing revenues and profits. It emphasizes the external communities with governance as valuable resources with several roles that promote corporate competitiveness. So, for a specialized sector with high technology such as the information technologies sector of metropolitan zone of Guadalajara (**ITSMZG**), we posed the next research question: **Which are the determinant factors of the OBM as an empirical model to be applied at the ITSMZG?**

Method: As you see, this research is aimed to pose, the determinant factors of the **OBM** as an empirical model to be applied at the **ITSMZG**. This is a documentary study to select the main variables among specialists in **ITSMZG** practicing the **OBM** process using analytic hierarchy process (**AHP**) and **Delphi's Panel** to contrast the academic terms with the specialists experience. It's a descriptive, exploratory, correlational, cross-sectional, qualitative-quantitative study to obtain a final questionnaire in Likert scale, with reliability tested through a pilot survey (**Cronbach's Alpha>0. 75**), applied during Jan. 2015-May 2016 to the total population asked**: 600 specialists of ITSMZG (150 IT teachers and 150 representatives of consulting firms as "*consultant part*"; 290 IT SME CEO and 10 IT LE CEO**

as the "*decision-making part*", since 1 year in the market, 80% with bachelor degree, 20% postgraduate, 20% women and 80% men)**.** It was designed a first-order structural equation modeling (**SEM**) as a confirmatory factor analysis (**CFA**) technique, using the **EQS 6. 1** software to analyze the **OBM** underlying variables, to determine a final **empirical model.**
Results: The result is an empirical **OBM** based on **5 main factors:** business management **BMG** (10 variables/76 indicators), strategy (**STR**, 3 variables/14 indicators), technology (**TEC**, 3 variables/24 indicators), new entrepreneurships (**NWE**, 3 variables /7indicators) and open innovation orientation (**OIO**, 3 variables/18 indicators), empirically proved for the **ITSMZG**.
Conclusion. Although the final empirical **OBM** has a significant positive effect among its variables, also showed different levels of factor loadings, meaning opportunities to improve the model for the **ITSMZG**.
Keywords: determinant factors, open business model, information technologies, Mexico.
Note: We offer a Glossary in **Appendix 2** for all the abbreviations and their meaning to do easiest the reading of this article.

RESUMEN. Introducción: Desde principios del siglo XXI, varios autores afirman que los modelos de negocio abiertos (**OBM**) permiten a una organización ser más eficaz en la creación y la captura de valor siendo un requisito previo para el éxito de las asociaciones de co-desarrollo. Como resultado de las tendencias de: crecientes costos de desarrollo y ciclos de vida de los productos/servicios más cortos, las empresas encuentran cada vez más difícil justificar las inversiones en innovación. El **OBM** resuelve ambas tendencias, subrayando los términos: "*ecosistema de la industria*" y/o "*modelo de negocio colaborativo*". No sólo cambia el proceso de innovación, sino que también modifica a las propias organizaciones mediante la reconfiguración de sus cadenas de valor y redes. Para las empresas, crea una lógica heurística basada en el actual modelo de negocio y tecnología para extenderlas, con estrategia, al desarrollo de la innovación para crear valor y aumentar los ingresos y beneficios. Enfatiza tanto las relaciones externas así como la gobernabilidad, como valiosos recursos con varios roles que promueven la competitividad corporativa. Por lo tanto, para un sector especializado de alta tecnología como lo es el de las tecnologías de la información

de la zona metropolitana de Guadalajara (**ITSMZG**), exponemos el siguiente problema de investigación:
¿Cuáles son los factores determinantes de la OBM como modelo empírico que se ha aplicado en el ITSMZG?
Método: Como se ve, esta investigación tiene como objetivo plantear los factores determinantes de la **OBM** como un modelo empírico que sea aplicado en el **ITSMZG**. Se trata de un estudio documental para seleccionar las principales variables entre los especialistas de las **ITSMZG** que practican el proceso **OBM** mediante el proceso de jerarquía analítica (**AHP**) y el **Panel de Delphi** a fin de contrastar los términos académicos con la experiencia de los especialistas. Es un estudio descriptivo, exploratorio, correlacional, transeccional, cualitativo-cuantitativo para obtener un cuestionario final en escala Likert, con confiabilidad a través de prueba piloto (**Alfa de Cronbach >0. 7**), aplicado entre enero 2015-mayo 2016 a una población total de: **600 especialistas en el ITSMZG (150 profesores de IT; 150 representantes de consultores de firmas IT como "*parte consultora*"; 290 CEO PyME y 10 CEO de empresas grandes como parte de "*toma de decisiones*",** con 1 año en el mercado, 80% con licenciatura, 20% con postgrado, 20% mujeres y 80% hombres).
Se diseñó un modelo de estructural ecuaciones de primer orden (**SEM**) como técnica de análisis factorial confirmatorio (**CFA**), mediante el software **EQS 6. 1** para analizar las variables subyacentes de **OBM**, y determinar un modelo final**.**
Resultados: El resultado es un modelo empírico de **OBM**, que consiste en **5 principales factores:** administración del negocio (**BMG**, 10 variables/76 indicadores), estrategia (**STR**, 3 variables/14 indicadores), tecnología (**TEC**, 3 variables/24 indicators), nuevos emprendimientos (**NWE**, 3 variables /7indicadores) y orientación de la innovación abierta (**OIO**, 3 variables/18 indicadores).
Conclusión. Aunque el modelo empírico final de **OBM** tiene un efecto positivo significativo entre sus variables, también mostró diferentes niveles de carga de factores, lo que significa oportunidades para mejorar el modelo para el **ITSMZG**.
Palabras Clave: **factores determinantes,** modelo de negocios abierto, tecnologías de información, Mexico.
Nota: Ofrecemos un glosario en el **Apéndice 2** para todas las abreviaturas y su significado a fin de hacer más fácil la lectura de este artículo.

1. Introduction

Jalisco state, placed in Mexico, has the most representative cluster of Information Technologies Sector located into the Metropolitan Zone of Guadalajara, Mexico (**ITSMZG**), home of the Mexico's "Silicon Valley". The **ITSMZG** is dedicated to develop new technologies in: design software, TV, cinema, advertising to videogames, digital animation, interactive multimedia and e-learning, among others. It has around 200 **IT** firms that exports 2,000 billion used annually on high value-added services, almost a third of the national total. The **ITSMZG** generates 20,000 jobs in the state, while coupled entire electronics industry, the workforce exceeds 100,000 posts (*Economista*, 2016). The **ITSMZG**, is characterized by the high **OBM** practices, so they are interested to analyze all the determinant factors related to improve all about the **OBM** process. The **ITSMZG** knows several aspects of **OBM** and their practices, so they need an empirical scale model as a first settlement to be adapted and applied.

2. Problem, Rationale of the Study and Hypotheses

The **problem** is proposed as a general question (**GQ**): Which are the determinant factors of **OBM** as an empirical model for the **ITSMZG**? The **rationale of the study** is due to the interest of the **ITSMZG** to know how measure the main variables of **OBM** process to do suggestions for the improvement of the model.

To solve the problem, we posed the next specific questions (**SQ**):

SQ1. Which are the variables proposed for the general conceptual model?;

SQ2. Which are the relationships of these variables?;

SQ3. Which are the most relevant variables of the model?

3. Literature Review

Since the first years of the XXI century, for the academic and the professional world, there has been a frequent mention of the term "*business model*". Specially today, that digital media in access and transmission data offer the great possibility of being networked (anywhere, any-time) managers and academics have speculated about which business models have led to spectacular successes and which have been used by organizations that have withered and died. The question of which business models are effective in this age of fast and dramatic change clearly occupies the minds of many. The business models have surged into the management vocabulary. But, there is still a lot of confusion about what business models are and how they can be used. The main facts, is that they are an strategic reference and have a powerful role in corporate management. While other authors have recently offered definitions of business model, none appear to be generally accepted (Shafer et al.,2005). Likewise steadily pace, the concept has been evolving as far the open innovation has been implemented by the firms due internet and information technologies. However, the authors show different definitions and point of views about what **OBM** is, therefore the objective of this article is to propose a framework for **OBM**.

We made a documentary study to determine the open business models factors (**OBM**), among **97**works from 1998 (Shafer et al., 2005) until nowadays (Weiblen, 2014), selecting **26 documents** (from 2006 until 2016) with detailed description about **OBM**. See **Table 1.**

Table 1
Open Model Business definitions

No.	*Year*	*Authors (Year)*	*Definition of business model*	*Business model elements*	*Variables standarization by concept*
1	2006	Chesbrough (2006)	*It's fragmented in : "technologies require appropriate business models to give them value"… "companies must develop more open business models if they are to make the most of the opportunities offered by Open Innovation"*	. Value proposition . Target market segment; . Value chain structure . Value network position . Economic model t o extract value to succeed. . Second markets . Technologies based on market . Technologies based on policies of the firm. . External resources and capabilities and barriers . Intellectual property . Costs . Shorter product life cycles . 6 types of business models based on differentiation . Implementing the open business models	. Value proposition. **(VPR)** . Market segmentation**.** **(MKS)** . Technology based on market **(TECM)** **.** Technology based on policies **(TECO)** . Key activities**.** **(KA)** . Key resources**.** **(KR)** . Intellectual property rights. **(IPR)** . Revenues per **IPR** **(RIPR)** . Cost structure. **(CST)** . Lean-Startup **(LST)**

No.	*Year*	*Authors (Year)*	*Definition of business model*	*Business model elements*	*Variables standarization by concept*
2	2007	Chesbrough (2007)	*It's fragmented in : "Companies must open their business models by actively searching for and exploiting outside ideas and by allowing unused internal technologies to flow to the outside, where other firms can unlock their latent economic potential"* *"Open business model enable an organization to be more effective in creating as well as capturing value"* *"As a result of both trends-rising development costs and shorter product lifecycles- companies are finding it increasingly difficult to justify investments in innovation. Open business models address both effects"* *"Open innovation models also attack the revenue side for instance licensing technologies the ability to experiment with their business models"*	. The business model is adapted to OBM . Capture value . Rising development cost . Shorter product lifecycles . Revenues due intellectual property rights . Ability to experiment with the business model . Technologies based on policies of the firm . Technologies based on market	. Strategy on **OBM (SOBM)** **.** Orientation of business model **(ORBM)** Value proposition. **(VPR)** . Cost structure. **(CST)** . Intellectual property rights. **(IPR)** . Revenues per **IPR (RIPR)** **.** Strategy on **IPR (SIPR)** . Technology based on policies **(TECO)** Technology based on market **(TECM)** . Lean Startup**(LST)**

No.	*Year*	*Authors (Year)*	*Definition of business model*	*Business model elements*	*Variables standarization by concept*
3	2007	Chesbrough & Schwartz, (2007)	*"Open business models are a prerequisite for successful co-development partnerships"*	. The same business model adapted to OBM	. Strategy on **OBM (SOBM)** **.** Orientation of business model **(ORBM)** Partnership. **(PTS)**
4	2008	Vetter et al., 2008)	*"Open business models are roles that emerge around a shared technical infrastructure."*	. Technologies based on policies of the firm	. Technology based on policies**(TECO)**
5	2009	Sandulli & Chesbrough, (2009)	*"Companies are beginning to share their internal resources with a third party to create value, or the reverse, companies are beginning to incorporate external resources in their own business model. These new business models have been defined by Chesbrough as open business models."*	. Resources . Capabilities . Value creation . Partnership	. Key resources. **(KR)** . Key activities. **(KA)** . Value proposition. **(VPR)** . Partnership. **(PTS)**
6	2009	Wang et al., (2009)	*"The so called 'open business model' is different from the current business model a company has constructed and allows internal and external knowledge to penetrate in the operations of companies."*	. The same business model adapted to OBM	. Strategy on **OBM (SOBM)** **.** Orientation of business model **(ORBM)** . Key resources. **(KR)** . Key activities. **(KA)**

No.	*Year*	*Authors (Year)*	*Definition of business model*	*Business model elements*	*Variables standarization by concept*
7	2010	Davey, Brennan, Meenan, & McAdam, (2010)	*"A successful open businessmodel creates heuristic logic that connects technical potential with the realization of economic value."*	. The same business model adapted to OBM	. Strategy on **OBM (SOBM)** . Orientation of business model **(ORBM)** . Value proposition. **(VPR)**
8	2010	(Chanal & Caron-Fasan)	*"Open business models can include external communities as valuable resources."*	. The same business model adapted to OBM	. Strategy on **OBM (SOBM)** . Orientation of business model **(ORBM)** . Partnership. **(VPR)**
9	2010	Soloviev, Kurochkin, Rendiuk, & Zazuk (2010)	*"The main advantage of the open business model is that this model involves the value creation by the efforts of a large community of developers."*	. The same business model adapted to OBM . Value creation . Community	. Strategy on **OBM (SOBM)** . Orientation of business model **(ORBM)** . Value proposition. **(VPR)** . Platform-Channels. **(PTF)** . Governance. **(GOV)**
10	2010	Smith et al. (2010)	*"The business model plays a central role in the open-innovation paradigm, some authors argue that firms are more innovative when they adopt open business models."*	. The same business model adapted to OBM	. Strategy on **OBM (SOBM)**
11	2011	Po-Young & Wan-Chen (2011)	*"As an extension of open innovation, open business models underscore a concept of industry ecosystem."*	. The same business model adapted to OBM	. Strategies on **OBM (SOBM)** . Orientation of business model **(ORBM)** . Platform-channels. **(PTF)**-Governance **(GOV)**

No.	*Year*	*Authors (Year)*	*Definition of business model*	*Business model elements*	*Variables standarization by concept*
12	2011	Alexy & George (2011)	*"The structures and mechanisms by which firms access knowledge outside their organizational boundaries to create value for the firm, sometimes by ceding control of product development pathways and its own intellectual property rights, are referred to as open business models."*	. Value proposition . Intellectual property rights	. Value proposition. (**VPR**) . Intellectual property rights(**IPR**) . Revenues per **IPR** (**RIPR**) . Strategy on **IPR** (**SIPR**) . Orientation of business model (**ORBM**)
13	2011	Cheng (2011)	*"an open business model serves as an organizing principle for structuring and coordinating various resources and functional units"*	. Governance	. Platform-channels. (**PTF**) . Governance(**GOV**)
14	2011	Chih-Ming & Huan. -Fang (2011)	*"The open business model transforms innovation and technology into economic results. Using a combination of innovative strategies and continuously integrating internal and external resources, the open business model promotes corporate competitiveness, establishes a network of collaboration relationships, and forms intercommunication platform models [...]"*	. Business model . Technologies based on policies of the firm . Strategy . External/internal resources . Network	. Technology based on policies (**TECO**) . Strategies about **OBM** (**SOBM**) . Key activities. (**KA**) . Key resources. (**KR**) . Platform-Channels (**PTF**) . Governance. (**GOV**)
15	2011	Romero & Molina, (2011)	*Seen as equivalent to a "collaborative business model" in value networks and value co-creation with customers.*	. Business model . Value proposition . Networks . Customer relationships	. Value proposition (**VPR**) . Platform-Channels. (**PTF**) . Governance (**GOV**) . Customer relationships management(**CRM**)

No.	*Year*	*Authors (Year)*	*Definition of business model*	*Business model elements*	*Variables standarization by concept*
16	2012	Purdy, Robinson, &Wei, (2012)	*"open business models enable firms to maximize the benefits of openness while limiting the risks. Synonymous use with open firm business model"*	. The same business model adapted to OBM . Risk	. Strategy on **OBM (SOBM)** **.** Orientation of business model **(ORBM)**
17	2012	Jagoda, Maheshwari, & Gutowski, (2012)	*"firms can better negotiate competitive pressures by making the boundaries of an organization open and more permeable to a bidirectional flow of innovative ideas. According to Chesbrough, there are two types of openness: outside in and inside out."*	. Key resources . Key activities . Technologies based on policies of the firm	. Key resources. (**KR**) . Key activities. (**KA**) . Technology based on policies (**TECO**)
18	2012	Sheets & Crawford, (2012)	*"Open business models involve the organizational use of external as well as internal ideas and resources, and of external as well as internal pathways for deploying them to create and capture value."*	. Value creation/capture . Key resources	. Value proposition. (**VPR**) . Key resources(**KR**)

No.	*Year*	*Authors (Year)*	*Definition of business model*	*Business model elements*	*Variables standarization by concept*
19	2012	Storbacka, Frow, Nenonen, & Payne, 2012)	*"Business models are typically designed around over-riding design themes [...]. We suggest that one over-riding theme can be 'co-creation' and argue that a focal actor wishing to engage in co-creation needs to design an 'open' business model that permits other actors to influence specific design elements."*	. Value co-creation . Partnership	. Value proposition (**VPR**) . Partnership. (**PTS**)
19	2012	Wang & Zhou (2012)	*"open innovation players select a proper business model to unlock the value of technology, which could be called as the open-innovation-based business model."*	. The same business model adapted to OBM . Technologies based on policies of the firm	. Strategy on **OBM (SOBM)** **.** Orientation of business model **(ORBM)** . Technology on policies (**TECO**) . Value proposition. (**VPR**)
20	2013	Frankenberger, Weiblen, & Gassmann, (2013)	*"Researchers on open business models outline even more explicitly the need for external collaboration by arguing that open business models lead to value creation and capturing by 'systematically collaborating with outside partners' (Osterwalder and Pigneur 2010: 109)."*	. Business model . Value capture/ creation . Partnership	. Value proposition. (**VPR**) . Partnership. (**PTS**)

No.	*Year*	*Authors (Year)*	*Definition of business model*	*Business model elements*	*Variables standarization by concept*
21	2013	(Holm et al., 2013)	*Open business models are explicitly defined in a broad sense: "Although based in part on innovation management research [...], here we expand [the concept of openness] to the more generic concept of a business model."*	. The same business model adapted to OBM . Value creation, delivery and capture	. Strategy on **OBM (SOBM)** . Orientation of business model **(ORBM)** . Value proposition. **(VPR)**
22	2013	Saebi & Foss (2013)	*"systematically linking open innovation strategies to core business model dimensions, notably the content, structure, governance of transactions"*	. Content . Structure . Governance Market-based innovation strategy with strategies: . Crowd-based innovation strategy . Collaborative innovation strategy . Network-based innovation strategy	. Strategy about **OBM (SOBM)** . Platform-Channels **(PTF)** . Governance**(GOV)**
23	2014	Gay (2014)	*"dominant partners use to capture value/innovation as they interact with, or invest in, smaller entrepreneurial firms."*	. Value proposition, creation/ value capture . Networking dynamics . Timing . Technologies based on policies of the firm . Business strategy	. Value proposition. **(VPR)** . Platform-Channels. **(PTF)** Governance. **(GOV)** . Technology based on policies**(TECO)** . Strategy about **OBM(SOBM)**

No.	*Year*	*Authors (Year)*	*Definition of business model*	*Business model elements*	*Variables standarization by concept*
24	2014	Demil, & Lecocq, X. (2014)	*"Not only this open movement changes the innovation process but it also modifies organizations themselves by reconfiguring value chains and networks, leading to what is called open business models"*	. Value capture/value creation . Intellectual property rights Value chains . Networks	. Value proposition. (**VPR**) . Intellectual property rights. (**IPR**) . Revenues per IPR (**RIPR**) . Strategy on **IPR** (**SIPR**) .. Orientation of business model (**ORBM**) . Platform-Channels. (**PTF**) Governance. (**GOV**)
25	2014	Weiblen, T. (2014).	*"the term 'openness' in open business models is grounded on the logic of the firm's collaboration with its ecosystem."*	. Business models . Value creation . Network	. Value proposition. (**VPR**) . Platform-Channels. (**PTF**). Governance. (**GOV**)

No.	*Year*	*Authors (Year)*	*Definition of business model*	*Business model elements*	*Variables standarization by concept*
26	2016	Kotmann & Piller (2016)	*Open business models trigger firms to establish more sustainable businesses that allow external stakeholders to take a share in the obtained profits*	. Nine archetypes of Business models . Value chain with manufacturer reference . External partners in production- consumption-circulation -Implications among firm-consumer relationships-consumer communities-sustainability of business model-product innovation-.	. Value proposition. (**VPR**) .. Partnership. (**PTS**) . Costumer relationship management (**CRM**)

Note: **VPR.** Value proposition; **MKS.** Market segmentation; **TECM.** Technology based on market; **TECO.** Technology based on policies of the firm.; **SOBM**. Strategy on OBM.; **IPR.** Intellectual property rights; **ORBM.** Orientation of OBM.; **SIPR.** Strategy on IPR.; **GOV**. Governance; **PTF.** Platform-Channels.; **PTS.** Partnership.; **KR.** Key resources; **CRM.** Customer relationship management; **RIPR**. Revenues per IPR; **KA.** Key activities; **LST.** Lean stat-up.; **CST.** Cost structure.
Source: Weiblen (2014) updated with own adaption.

With these results, we proceeded to detect the more relevant **variables** by mean of a variable standardization by concept, in order to gather them in little common groups according the open business definitions. This represents the **academic vision**. See **Table 2.**

This vision was faced to the empirical point of view (**empirical vision**) of **5 renowned specialists at ITSMZG in the practice of OBM.** Using **AHP** technique (Saaty, 1997) and **Focus Group Delphi's Oracle** we weighed and determined the **most important variables** to use in our conceptual model. Even more, the specialist recommended **5 underlying factors,** for best variables grouping to explain the **OBM:** business management **BMG**, strategy (**STR**), technology (**TEC**), new entrepreneurships (**NWE**) and open innovation orientation (**OIO**). See **Table 3.**

Table 2
OBM Variables mentioned for each author analyzed

Item	*Variables*	*Authors numbered as the Table 1*																									*TOT*
		1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*	*21*	*22*	*23*	*24*	*25*	*26*	
1	**CRM**															X											X	2
2	**CST**	X	X																									2
3	**GOV**									X				X	X	X								X	X	X		7
4	**IPR**	X	X										X												X			4
5	**KA**	X				X	X								X			X										5
6	**KR**	X				X	X								X			X	X									6
7	**LST**	X	X																								X	3
8	**MKS**	X																										1
9	**ORBM**		X	X			X	X	X	X			X				X					X	X		X			11
10	**PTF**									X		X		X	X	X								X	X	X		8
11	**PTS**			X		X						X								X	X				X			6
12	**RIPR**	X	X										X												X			4
13	**SIPR**		X									X	X															3
14	**SOBM**		X	X			X	X	X	X	X	X			X		X					X	X	X				13
15	**TECM**	X	X																									2
16	**TECO**	X	X		X										X			X						X				6
17	**VPR**	X	X			X		X	X	X			X			X			X	X	X	X	X	X	X	X	X	17
		10	10	3	1	4	4	3	3	5	1	4	5	2	6	4	2	3	2	2	2	3	3	5	7	3	3	
TOTAL																												100

Notes: **CRM.** Customer relationship management; **CST.** Cost structure; **GOV**. Governance; **IPR.** Intellectual property rights; **KA.** Key activities; **KR.** Key resources; **LST.** Lean start-up; **MKS.** Market segmentation; **ORBM.** Orientation of OBM.; **PTF.** Platform-Channels.; **PTS.** Partnership; **RIPR**. Revenues per IPR; **SIPR.** Strategy on IPR.; **SOBM**. Strategy on OBM.; **TECM.** Technology based on market; **TECO.** Technology based on policies of the firm; **VPR.** Value proposition.
Source: Own.

Table 3
AHP or Saaty's Theorem to identify variables and factors of OBM

Objective		*Open Business Model (OBM)*			
	Factor as Empirical vision	*Variable as Academic vision*		*Frecquency as Academic vision*	*AHP weighing as an empirical vision*
Alternatives	BMG	1	VPR	17	0. 10
	STR	2	SOBM	13	0. 09
	OIO	3	ORBM	11	0. 09
	BMG	4	PTF	8	0. 08
	OIO	5	GOV	7	0. 08
	BMG	6	KR	6	0. 07
	BMG	7	PTS	6	0. 07
	TEC	8	TECO	6	0. 07
	BMG	9	KA	5	0. 07
	NWE	10	IPR	4	0. 06
	BMG	11	RIPR	4	0. 06
	NWE	12	LST	3	0. 05
	STR	13	SIPR	3	0. 04
	BMG	14	CRM	2	0. 03
	BMG	15	CST	2	0. 02
	TEC	16	TECM	2	0. 01
	BMG	17	MKS	1	0. 01
		Total		100	1. 00

Notes: **BMG.** Business model generation; **CRM.** Customer relationship management; **CST.** Cost structure; **GOV**. Governance; **IPR.** Intellectual property rights; **KA.** Key activities; **KR.** Key resources; **LST.** Lean start-up; **MKS.** Market segmentation; **NWE.** New entrepreneurship; **OIO.** Orientation of the innovation; **ORBM.** Orientation of OBM.; **PTF.** Platform-Channels.; **PTS.** Partnership; **RIPR**. Revenues per IPR; **STR.** Strategy**; SIPR.** Strategy on IPR.; **SOBM**. Strategy on OBM.; **TEC.** Technology; **TECM.** Technology based on market; **TECO.** Technology based on policies of the firm.; **VPR.** Value proposition.
Source: Own.

So, we started to describe the underlying factors (**BMG, STR, TEC, NEW, OIO**) grouping our variables with their principal features, under the **OBM** vision, as:

3.1 Open Business Model (OBM) Factor

With the increased adoption of open innovation practices, *"open business models"* (**OBM**) have emerged as a new design theme (Chesbrough, 2006). As we've see, exist a lot of definitions to be analyzed depending the point of view of the researcher, for example Weiblen (2014) refers in its study of open business model definitions, among **13 papers** and three groups of concepts: ***"a) Same:*** *for seven of the papers, it was not possible to spot a notable difference between open innovation and open business model. The concepts are used almost synonymously.* ***b) OBM = BM based on OIN:*** *in two of the papers, the authors see a firm using open innovation principles as one that implements an open business model but the differentiation is made.****c) OBM = BM adjusted to OIN:*** *four papers adopt a slightly different standpoint. Here, certain adjustments to the firm's business model have to be made to accommodate for the incorporation of open innovation into R&D.*

As the last two groups show, there is a slight difference in meaning, but the border between open innovation and the open business model concept is hard to draw. Before taking up this point in the discussion of the results, the remaining papers of the literature base, which take a broader perspective on the open business model, are presented."

Despite the mentioned above, to facilitate our point of view of conceptual **OBM**, in this paper, we propose to use the Osterwalder& Pigneur (2010) definition of business model: "*A business model describes the rationale of how an organization creates, delivers, and captures value"*. If we see the **Table 4** we found out in an implicit form, the 9 blocks of the Osterwalder & Pigneur's (2010) model: **VPR**, **MKS**, **PTF**, **KA**, **KR**, **CRM**, **RIPR**, **CST** and therefore we can call these group of variables the business management (**BMG**) factor. Although some authors, such as Euchner and Ganguly (2014) comment about this part of the model: *"it misses the key dynamic elements of working business models— it does not represent coherence (or the relationship among elements); it does not represent the competitive position (which is off the canvas); and it does not quantify the economic leverage points".* But, we consider that it can be well complemented, with the remaining variables which are grouped, as follows: **TECM**, **TECO** variables group

we can call as a technology (**TEC**) factor; **SOBM, SIPR** variables group as a strategy (**STR**) factor; **IPR, DIV** variables group we can call as a new entrepreneurships (**NWE**) factor and finally, **ORBM, GOV** variables group we can call as a open innovation orientation(**OIO**) factor.

3. 1. 1. The Business Model Management (bmg) Factor.

As we mention above, this article is based and adapted to the Osterwalder & Pigneur (2010) model, more recognized as Business Model Generation. See **Table 4.**

Table 4
The Business Model Model Generation
as Business Model Management Factor

<table>
<tr><td rowspan="2">PTS</td><td>KYA</td><td rowspan="2">VPR</td><td rowspan="2">CRM</td><td rowspan="2">MKS</td></tr>
<tr><td>KYR</td></tr>
<tr><td colspan="3">CST</td><td colspan="2">RIPR</td></tr>
</table>

Note: **CRM.** Customer relationship management; **CST.** Cost structure.; **KA.** Key activities; **KR.** Key resources; **MKS.** Market segmentation; **PTF.** Platform-Channels; **PTS.** Partership; **RIPR**. Revenues per IPR; **VPR.** Value proposition.
Source: Osterwalder & Pigneur (2010) with own adaption.

The proposed conceptual **OBM** is adapted and explained as follows:

- The market segmentation (**MKS**) as the basis to define the services and products specialized to offer to the customer according Osterwalder & Pigneur (2010) and being: mass market, niche market, segmented market, diversified market, multi-sided platforms (or multi-sided markets). The key questions to be solved are: For whom are we creating value?, Who are our most important customers?. It represents the opportunity to analyze, different application of the technology besides the current market such as the discovering and developing new markets or for licensing other firm's market (Osterwalder & Pigneur, 2010; OECD, 2008).
- The value proposition (**VPR**) is the core of any business and is characterized by: newness, performance, customization, *"getting the job done",* design, brand status, price, cost reduction, risk re-

duction, accessibility, convenience /usability. The key questions to be solved: are: what value do we deliver to the customer? which one of our customer's problems are we helping to solve?, which customer needs are we satisfying?, what bundles of products and services are we offering to each Customer Segment? (Osterwalder & Pigneur, 2010). The model includes the user a source of innovation to create value, as a tool to capture value (Von Hippel 2005). A growing number of research and development-driven companies are located in knowledge-based ecosystems. Value creation by these ecosystems draws on the dynamics of single firms (interacting and partnering) as well as the ecosystem at large (Van der Borgh et al. 2012).

- The customer relationship management (**CRM**). This section describes the types of relationships it wants to establish with specific customer segments, being for instance*: personal assistance, dedicated personal assistance, self-service, automated services, communities, co-creation*. Special attention represents the *co-creation* relationship because in the world of Web 2. 0 has considerably increased the possibilities of user involvement in the production process and, thereby, has given rise to new forms of *co-creation* (**OBM** with customers). Because the roles of consumers, (or *prosumers*) have radically changed, specific challenges have emerged, being the main challenges: incentives, risks and costs, IPRs. (Rayna & Styriukova, 2014). The types of relationships might be driven by the following motivations:. *customer acquisition; customer retention; boosting sales (upselling).* It includes key questions to be solved: through which channels do our customer segments want to be reached?, how are we reaching them now?, how are our channels integrated?, which ones work best?, which ones are most cost-efficient? how are we integrating them with customer routines? (Osterwalder & Pigneur, 2010).
- The channels based on platforms (**PTF**). This block describes how a company communicates with and reaches its customer segments to deliver a value proposition. It's used for raising awareness among customers about a company's products and services, helping customers evaluate a company's value proposition allowing customers to purchase specific products and services delivering

a value proposition to customers and providing post-purchase customer support. It involves key questions to be solved: through which channels do our customer segments want to be reached?, how are we reaching them now?, how are our channels integrated?, which ones work best?, which ones are most cost-efficient?, how are we integrating them with customer routines? It's highly recommended, to be close to customers and providers follow the channel phases, such as: awareness, evaluation, purchase, delivery and after sales with the own (or with partners) resources and capabilities (Osterwalder & Pigneur, 2010; OECD, 2008).

- The revenues streams (**RIPR**) is adapted from the original Osterwalder & Pigneur (2010) model representing the cash a company generates from each customer segment (costs must be subtracted from revenues to create earnings) specially differenced here, from **IPR** due the intellectual capital of the firm (mainly based on technology) and taking different forms, such as: assets sales, usage fee, subscription fee, lending/renting/leasing, licensing, brokerage fees, advertising, and several forms of pricing (static/dynamics) (Osterwalder & Pigneur, 2010). This variable represents a great chance, for the organizations based on de **IPR** protection as: patents, trademarks and copyrights, for commercializing them using *patent pools* or *cross-licensing portfolios*, for instance (OECD, 2008). Based on **IPR**, some key question to be solved are: for what value are our customers really willing to pay?, for what do they currently pay?, how are they currently paying?, how would they prefer to pay?, how much does each **RIPR** contribute to overall revenues?
- The key resources (**KYR**). In **OBM** there's no more the most important assets required to make a business model work (Chesbrough, 2006) due the capability of the firm to access to the external resources of its partners. But every **OBM,** requires it. These resources allow an enterprise to create and offer a **VPR**, reach markets, maintain relationships with **MKS**, and earn revenues involving tangible (buildings, infrastructure, labs, etc.) and intangible (data, information, talent personnel, etc.) assets. **KYR** can be physical, financial, intellectual, or human; also can be owned or leased by the company or acquired from key partners

(Osterwalder & Pigneur, 2010). Some key questions to be solved are: what key resources do our value propositions require?, our distribution channels?, customer relationships?, revenue streams based on **IPR**? If we opening up, we see that a conceptual **OBM** might includes various perspectives: (1) globalization of innovation, (2) outsourcing of R&D, (3) early supplier integration, (4) user innovation, and (5) external commercialization and application of technology (Gassman, 2006) in own or partners labs (Asakawa et al. 2010) to apply the **KYR** in optimal conditions

- -The Key Activities (**KYA**) there's no more the most important assets required to make a business model work (Chesbrough, 2006) due the capability of the firm to access to external activities of its partners. It describes the most important things a company must do to make its **OBMs** work as the most important actions a company must take to operate successfully. They are required to create and offer a **VPR**, reach markets, maintain **CRM**, and earn revenues. Some key activities for instance are: *production, problem solving and platform network*. Key questions to be solved are: what key activities do our value propositions require?, our distribution channels?, customer relationships?, revenue streams? (Osterwalder & Pygneur, 2010). For instance, about the key activities involving knowledge, exists an spatial clustering of economic activity and its relation to the spatiality of knowledge creation in interactive learning processes. It questions the view that tacit knowledge transfer is confined to local milieus whereas codified knowledge may roam the globe almost frictionless. Some studies highlight the conditions under which both tacit and codified knowledge can be exchanged locally and globally (i. e. cluster and network innovation systems) (Bathelt et al. 2004). There is currently a broad awareness of **OBM** and its relevance to corporate R&D. The implications and trends that underpin **OBM** are actively discussed in terms of strategic, organizational, behavioral, knowledge, legal and business perspectives, and its economic implications as key activities (Enkel et al. 2009). Previous studies have firmly established the technological gatekeeper to be a key node in the innovation process as key activities (acquiring, translating, and disseminating external information throug-

hout the R&D unit) (Whelan et al. 2010). Besides, several studies argue that a key activity of a firm is to recognize the value of new, external information, assimilate it, and apply it to commercial ends is critical to its innovative capabilities (Cohen & Levinthal, 1990; OECD, 2008) called commonly as absorptive capacity in an **OBM.** Some special conditions for instance, the pool of scientist, clusters and academic institutes, near to markets and production facilities are key factors to do investments for activities aimed to R&D, in other countries (Schwaag 2006; INSEAD et al., 2006). Companies base their decisions to locate R&D as the key activities on a variety of factors, principally: market potential, quality of R&D staff, university collaboration, and intellectual property protection. While lower cost can be a consideration (i. e. outsourcing) this is generally less important than other factors. (Thursby & Thursby 2006; Kuemmerle 1997; Dunning & Narula 1995). Exists acknowledge that some degree of outsourcing can further corporate creativity and that virtuality makes sense under certain conditions. But every company, they contend, needs to tailor its organization to its own operations and its unique sources of innovation (Chesbrough & Teece, 2002).

- The Partnerships (**PTS**) represent the network of suppliers and partners that make the business model work companies forge partnerships for many reasons, and partnerships are becoming a cornerstone of many business models. Companies create alliances to optimize their business models, reduce risk, or acquire resources. There are four different types of partnerships: a) Strategic alliances between non-competitors, b) Coopetition: strategic partnerships between competitors; c) Joint ventures to develop new businesses; d) Buyer-supplier relationships to assure reliable supplies (Osterwalder & Pigneur, 2010). The motivations to do it are: reduction of risk and uncertainty, optimization and economy of scale, acquisition of particular resources and activities. Our conceptual **OBM** is completely supported by partnership especially in the partnership with *sub-national* or *regional innovation systems* (OECD, 2008b; Cook, 2005; Beckan et al. 2004) as well as the relationship of University-Government-

Organization (Triple Helix) (Etzkowitz & Leydesdorff, 1995), and recently, the society (Miller et al., 2016).

· The cost structure (**CST**) determines all costs incurred to operate the **OBM.** Creating and delivering value, maintaining customer relationships, and generating revenue all incur costs. Such costs can be calculated relatively easily after defining **KYA**, **KYR**, and **PTS.** There are several types of costs, such as: *cost-driven, value-driven, fixed costs, variable costs, economies of scale, economies of scope.* Some questions to be solved are: what are the most important costs inherent in our **OBM**?, which **KYR** are most expensive?, which **KYA** are most expensive?. Some authors (Remneland-Wikhamn & Knights, D. 2012) have called this *transaction cost economics* (**TCE**) and consider that has had a strong impact on theories of economic exchange but also on **OBM**, even though the relationship is often implicit rather than explicit. The key questions to be resolved are: who are our key partners? who are our key suppliers?, which key resources are we acquiring from partners?, which key activities do partners perform?

Hence, our hypothesis is:

H1. Higher level of **BMG** higher level of **OBM** at **ITSZMG.**

3.1.2 The Strategy (STR) Factor

The strategy (**STR**) in regard of the match to **OBM** is likely to be an important antecedent to open innovation performance, because the "*… essence of a business model is in defining the manner by which the enterprise delivers value to customers, entices customers to pay for value, and converts those payments to profit*" (Teece, 2010). These set of manners are proposed in our model to be implemented as:

SOBM. Which is aimed to determine **4 OBM** strategies, according Saebi & Foss (2013). See **Table 5**.

Table 5
Strategies for OBM

Business model dimensions	*Market-based innovation strategy*	*Crowd-based innovation strategy*	*Collaborative innovation strategy*	*Network-based innovation strategy*
	Efficiency-centric OBM	User-centric OBM	Collaborative OBM	Open platform business model
Content	-Efficiency-centered value proposition, enabled by reduction in transaction and coordination costs	. User-centered value proposition, input from communities of users	. Radical innovations and opening up of new target segment	. Business model acts as open-innovation platform for multiple stakeholders
Structure	-Redefinition of role of internal R&D system -Efficiency-centered structure	-Ideation phase of innovation process "*outsourced*" to the crowd	-Users / suppliers / customers / competitors become key partner in innovation process	-Re-organization of the production & distributional system -Need for complementary internal network
Governance	-Monetary remuneration for external knowledge provider -Use of "*integration experts*" to absorb market-available knowledge	- Monetary prizes or recognition for external knowledge providers -Incentives to engage and manage communities of users for own employees	-Contract based, sharing of rewards on organizational level with external knowledge provider -Incentives for own employees to engage with lead users and alliance partners	-Provide incentives for own employees to engage with multitude of knowledge partners (individuals, companies, communities) -Re-distribution of risks & rewards

Source: Saebi & Foss (2013).

However, it still has a lot to study and learn about the implications of these strategies because, for instance user-centric **OBM** in the specific context of project-based firms can show negative interactions are related to the client's attempts to reduce costs through tender-based competition to push down prices, or through contracts that push the risk onto the contractors, owing price competition with negative impact in innovation (Hopkins et al. 2010).

SIPR. National surveys of R&D labs across the manufacturing sectors in several industrialized countries (i. e. USA and Japan) show that intraindustry R&D knowledge flows and spillovers are greater, and the appropriability of rents due for patents and intellectual property take an strategic importance for innovation (Coehn et al. 2002). The value of the open innovation approach is now widely recognized, and the practice has been extensively researched, but still very little is known about the relative impact of firm-level and laboratory-level open innovation policies and practices on R&D performance (Asakawa et al. 2010) that most be involved in an **OBM**, to get competitive advantage (Rohrbeck, et al. 2009). Even more, the secrecy of vital process of the firm must be protected (OECD, 2008).

Hence, our hypothesis is:

H2. Higher level of **STR** higher level of **OBM** at **ITSZMG.**

3.1.3 The Technology (TEC) Factor

It's one of the most important factors in **OBM**. It's an asset that firms use such as: *technology in-licensing*, *technology licensing*, and *technology out-licensing* (Chesbrough,& Kardon-Crowter, 2006). Based on the results, we distinguished the next **variables** around **TEC**:

TECM. - How the technology is created by the own firm's capabilities and resources, or how the firm uses its own capabilities to do alliances to get external technology and the fact to aim to own market or other markets, represent the core of the open innovation in this matter (Chesborough, 2003) and is strategic integrate it onto the **OBM.** Besides, acquiring external knowledge, many firms have begun to actively commercialize technology, for example, by means of outlicensing. This increase in inward and outward technology transactions reflects the new paradigm of open innovation. Most prior re-

search into open innovation is limited to theoretical considerations and case studies, whereas other lines of research have focused either on external technology acquisition or exploitation (Lichtenthaler & Holger 2009).

TECO. Companies have historically invested in large research and development departments to drive innovation and provide sustainable growth. What is emerging is a more **OBM**, where companies recognize that not all good ideas will come from inside the organization and not all good ideas created within the organization can be successfully marketed internally. To date, Open Innovation concepts have been regarded as relevant primarily to *"high-technology"* industries. Even more, without knowing it, there are several companies that are already applying many concepts in a wide range of industries (Chesbrough, & Kardon-Crowter, 2006). So, it's an important matter the regulation of how to use the technology, by mean of firm's policies.

Hence, our hypothesis is:

H3. Higher level of **TEC** higher level of **OBM** at **ITSZMG;**

3. 1. 4. The New entrepreneurships (NWE) Factor

- The new entrepreneurships (**NWE**) successfully achieved are a good indicator of any **OBM**, such as the ***spin-in***, ***spin-out*** and ***spin-off*** in certain period. Hence, we propose in our conceptual **OBM:**
- The intellectual property rights (**IPR**) supported by the activities, policies, process, etc. involved in the firm to create: patents, trademarks and copyrights. The effective management of IP is crucial for identifying useful external knowledge and particularly for capturing the value of a firm's own **IPR;** hence, the protection of **IPR** attracts more attention, especially in emergent countries, because their weak reinforcement. Empirical studies on the impact of **IPR** of foreign R&D have generally provided evidence that the protection has a positive impact on inward R&D, especially in largest companies. However, the opposite occurs in in the **SMEs** that they may face greater risk in collaborations with largest companies because they typically have fewer resources and limited expertise in this issue (OECD, 2008). As we saw, the **IPR**

must be included in our conceptual **OBM**, because is one of the most important outcomes.

· Lean start-up (**LST**). It's a term that brings together the principles of customer development, agile methodologies and lean practices. By using short and frequent cycles for tests and corrections, this approach aims at changing the way firms are built and products are designed, helping companies to succeed in a business landscape riddled with risk. Particularly, it seeks to minimize costs, waste and time to market, giving new products the best possible chance to get off the ground and into the hands of customers. Even though the lean start-up approach is still in an embryonic stage, it has attracted much attention in recent years among entrepreneurs, technologists and investors. Yet, this research topic certainly constitutes and interesting research stream to better understand the process of starting up a new venture. According to Ries (2011), the rationale behind the lean start-up approach is to optimize the utilization of scarce resources by using smaller and faster iterations for testing a vision continuously so as to get a desired product to customers' hands faster. To accomplish this goal, lean start-ups strive to minimize the expenditure of resources for anything but the creation of value for the customer. (Trimi & Berbegal-Mirabent, 2012).
Hence, our hypothesis is:
H4. Higher level of **NWE** higher level of **OBM** at **ITSZMG.**

3. 1. 5. The Open Innovation Orientation (OIO) Factor

· The **OI** orientation (**OIO**). We consider is one of the most important factors in our conceptual model, because is here, where the executives can decide at the beginning with the **OBM**, the course of the firm of in **OIN** process. To achieve this, we propose

· The orientation of business model (**ORBM**). Some studies show that **OIN** usually falls into lower performance by the definition of how the knowledge flows. In this sense, for **OIN** is categorized into *knowledge exploration, knowledge retention, and knowledge exploitation* (Lichtenthaler, 2009). Firms integrate knowledge exploitation and knowledge exploration *to maximize their technolo-*

gical capabilities and competencies (Lichtenthaler,2008). In this sense Chien-Tzu & Wan Fen (2014), summarize that *knowledge exploitation* reflects: the innovation practices to systematize purposive outflows of knowledge as well as the firm's behavior to be efficient, implementing and improving the production. By other hand, the *knowledge exploration* refers to: purposive inflows of knowledge as well as the firm's behavior for discovering and experimenting due the risks that are being taken. Other exploratory studies have examined the corporate venturing as an effective means of technology acquisition (spinning in) and technology divestment (spinning out) establishing the drivers for, and benefits of, these approaches as strategic tools for deriving greater value from R&D; identifying current good practices; and understanding the barriers to progress (EIRMA, 2003)

- Governance (**GOV**) might be one of the most important variables due the participants in the **OBM** process may belong to organizations with different structures and goals. For instance, several large companies with R&D are usually managed through central governance system. Some **OBM** governance issues that may need to be addressed include ownership and decision rights, issue escalation, organizational structure, resource commitments and potential timing, termination rights and conditions. Partners may wish to develop operating procedures that include standards for collecting, storing and sharing data. Establishing clear roles and responsibilities for collaboration team leaders and members for each step of the joint discovery, development, and delivery process are also important. (Deloitte, 2015). Finally, all governance system must be regulated by rules of ethics. The part of ethics in our conceptual **OBM** consists of three principal components: *expectations, perceptions and evaluations* that are interconnected by five sub-components: *society expects; organizational values, norms and beliefs; outcomes; society evaluates; and reconnection aspiring* (Svensson & Wood, 2007). The model aspires to be highly dynamic due the continuous and an iterative process. There is no actual end of the process, but a constant reconnection to the initiation of successive process iterations of the business ethics

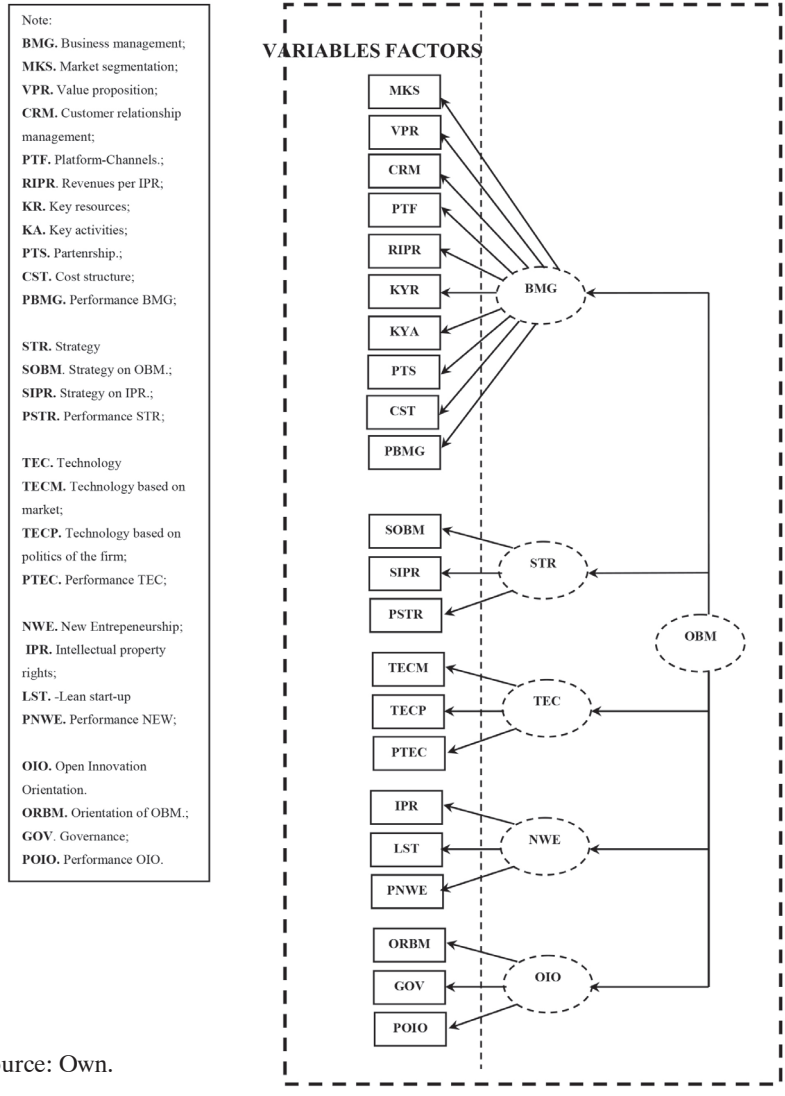
of conceptual **OBM**. The principals and sub-components of the model construct the dynamics of this continuous process.
Hence, our hypothesis is:
H5. Higher level of **OIO** higher level of **OBM** at **ITSZMG.**

3. 1. 6 The Key performance Indicators of each factor

It is essential that measurement be timely. Today, a **KPI** (key performance indicators) provided to management that is more than a few days old is useless. KPIs are prepared in real time, with even weekly ones available by the next working day. Many KPI project teams will also, at first, feel that having only 10 KPIs is too restrictive and may wish to increase KPIs to 30. With careful analysis, that number will soon be reduced to the 10 suggested unless the organization is made up of many businesses from very different sectors; in that case, the 10/80/10 rule can apply to each diverse business, providing it is large enough to warrant its own KPI rollout. In this article we only require to the firms if they use some KPI because most of them are financial and confidential. Hence we propose a **KPI** for each factor such as: strategy (**PSTR**), technology (**PTEC**), business model management (**PBMG**), new entrepreneurships (**PNWE**) and finally, open innovation orientation (**OIO**) (Parmented, 2010). The mentioned **KPI's** could establish the relationship between outbound open innovation (indicating an inside-out process) and firm performance. In particular, it suggests that outbound open innovation may have positive and negative effects on firm performance based on potential benefits and risks of transferring technology. To what degree these effects materialize depends on internal factors. Consequently, a proficient internal management of outbound open innovation is critical to avoid its potential risks and to capture its substantial benefits. In this regard, future research may substantially deepen the insights into the relevance and role of outbound open innovation (Lichtenhauler, 2015). In order to promote and ensure the performance of **OBM,** an assessment framework and the evaluation indicators are required (Chien-Tzu & Wan Fen, 2014). All mentioned above would be serve as a feedback to control the **OBM** process as an **Innovation Business Model** (Mejía et al. 2014).

Please, see **Scheme 1** for the general conceptual model and the **Appendix 1** for the final detailed questionnaire.

Scheme 1
General Conceptual Model



Source: Own.

4. Method

We show the **Table 6** with a summary of the test and values used in this research.

Table 6
Technical Research Data, Test and Values used in this Research

Technical Research Data	
Features	***Survey***
Universe	**1000** specialists in business design at **ITSMZG**
Scope	Metropolitan Zone of Guadalajara, México
Sample Unit	**600** specialists at **ITSMZG** **ITSMZG** involving: 150 IT teachers; 150 representatives of consulting firms; 290 IT SME CEO and 10 IT LE CEO
Collection Method of Data	e-Mail/ Inquiry
Scale	Likert 5
Date of Fieldwork	January-2015-May-2016
Total of interviews	**680**

Test used in this Research	*Value /Description*	*Author*
Ratio NC/VoQ= Number of cases (NC) & Variables Of Questionnaire (VoQ)	NC= 600 (>=100 and <=1000) specialists at ITSMZG VoQ = 22 Ratio NC/VoQ= 600/22=27>10 (>10 recommended by Hair, 2014)	Hair et al. (2014)
CFA (Confirmatory Factorial Analysis) by Maximum Likelihood Method, and Covariance Analysis by EQS 6. 1 software	To verify the Reliability and the Validity of the Measurement Scales	Bentler, (2006); Brown, (2006); Byrne, (2006)
Cronbach's Alpha (CHA) and Composite Reliability Index (CRI)	CHA (Per Factor Via SPSS) & CRI>=0. 7 / Reliability of the Measurement Scales	Bagozzi & Yi, (1988); Nunnally & Bernestain, (1994); Hair et al., (2014)

Test used in this Research	*Value /Description*	*Author*
Mardia's Normalized Estimate. (M)	M>5. 00 / Distributed as a unit normal variate such that large values reflect significant positive kurtosis and large negative values reflect significant negative kurtosis. Bentler (2006) has suggested that in practice, values >5. 00 are indicative of data, that are non-normally distributed	Bentler (2006); Byrne, (2006)
The Satorra–Bentler scaled statistic (S-Bχ2)	SBχ2. - By specifying ME=ML, ROBUST, the output provides a robust chi square statistic (χ2) called. This is to minimize the outliers and achieve goodness of fit	Satorra & Bentler, (1988)
Normed Fit Index (NFI)	NFI>=0. 8 and <=. 89. / Index used for more than two decades by Bentler and Bonett's (1980) as the practical criterion of choice, as evidenced in large part by the current "classic" status of its original paper (Bentler, 1992; and Bentler & Bonett, 1987, cited by Byrne, 2006). However, NFI has shown a tendency to underestimate fit in small samples,	Bentler & Bonnet, (1980); Byrne (2006)
Comparative Fit Index (CFI)	CFI>=0. 8 and <=. 89. Bentler (1990, cited by Byrne, 2006) revised the NFI to consider sample size and proposed the Comparative Fit Index (CFI). Values for both the NFI and CFI range from zero to 1. 00 and are derived from comparison between the hypothesized and independence models, as described previously. As such, each provides a measure of complete covariation in the data. Although a value >. 90 was originally considered representative of a well-fitting model (see Bentler, 1992, cited by Byrne, 2006), a revised cutoff value close to 0. 95 has been advised (Hu & Bentler, 1999, cited by Byrne, 2006). Although both indexes of fit are reported in the EQS output, Bentler (1990, cited by Byrne,2006) suggested that the CFI should be the index of choice	Bentler & Bonnet, (1980); Byrne (2006)

Test used in this Research	*Value /Description*	*Author*
Non-Normed Fit Index (NNFI)	NNFI>=0. 8 and <=. 89. It is a variant of the NFI that takes model complexity into account. Values for the NNFI can exceed those reported for the NFI and can also fall outside the zero to 1. 00 range. (Byrne, 2006)	
Root Mean Square Error of Approximation (RMSEA)	RMSEA>=0. 05 and <=0. 08 / The RMSEA considers the error of approximation in the population and asks the question, "How well would the model, with unknown but optimally chosen parameter values, fit the population covariance matrix if it were available?" (Browne & Cudeck, 1993, pp. 137-8, cited by Byrne, 2006). This discrepancy, as measured by the RMSEA, is expressed per degree of freedom, thus making it sensitive to the number of estimated parameters in the model (i. e., the complexity of the model). Values less than. 05 indicate good fit, and values as high as. 08 represent reasonable errors of approximation in the population (Browne & Cudeck, 1993, cited by Byrne, 2006). Addressing Steiger's (1990, cited by Byrne, 2006) call for the use of confidence intervals to assess the precision of RMSEA estimates, EQS reports a 90% interval around the RMSEA value. In contrast to point estimates of model fit (which do not reflect the imprecision of the estimate), confidence intervals can yield this information, thereby providing the researcher with more assistance in the evaluation of model fit.	Hair et al, (2014); Byrne, (2006); Chau, (1997); Heck, (1998)

Test used in this Research	*Value /Description*	*Author*
Convergent Validity (CV)	All items of the related factors are significant ($p < 0.01$), the size of all standardized factorial loads are exceeding 0. 60 (Bagozzi & Yi, 1988) the extent to which different assessment methods concur in their measurement of the same trait (i. e., construct)—ideally, these values should be moderately high (Byrne, 2006)	Bagozzi & Yi, (1988); Byrne, (2006)
Variance Extracted Index (VEI)	VEI > 0. 50 / In all paired factors as constructs. In a matrix representation, The diagonal represents the (VEI), while above the diagonal part presents the variance (the correlation squared); below the diagonal, is an estimate of the correlation of factors with a confidence interval of 95%. See the Table. Discriminant validity of the theoretical model mentioned below.	Fornell & Larcker, (1981)
Discriminant Validity (DV)	DV / It is the extent to which independent assessment methods diverge in their measurement of different traits—ideally, these values should demonstrate minimal convergence. (Byrne, 2006). DV is provided in two forms: First, with a 95% interval of reliability, none of the individual elements of the latent factors correlation matrix contains 1. 0 (Anderson&Gerbing,1988). Second, VEI between the each pair of factors is higher than its corresponding VEI (Fornell&Larcker,1981). Therefore, based on these criteria, different measurements made on the scale show enough evidence of reliability, CV and DV. See the Table. Discriminant validity of the theoretical model mentioned below.	Byrne, 2006; Anderson & Gerbing, (1988); Fornell & Larcker, (1981)
Nomological Validity (NV)	It is tested using the chi square, through which the theoretical model was compared with the adjusted model. The results indicate that no significant differences are good theoretical model in explaining the observed relationships between latent constructs	Anderson & Gerbing, (1988); Hatcher, (1994)

Author: several authors, by own adaption.

About the reliability and validity of the measurement scales, it was used the Confirmatory Factor Analysis (**CFA**) by mean of the maximum likelihood method with **EQS 6. 1** software (Bentler 2006; Brown, 2006; Byrne, 2006). **Cronbach's alpha** and the **Composite Reliability Index** (**CRI**) (Bagozzi & Yi, 1988) were used as a techniques to prove the reliability of the measurement scales where all the values exceeded the recommended value of **0. 7** for both measurements, which indicates that there is evidence and justifies internal reliability of the scales (Hair et al., 2014). It represents the variance extracted from the group of the observed variables and the fundamental construct (Fornell & Larcker, 1981), particularly, values **0. 6** are desirable (Bagozzi & Yi, 1988). The settings used in this study were: the Normed Fit Index (**NFI**), the Non-Normed Fit Index (**NNFI**), the Comparative Fit Index (**CFI**) and the Root Mean Square Error of Approximation (**RMSEA**) (Bentler & Bonnet, 1980; Byrne, 2006; Bentler, 1990; Hair et al. 2014; Chau 1997; Heck, 1998). Values of **NFI, NNFI** and **CFI** between **0. 80** >= and <= **0. 89** represent a reasonable fit (Hair, et al.,2014) and >= **0. 90** represents an evidence of a good fit of the theoretical model (Byrne, 2006). **RMSEA < 0. 08** are acceptable (Hair et al., 2014).

The **CFA** results are presented in **Table 7.**

Table 7
Internal Consistence and Convergent Validity Evidence of the Theoretical Model

Factor	*Item*	*Variable*	*Factor Loading >0. 6 (a)*	*Robust t-Value*	*Average Factor Loading*	*Cronbach's Alpha >=0. 7 (b)*	*CRI (b)*	*AVE >0. 5 (c)*
STR	1	SOBM	0. 701*	1. 000a	0. 713	0. 718	0. 719	0. 670
	2	SIPR	0. 824*	57. 666				
	3	PSTR	0. 616*	9. 651				
TEC	4	TECM	0. 680*	1. 000a	0. 702	0. 710	0. 718	0. 689
	5	TECO	0. 733*	27. 854				
	6	PTEC	0. 695*	17. 941				

Factor	*Item*	*Variable*	*Factor Loading >0. 6 (a)*	*Robust t-Value*	*Average Factor Loading*	*Cronbach's Alpha >=0. 7 (b)*	*CRI (b)*	*AVE >0. 5 (c)*
BMG	7	MKS	0. 823*	1. 000a	0. 706	0. 711	0. 727	0. 678
	8	VPR	0. 950*	68. 010				
	9	CRM	0. 680*	27. 739				
	10	PTF	0. 703*	21. 236				
	11	RIPR	0. 603*	7. 078				
	12	KYR	0. 634*	7. 120				
	13	KYA	0. 610*	7. 051				
	14	CST	0. 715*	49. 401				
	15	PTS	0. 741*	56. 501				
	16	POBM	0. 604*	7. 041				
NWE	17	IPR	0. 694*	1. 000a	0. 708	0. 712	0. 719	0. 601
	18	DIV	0. 730*	6. 959				
	19	POBM	0. 700*	6. 361				
OIO	20	ORBM	0. 803*	1. 000a	0. 719	0. 721	0. 725	0. 645
	21	GOV	0. 692*	18. 467				
	22	POIO	0. 664*	9. 327				

Results: (S-BX² with df= 205) = 135. 604; df=155; p < 0. 000; NFI = 0. 802; NNFI = 0. 813; CFI = 0. 818; RMSEA = 0. 064

Conclusion: the relationships among the variables and dimensions, have good adjustment and a good fit to the data; hence, exist enough evidence of convergent validity and reliability, which justifies the internal reliability of the scales (Nunnally & Bernstein, 1994; Hair et al., 2014).

Notes:

* Parameters constrained to the value in the identification process = p < 0. 01

a. According Bagozzi & Yi, 1988.

b. According Hair 2014.

c. Average Variance Extracted (**AVE**), according Fornell & Larcker, 1981.

Source: Own.

Additionally, **Cronbach's alpha** and the **CRI** exceed the value of **0. 70** recommended by Hair (2014) and the Average Variance Extracted (**AVE**) was calculated for each pair of constructs, resulting in an **AVE** more than **0. 50** (Fornell & Larcker, 1981). As evidence of convergent validity, the results pointed out that all of the **CFA** items factor related are significant (p <0. 001) and the magnitude of all the factorial charges is superior of **0. 60** (Bagozzi & Yi, 1988).

Likewise, all the items of related factors are significant ($p < 0.001$). The size of all the standardized factorial loads are above the value **0. 60** (Bagozzi & Yi, 1988).

These values indicate that there is enough evidence of convergent validity and reliability, which justifies the internal reliability of the scales (Nunnally & Bernstein, 1994; Hair et al., 2014). Regarding the discriminating validity of the theoretical model, the evidence is shown in **Table 8**.

Table 8
Discriminant Validity Measuring of the Theoretical Model

Factor	*STR*	*TEC*	*BMG*	*NWE*	*OIO*
STR	0. 670	0. 088	0. 066	0. 067	0. 030
TEC	0. 450-0. 736	0. 689	0. 071	0. 054	0. 051
BMG	0. 779-0. 965	0. 415-0. 620	0. 678	0. 087	0. 061
NEW	0. 677-0. 702	0. 814-0. 905	0. 421-0. 599	0. 601	0. 043
OIO	0. 667-0. 805	0. 704-0. 866	0. 705-0. 815	0. 698-0. 801	0. 645

Note: The diagonal represents the Average Variance Extracted (**AVE**), whereas above the diagonal part presents the Variance (the correlation squared). Below the diagonal, it is shown the correlation estimation of the factors with a confidence interval of 95%.
Source: Own.

1. It can be seen the confidence interval test (Anderson & Gerbing, 1988), which establishes that, with an interval of 95% of reliability, none of the individual elements of the latent factors of the correlation matrix has the value of **1. 0**.
2. It can be seen the extracted variance test (Fornell & Larcker, 1981) which indicates that the variance extracted between each pair of constructs is higher than their corresponding **AVE.** Therefore, according to the results obtained from both tests, it can be concluded that both measurements show enough evidence of discriminating validity from the theoretical model.

5. Results

In order to prove the hypotheses presented in the theoretical model, a structural equations modeling (SEM) with software EQS 6. 1 by means of CFA of first order was applied (Bentler, 2006; Byrne, 2006; Brown, 2006). So, the nomological validity of the theoretical model was examined through the Chi-square test, which compared the results obtained between the theoretical model and the measurement model. Such results indicate that the differences between both models are not significant which can offer an explanation of the relationships observed among the latent constructs (Anderson & Gerbing, 1988; Hatcher, 1994). See **Table 9.**

Table 9
Structural equation modeling results from the theoretical model

Hypotheses	*Path*	*Standardized path coefficients*	*Robust t-Value*
H1. Higher level of STR higher level of OBM at ITSZMG; . The model has significant positive effect.	STR→OBM	0. 789***	24. 429
H2. Higher level of TEC higher level of OBM at ITSZMG; . The model has significant positive effect.	TEC→OBM	0. 866***	33. 887
H3. Higher level of BMG higher level of OBM at ITSZMG; . The model has significant positive effect.	BMG→OBM	0. 750***	56. 457
H4. Higher level of NWE higher level of OBM at ITSZMG; . The model has significant positive effect.	NWE→OBM	0. 733***	34. 876
H5. Higher level of OIO higher level of OBM at ITSZMG; . The model has significant positive effect.	OIO→OBM	0. 876***	45. 987

Results: (S-BX^2 with df = 270) = 81. 201; p < 0. 000; NFI = 0. 820; NNFI = 0. 844; CFI = 0. 823; RMSEA = 0. 060.
**Note: ***** = p < 0. 01
Conclusion: The model has significant positive effect among the Factors
Source: Own.

6. Discussion

We emphasize the value of this study because is the result of an extensive literature review to obtain the main **OBM** variables contrasted with the experience of the specialists at **ITSMZG**, through **AHP** and **Delphi's Panel**. It is quite clear at the **ITSMZG,** that the concepts have not been enough disseminated, understood and applied in the field of the **OBM**. This represents a great chance for the **ITSMZG**, because is necessary the actions planning and execution to increase the rest of **18 variables** (see **Table 7**, factor loading values **>=0. 6 and <=0. 8**) in order to improve the conceptual **OBM**. According the results of our empirical **OBM** model, we recommend for the **ITSMZS**, the next actions:

- For strategy (**STR**) **factor**, is necessary that the firm in strategy **OBM** (**SOBM**) **variable**, firstly defines with accurate the kind of design to use, for instance: efficiency-centric open business model; user-centric open business model; crowd-based innovation strategies; collaborative open business model; open platform business model or other; this is because each different design brings different actions plans, saving time and resources. For strategy on intellectual property rights (**SIPR**), although there is a level of awareness about this, is not reflected in real actions to create, generate and protect the **IPR.** For the firm, is highly recommended, defines the main motivation for registration and how to make business with **IPR.**
- For technology (**TEC**) **factor,** we have that one main feature of **OBM** is to see for internal and external resources and capabilities to create, share, buy and/or sell technology. In this sense for technology based on market (**TEM**) will require some kind of technology based on policies (**TECO**), onto the firm to check out the opportunities and make it happen.
- For open business management **OBM factor**, as we've seen, we believe that the Osterwalder & Pigneur (2010) model is enough to adapt it and apply it with its most important **variable** blocks: **MKS.** Market segmentation; **CRM.** Customer relationship management; **PTF.** Platform-Channels; **VPR.** Value proposition; **RIPR.** Revenues per **IPR**; **KYR.** Key resources;; **KYA.** Key activities; **PTS.**

Partnership; **CST.** Cost structure. Some of these elements would be more or less strategic according the level of relationships with resources and capabilities of third parties (partners) as a main feature of the **OBM** process.

- For new entrepreneurships (**NWE**) **factor**, also we found out a low level of awareness to use it, but it represents the main product of the **OBM** and here, it has been divided in: intellectual property rights (**IPR**) pretty related with strategy intellectual property rights (**SIPR**) and the lean start-up (**LST**), as the best indicator of how the **OBM** is able to create new enterprises by mean of spin-offs, start-ups, etc.
- For open innovation orientation (**OIO**) **factor** through the orientation business management (**ORBM**) we determine the factor where the firm decides the mode of **OBM** is going to be applied it's the heart of the planning block and involves the connection of how the knowledge is going to be used for the development and how is going to be integrated in the **OBM.** To make it happen, is necessary regulations involved in form of governance to control all the process.
- Also, it's highly recommended the design of several key **performance indicators** for each one of the **factors** such as performance of: strategy (**PSTR**), technology (**PTEC**), business model management (**PBMG**), new entrepreneurships (**PNWE**) and finally, open innovation orientation (**OIO**) to measure and feedback all the process and take the better decisions for improvement of each factor.
- Finally, for further studies of this empirical **OBM** is important to determine also, the most important indicators in the model, suggesting a linear regression analysis to find out the correlations between the factors and variables and analyze, how they are interacting in the model.
- For most generalized model, we suggest to replicate this empirical **OBM** in other similar industry of the area, just like: the biopharmaceutical sector or the automobile sector to establish a general empirical model for **OBM.**

7. Conclusion

This study concluded answering all the specific questions (**SQ1, SQ2, SQ3**) and the general question (**GQ**), with a proposition of a conceptual **OBM** framework (see **Appendix 1**), with 5 factors: **STR** (3 variables/14 indicators), **TEC** (3 variables/24 indicators), **BMG** (10 variables/76 indicators), **NWE** (3 variables /7indicators) and **OIO** (3 variables/18 indicators) (See **Scheme 1**). The model has significant positive effect in our pose hypotheses, mainly in 4/24 variables (see **Table 7** factor loading values >=0. 8): **SIPR**, **MKS**, **VPR** and **ORBM**. This proposition is product for the academic vision (literature review) and the consulting of specialists experience at **ITSMZG**, through the analytic hierarchy process (**AHP**).

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Appendix 1

Final Questionnaire

Source: several authors with own adaption

Note:
Note:
BMG. Business management; **MKS.** Market segmentation; **VPR.** Value proposition; **CRM.** Customer relationship management; **PTF.** Platform-Channels.; **RIPR**. Revenues per IPR; **KR.** Key resources; **KA.** Key activities; **PTS.** Partnership.; **CST.** Cost structure; **PBMG.** Performance BMG; **STR.** Strategy; **SOBM**. Strategy on OBM; **SIPR.** Strategy on IPR; **PSTR.** Performance STR; **TEC.** Technology; **TECM.** Technology based on market; **TECO.** Technology based on politics of the firm; **PTEC.** Performance TEC; **NWE.** New entrepreneurship; **IPR.** Intellectual property rights; **LST. -**Lean start-up; **PNWE.** Performance NWE; **OIO.** Open Innovation Orientation;

ORBM. Orientation of OBM; **GOV**. Governance; **POIO.** Performance OIO.

Appendix 2

Glossary

Abbreviation	*Meaning*
AHP	Analytic hierarchy process
BM	Business Model
BMG	Business management
CRM	Customer Relationship Management
CST	Cost structure
GQ	General question
GOV	Governance
IT	Information Technologies
IPR	Intellectual property rights
ITSMZG	The information technologies sector of metropolitan zone of Guadalajara
KYA	Key activities
KYR	Key resources
LST	Lean start-up
MKS	Market segmentation
NEW	New entrepreneurship
OBM	Open Business Model
OIN	Open innovation
OIO	Open innovation orientation
ORBM	Orientation of OBM
PBMG	Performance of BMG
PNWE	Performance of NEW
POIO	Performance of OIO
PSTR	Performance of STR
PTF	Platform-Channels
PTS	Partnership
RIPR	Revenues per IPR
SEM	Structural equations modeling
SIPR	Strategy on IPR
SOBM	Strategy on OBM
SQN	Specific question (number)
STR	Strategy
TEC	Technology
TECM	Technology based on market
TECO	Technology based on policies of the firm
VPR	Value proposition

Source: own.

The first results in Mexico for an Empirical Model of Open Innovation

ABSTRACT. Propose. It's aimed to disclose an empirical model of Open Innovation (OIN) in the Information Technologies Sector of Metropolitan Zone of Guadalajara, Mexico (ITSMZG) to achieve a useful model to be used.
Design. The variables for the theoretical framework were determined using Delphi's focus group panel and Analytic Hierarchy Process (AHP) obtaining academic and expert visions.
The methodology. It's a descriptive, exploratory and a cross-sectional study, with a final Likert scale questionnaire, tested for reliability and validity with survey applied to 400 ITSMZG specialists (Jan-2017-Jun-2017).
The results of OIN model were analyzed using exploratory factor analysis (EFA) by SPSS 20 IBM, obtaining 3 underlying variables: knowledge management (KMG), open business models (OBM), innovation ecosystem (IEC), with 26 dimensions/64 indicators.
Keywords: Empirical Model; Open Innovation; Information Technologies Sector; Mexico

Introduction

Innovation matters. According to the US department of Commerce, technological innovation accounted for 75% of GDP growth in the USA since the end of World War II. (Ezell & Atkinson 2010). For Jalisco state, its cluster of Information Technologies Sector located into the Metropolitan Zone of Guadalajara, Mexico (ITSMZG), represents such technological innovation. The ITSMZG develops new technologies in: design software, TV, cinema, advertising to videogames, digital animation, interactive multimedia and e-learning, among others. It has around 200 IT firms, 20,000 jobs in the state

that exports 2,000 billion USD annually on high value-added services, almost a third of the national total (Economista, 2016).

The ITSMZG, is characterized by the high innovation practices, so they are interested to analyze all the determinant factors related to improve all about the process of innovation. The ITSMZG knows some aspects of OIN and its practice, so they need an empirical model as a first settlement to be adapted and applied. The subjects under study were the 400 specialists at 200 firms of ITSMZG, including: SME CEOs (100), back office/ front office managers (100), software designers (100), and directors of business consultant firms (100) all of them grouped in a cluster called:"*Digital Creative City"* placed in Guadalajara, Mexico. Period of application: Jan, 2017-Jun, 2017. Therefore, the problem is posed as a question: which is the empirical model proposed for the Open Innovation (OIN) ?.

The rationale of the study the ITSMZG interest to know how the main dimensions of OIN can be reduced, to get an empirical model as a first settlement model to be used in the sector. To achieve this, we proposed several specific Questions (SQ):

SQ1: *Which are the indicators proposed for the general empirical model?;*

SQ2: *Which are the underlying dimensions and variables of the final empirical model?;*

SQ3: *Which are the cumulative effects of the underlying variables in the model?*

Method

We made a literature review, starting with conceptual definitions to establish our theoretical framework, basis of our model. Firstly, OIN is defined as: *"open innovation is a distributed innovation process based on purposively managed knowledge flows across organizational boundaries, using pecuniary and non-pecuniary mechanisms in line with each organization's business model. These flows of knowledge may involve knowledge inflows to the focal organization (leveraging external knowledge sources through internal processes), knowledge outflows from a focal organization (leveraging internal knowledge through exter-*

nal commercialization processes) or both (coupling external knowledge sources and commercialization activities." (Chesbrough & Bogers, 2014). However, the challenges also call attention to the quadruple helix model of innovation where civil society joins with business, academia, and government sectors to drive changes far beyond the scope of what any one organization can do on their own (Curley & Martin, 2012).

Related with OIN are: the external/internal Knowledge Management (KMG) (OECD, 2003; OECD, 2008) flowing in the organization and the open business model (OBM),that enables an organization to be more effective in creating as well as capturing value (Chesbrough, 2007).

Combinations of OIN and OBM generate interesting models to create and capture value, and they have not been enough specified before in the OIN literature (Vanhaverbeke & Chesbrough, 2014).

But, how OIN is involving all the factors? One of the insights are the IEC, defined as an element that: *"models the economic rather than the energy dynamics of the complex relationships that are formed between actors or entities whose functional goal is to enable technology development and innovation"* (Jackson, 2010). So, in this context, are related several actors, such as: the material resources (funds, equipment, facilities, etc.); the human capital (students, faculty, staff, industry researchers, industry representatives, etc.) that make up the institutional entities participating in the ecosystem (e.g. the universities, colleges of engineering, business schools, business firms, venture capitalists, industry-university research institutes, federal or industrial supported Centers of Excellence, and state and/or local economic development and business assistance organizations, funding agencies, policy makers, etc.), (Jackson, 2010). As you see, resources, human capital and all the relationships between people, the ways that they interact with each other in the context of their environment, and the systems of principles, rules and norms that are set up to guide these interactions, are gathered in one term: the governance (Turton, et al.,2007).

To apply these concepts we resumed the features of the subject of study, showed in the **Table 1**:

Table 1
Technical Research Data

Technical Research Data	
Features	*Survey*
Pilot survey for reliability and validity test. Scope	5 ITSMZG specialists or experts (1 SME CEO; 1 back office/ 1 front office manager; 1 software designer; 1 consultant)
Pilot survey for reliability and validity test. Date of fieldwork	Oct-Nov. 2016
Final survey introducing the theoretical model. Scope	The Information Technologies Sector of Metropolitan Zone Guadalajara, Mexico (ITSMZG). 400 specialists at 200 firms of ITSMZG
Final survey introducing the theoretical mode. Sample unit	The ITSMZG specialists (400) including: SME CEOs (100), back office/ front office managers (100), software designers (100), and directors of business consultant firms (100) all of them grouped in a cluster called: *"Digital Creative City"* placed in Guadalajara, Mexico
Final survey introducing the theoretical mode. Collection method of data	e-Mail/ and direct interview inquiry
Final survey introducing the theoretical mode. Scale	Likert 5
Final survey introducing the theoretical mode. Date of fieldwork	January 2017-June 2017

Source: own.

To determine the variables to explain as a theoretical model, we detected the more relevant variables by mean of a variable standardization by concept, based on more than **40 papers** related to the **OIN.** See **Table 2.**

Table 2
Authors and variables related with the OIN Factor

[Number] Author	*Variable Standarization*
[1] OECD (2003)	(1) LSP; (2) T&M; (3) P&S; (4) COM
[3] Asakawa y Sawada. (2010)	
[8] West & Bogers (2014)	
[7] Mejia-Trejo et al. (2013)	
[15] Chatenier et al. (2010)	(4) COM
[1] OECD (2003)	(5) INC
[4] Allarakhia et al. (2010)	
[2] OECD (2008)	
[5] Gassman y Enkel (2004)	(6) KC&A
[1] OECD (2003)	
[6] Goglio-Primard, y Crespin-Mazet (2014)	
[9] Keup y Gassman (2009)	
[10] Parmented (2010)	(7) PKMG
[11] Lichtenthaler (2015)	
[12] Chien-Tzu y Wan Fen (2014)	
[13] Beckman et al. (2004)	(8) OIO
[12] Chien-Tzu y Wan Fen (2014)	
[14] EIRMA (2003)	
[2] OECD (2008)	
[16] Osterwalder y Pigneur, (2010)	(9) MKS
[38] Saebi & Foss (2013)	
[2] OECD (2008)	
[17] Chesbrough (2003)	
[16] Osterwalder y Pigneur, (2010)	(10) VP
[19] Von Hippel (2005)	
[17] Chesbrough (2003)	
[20] Van der Borgh et al. (2012)	
[16] Osterwalder y Pigneur, (2010)	(11) CRM
[2] OECD (2008)	
[21] Rayna y Styriukova (2014);	
[16] Osterwalder y Pigneur, (2010);	(12) CHM
[2] OECD (2008)	(13) RIPR
[17] Chesbrough (2003)	
[25] Chesbrough y Teece (2002)	
[30] Chesbrough, y Kardon –Crowter, (2006)	
[16] Osterwalder y Pigneur, (2010)	(14) KYR
[22] Gassman (2006)	
[3] Asakawa y Sawada. (2010)	

[Number] Author	*Variable Standarization*
[16] Osterwalder y Pigneur, (2010)	(15) KYA
[2] OECD (2008)	
[23] Enkel et al.(2009)	
[24] Schwaag (2006)	
[25] Chesbrough y Teece (2002)	
[16] Osterwalder y Pigneur, (2010)	16 (CST)
[26] Remneland-Wikhamn y Knights, D. (2012)	
[16] Osterwalder y Pigneur, (2010);	17 (PTS)
[2] OECD (2008)	
[22] Gassman (2006)	
[27] Etzkowitz y Leydesdorff, (1995)	
[28] Tidd (2006)	
[29] Miller et al. (2016)	
[17] Chesbrough (2003)	18 (TEC)
[40] Hopkins et al. (2011)	
[30] Chesbrough,y Kardon-Crowter, (2006)	
[31] Cohen et al. (2002)	19(STR)
[3] Asakawa y Sawada. (2010)	
[32] Rohrbeck,et al. (2009)	
[39] Yun-Hwa & Kuang-Peng H.(2010)	
[2] OECD (2008)	
[2] OECD (2008)	20(NWE)
[14] EIRMA (2003	
[10] Parmented (2010)	21(POBM)
[11[Lichtenthaler (2015)	
[12] Chien-Tzu y Wan Fen (2014)	
[2] OECD (2008)	22(RSK)
[33] Sieg et al. (2010)	
[28] Tidd (2006)	
[2] OECD (2008);	23(OIEC)
[34] Nelson (1993)	
[37] Gassmann et al. (2010)	
[35] Docherty (2006)	
[6] Goglio-Primard, y Crespin –Mazet (2014)	
[20] Van der Borgh, et al. (2012)	
[36[Holmes y Smart (2009)	
[35] Docherty (2006);	24 (TIEC)
[36] Holmes y Smart (2009)	
[2] OECD (2008)	
[6[Goglio-Primard, y Crespin –Mazet (2014)	
[18] Deloitte (2015)	25(GOV)
[15] Chatenier et al. (2010)	

[Number] Author	*Variable Standarization*
[10] Parmented (2010)	26(PIEC)
[11] Lichtenthaler (2015)	
[12] Chien-Tzu y Wan Fen (2014)	
[41] Cavanillas, et al. (2015)	27 (BVC)
[42] Tableau (2017)	
[43] OECD (2011)	
[43] OECD (2011)	28(DTQ)
[41] Cavanillas, et al. (2015)	
[42] Tableau (2017)	
[41] Cavanillas, et al. (2015)	29(CBG)
[42] Tableau (2017)	
[43] OECD (2011)	
[10] Parmented (2010)	30(PBGD)
[11[Lichtenthaler (2015)	
[12] Chien-Tzu y Wan Fen (2014)	

Notes: (1)LSP.Leadership ; (2) T&M.Training and Mentoring; (3) P&S. Policies and Strategies; (4) COM.Communication ; (5) INC.Incentives ; (6) KC&A.Knowledge capture & acquisition; (7) PKMG. Performance of KMG; (8) OIO.Open Innovation Orientation; (9) MKS.Market Segmentation; (10) VP.Value Proposition; (11) CRM. Customer Relationship; (12) CHM.Channels of Distribution; (13) RIPR.Revenue Streams for Intellectual Property Rights; (14) KYR.Key Resources; (15) KYA.Key Activities; (16) CST. Cost ; (17) PTS.Partnership; (18) TEC.Technology ; (19) STR. Strategy; (20) NWE.New Entrepreneurships; (21) POBM Performance of OBM; (22) RSK.Risk; (23) OIEC.Opportunities of Innovation Ecosystem ; (24) TIEC.Threats of Innovation Ecosystem; (25) GOV.Governance; (26) PIEC. Performance of IEC. (27).
Source: own.

We summarized on a total frequency, the variables vs. authors to prepare the account of academic vision. **See Table 3.**

Table 3
Searching the variables representing the OIN factor as academic vision

ID	*Variables*	*Authors numbered as the Table 2*																						*Total*
		1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	***15***	***16***	***17***	***18***	***19***	***20***	***21***	***22***	***23***	*Frequency*
1	LSP	X		X				X	X																4
2	T&M	X		X				X	X																4
3	P&S	X		X				X	X																4
4	COM	X		X				X	X							X									5
5	INC	X	X		X																				3
6	KC&A	X				X	X			X															4
7	PKMG										X	X	X												3
8	OIO		X										X	X	X										4
9	MKS		X														X	X							3
10	VP																X	X		X	X				4
11	CRM		X														X					X			3
12	CHM																X								1
13	RIPR		X															X							2
14	KYR			X													X						X		3
15	KYA		X																					X	2
16	CST																X								1
17	PTS		X														X						X		3
18	TEC																	X							1
19	STR		X	X																					2
20	NWE		X												X										2
21	POBM										X	X	X												3
22	RSK		X																						1
23	OIEC		X				X														X				3
24	TIEC		X				X																		2
25	GOV															X			X						2
26	PIEC										X	X	X												3

Table 3 cont.
Searching the variables representing
the OIN factor as academic vision

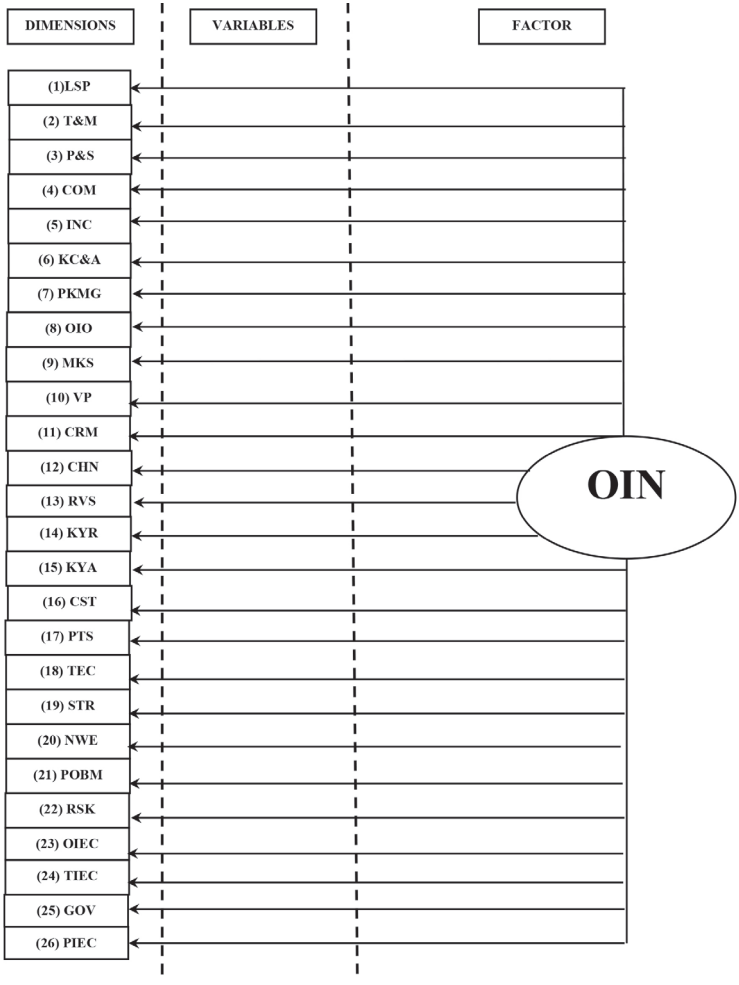
ID	*Varia-*	*Authors numbered as the Table 2*																*Total*
	bles	*24*	*25*	*26*	*27*	*28*	*29*	*30*	*31*	*32*	*33*	*34*	*35*	*36*	*37*	*38*	*39*	*40*	*Frequency*
1	LSP																		4
2	T&M																		4
3	P&S																		4
4	COM																		5
5	INC																		3
6	KC&A																		4
7	PKMG																		3
8	OIO																		4
9	MKS															X			4
10	VP																		4
11	CRM																		3
12	CHM																		1
13	RIPR		X					X											4
14	KYR																		3
15	**KYA**	X	X																4
16	CST			X															2
17	PTS				X	X	X												6
18	TEC							X										X	3
19	STR								X	X							X		5
20	NEW																		2
21	POBM																		3
22	RSK					X					X								3
23	OIEC											X	X	X	X				7
24	TIEC												X	X					4
25	GOV																		2
26	PIEC																		3
	Total																		94

Source: own.

Design

As a result of the Literature Review we conclude the academic vision, obtaining the **Scheme 1.**

Scheme 1
The conceptual model of oin. Academic Vision



Source: Own.

Regarding **Tables 2** and **3** to obtain our proposal of factors and variables, we applied the qualitative analysis on these tables, to obtain the expert vision of this research applying focus group with Delphi Panel technique and Analytic Hierarchy Process (AHP, Saaty, 1997) to 5 ITSMZG specialists or experts (1 SME CEO; 1 back office/ 1 front office manager; 1 software designer; 1 consultant) focusing the attention and experience of each one of them, to ask some suggestions to get the best grouping of factors and variables and the best names to associate them to the OIN. The results were, for the OIN factor: Knowledge Management (KMG), Open Business Models (OBM), and Innovation Ecosystem (IEC). We finally grouped in a table both: academic and expert vision. **See Table 4.**

Table 4

Focus Group by Delphi Panel and AHP to determine the main groups of Variables of OIN under Academic and Expert Vision

Objective	*Open INNOVation (OIN) Factor*						
	ID	*Variables*	*Factor as Academic Vision*		*Factor as Expert Vision*		*%Difference (Academic Vision- Expert vision)*
			Frequency	*%*	*Group suggested*	*AHP weighing as Expert Vision (%)*	
Alternatives	1	LSP	4	4.26	KMG	6.9	-2.64
	2	T&M	4	4.26		6.8	-2.54
	3	P&S	4	4.26		5.4	-1.14
	4	COM	5	5.32		5.4	-0.08
	5	INC	3	3.19		5	-1.81
	6	KC&A	4	4.26		4.9	-0.64
	7	PKMG	3	3.19		2.9	0.29
	8	OIO	4	4.26	OBM	5.2	-0.94
	9	MKS	4	4.26		4.6	-0.34
	10	VP	4	4.26		4.7	-0.44
	11	CRM	3	3.19		4.6	-1.41
	12	CHM	1	1.06		4.5	-3.44
	13	RIPR	4	4.26		4.9	-0.64
	14	KYR	3	3.19		4.2	-1.01

Objective	Open INNOVation (OIN) Factor						
	ID	Variables	Factor as Academic Vision		Factor as Expert Vision		%Difference (Academic Vision-Expert vision)
			Freq-uency	%	Group suggested	AHP weighing as Expert Vision (%)	
Alternatives	15	KYA	4	4.26	OBM	4.8	-0.54
	16	CST	2	2.13		3.9	-1.77
	17	PTS	6	6.38		2.1	4.28
	18	TEC	3	3.19		3	0.19
	19	STR	5	5.32		2	3.32
	20	NWE	2	2.13		2.3	-0.17
	21	POBM	3	3.19		1.9	1.29
	22	RSK	3	3.19	IEC	2.5	0.69
	23	OIEC	7	7.45		2	5.45
	24	TIEC	4	4.26		3	1.26
	25	GOV	2	2.13		1.5	0.63
	26	PIEC	3	3.19		1	2.19
TOTAL			94	100		100	

Source: own.

We emphasized about this table, was our initial approach of grouping of variables and it shall be necessary to refine it with an exploratory factorial analysis, as second stage. But, before doing it we shall explain each of these factors and variables as a theoretical framework to determine our general conceptual model of OIN, through the literature review. For practical analysis, we excluded the PKMG, POBM and PIEC dimensions due, these are performance key dimensions of each variable.

The Theoretical Framework

Knowledge Management (KMG)

It *"covers any intentional and systematic process or practice of acquiring, capturing, sharing, and using productive knowledge, wherever it resides, to enhance learning and performance in organizations"*(Scarbrough,

Swan & Preston, 1999 cited in OECD, 2003). Hence, we propose a model based on a strong leadership (LSP) of its members (OECD, 2003; Mejía-Trejo et al., 2013) able to establish different mechanisms of communications (COM) (Chatenier et al. 2010; OECD 2003) to transmit the explicit and tacit knowledge, including training the personnel and mentoring the apprentices (T&M) with policies and strategies (P&S) about rewards and incentives to the personnel (INC) in inbound and outbound knowledge frontiers of the Firm (OECD, 2003; Asakawa et al., 2010; Hughes& Wareham, 2010; West& Bogers 2014). To do a best knowledge capture and acquisition (KC&A) (Gassman & Enkel, 2004; OECD 2003; Goglio-Primard, & Crespin –Mazet, 2014; Keup & Gassman, 2009), the incentives to the operative personnel is recommended (OECD, 2003); Allarakhia et al., 2010) achieving an OIN key performance indicator according the context of the business (Parmented, 2010; Lichtenthaler, 2015; Chien-Tzu & Wan Fen, 2014).

We consider to potentiate the OIN Orientation (OIO) by the definition of exploring it, as the experimenting with new alternatives and/or exploiting it, as the refining and extending of the existing knowledge (2004; Chien-Tzu & Wan Fen, 2014,) and what kind of driver is using, such as: the purchase of technology, licensing, franchising, etc. (Chiaroni, et al., 2010).

So, our hypothesis is:

H1: The dimensions of: LSP, COM, T&M, P&S, INC, KC&A, OIO, have enough significant variance to be grouped in an independent variable, that we can call Knowledge Management.

Open Business Model (OBM)

We consider the Osterwalder& Pigneur (2010) definition of business model: "*A business model describes the rationale of how an organization creates, delivers, and captures value"* So, with the increased adoption of open innovation practices, *"open business models"* have emerged as a new design theme (Chesbrough, 2006). The market segmentation (MKS) as the basis to define the services and products specialized to offer to the customer (Osterwalder & Pigneur, 2010) and represents the opportunity to analyze, different application of the technology besides the current market such as the discovering

and developing new markets or for licensing other Firm's Market (OECD, 2008; Chesbrough 2003).The value proposition (VP) is the core of any business, so it should be emphasized in different forms, such as: branding, performance, newness, etc. (Osterwalder & Pigneur, 2010) and make the user a source of innovation *to create value*, as a tool to *capture value* (Von Hippel 2005; Chesbrough 2003; Van der Borgh et al. 2012).

The customer relationship management (CRM) as a tool, must be applied in different channels (CHM) own & partners, in all its different forms, such as: personal service, automated-service, self-service, etc. (Osterwalder & Pigneur, 2010; OECD, 2008) emphasizing the co-creation (Rayna & Styriukova, 2014) in network.

The revenues streams (RIPR) represent a great chance, for the organizations based on de intellectual property rights (IPR) protection as: patents, trademarks and copyrights, for commercializing them using patent pools or cross-licensing portfolios, for instance (OECD, 2008).

The key resources (KYR) must be recognized (Osterwalder & Pigneur, 2010; Gassman, 2006); Asakawa et al.,2010) involving tangible (buildings, infrastructure, labs, etc.) and intangible (data, information, talent personnel, etc.) assets. The Key Activities (KYA) mainly the R&D network, be more productive based on absorptive capacity features, knowledge and technology (OECD, 2008; Enkel et al. 2009; Schwaag 2006; Chesbrough & Teece, 2002).

The minimum of the costs (CST) in all senses like fixed-cost, variable-cost, economy-scale, economy-scope, etc. (Remneland-Wikhamn & Knights, D. 2012). The Partnerships (PTS) represents a solid base to make business, involving the relationship University-Government-Organization (Triple Helix) (Etzkowitz & Leydesdorff, 1995;Tidd, 2006; OECD,2008; Gassman, 2006), and recently, the society (Miller et al.,2016).

The strategy (STR) applied in different ways: Market-Based Innovation; Crowd-Based Innovation Strategies or Collaborative Innovation; Network-Based Innovation Strategies (Saebi & Foss 2013; Gassmann et al.2010; Yun-Hwa & Kuang-Peng, 2010; Hopkins et al., 2011) according different final goals to implement, such as: improvement of revenues, performance, competitive advantage, or

even more, ensure the secrecy, etc. (Cohen et al. 2002; Asakawa et al.,2010; Rohrbeck, et al. 2009; OECD 2008).

Finally, the new entrepreneurships (NWE) successfully achieved are a good indicator of any OBM, such as the *spin-in*, *spin-out* and *spin-off* in certain period.

So, our hypothesis is:

H2: The dimensions of: MKS, VP, CRM, CHM, RIPR, KYR, KYA, CST, PTS, STR, NWE, have enough significant variance to be grouped in an independent variable, that we can call Open Business Model.

Innovation Ecosystem Variable

The Firm is interacting permanently among different actors, as: providers, customers, government, etc. conforming an ecosystem with elements to analyze like the risk (RSK) involving: cost, the infringement litigation with other companies in a similar and/or different product markets, etc. (Sieg et al. 2010).

The opportunities (OIEC), based on: the potential on how well knowledge flows and the system is connected, a greater sense of urgency for internal groups to act on ideas or technology, opportunity to refocus some internal resources on finding, screening and managing implementation, etc. (OECD,2008c, Goglio-Primard, & Crespin –Mazet,2014).

The threats (TIEC) such as: the extra costs of managing co-operation with external partners, the lack of control, the potentially opportunistic behavior of partners, (Goglio-Primard, & Crespin – Mazet,2014), the adverse impact of flexibilities, overdependence of partners, etc. (Fichter 2009).

The technology (TEC) as an important agent, due its capacity to incorporate it in an external or internal way to the organization and aimed to the current or different markets (Chesbrough,& Kardon-Crowter, 2006)

A governance system (GOV) able to be elected and recognized, as a key factor for applying the principles of behavioral rules that support and regulate all the transactions by mean of written rules, the process of election of central governance, establishing roles and responsibilities to make decisions, etc.

Hence, our final hypothesis is:

H3: The dimensions of: RSK, OIEC, TIEC, TEC, GOV have enough significant variance to be grouped in an independent variable, that we can call Innovation Ecosystem.

Designing and launching the Final Questionnaire

We designed and proved the final questionnaire through a pilot test for the applicability conditions of the database, according Hair et al. (2014) with the following results. See **Table 5.**

Table 5
Database Applicability Conditions

Database Applicability Conditions : Fundamentals		
Test	*Value*	*Results*
The reliability of Cronbach Alpha's Test (Hair et al., 2014, p.125). Measure of reliability that ranges from 0 to 1, with values of 0.6 to 0.7 deemed the lower limit of acceptability	0.803	OK
The normality Kolmogorov-Smirnoff-Lillieforce Test (Hair et al.,2014, p.73.81.)	All the 23 dimensions with Sig. asintót. (bilateral) with each dimension result: p>0.05	OK
The homoscedasticity Levene Test (Hair et al.,2014, p.82.85.)	All the 23 dimensions on Levene's Test For Equality of Variances with Sig.0.124>0.05	OK
Sample Size (Hair et al.,2014, p.10.21)	200 with a ratio of : 200/23 dimensions=8.69>5:1	OK

Source: own supported by Hair et al.,2014 criteria.

With these results we launched the final survey to the 400 ITS-MZG specialists.

Procedure

Once the results of the final survey (400 ITSMZG) were obtained, we applied the Exploratory Factor Analysis, able to determine the variance contribution of each variable and so, to determine how many of these variables would be reduced to confirm the underlying variables. This reduction was made using the Hair (et al.,2014) criteria. See **Table 6.**

Table 6
Exploratory Factor Analysis Conditions

Exploratory Factor Analysis Conditions: Fundamental Tests		
Test	*Value*	*Results*
Factor Loadings (Hair et al., 2014, p. 117 (at least, 50%+1) in the matrix correlations : +-0.3 to +-0.4 are considered to meet the minimal level of structure, Loadings +-0.5 or greater are considered practically significant. Loadings exceeding 1.7 are considered indicative of well-defined structure and are the goal of any factor analysis in the correlations. The **Determinant of the R-matrix** should be greater than 0.000001. If it is lower this suggests **multicollinarity**. If our value is 1.113E-02 (this means 0.01113) and is therefore greater than 0.000001.We advise about variables that correlate highly (for example **r > 0.8**): if this is the case an option is to eliminate one of these variables from the investigation. (Hinton et al. 2004, p.348).	+-0.3 to +-0.4 are considered to meet the minimal level of structure (Our case) at least 50%+1	OK
Anti-image Correlation Matrix. Matrix of the partial correlations among variables after factor analysis, representing the degree to which the factors explain each other in the results. The diagonal contains the "*measures of sampling adequacy*" for each variable, and the off diagonal values are partial correlations among variables. (Hair et al. 2014,p.90)	All the diagonal values >=0.05	OK

Exploratory Factor Analysis Conditions: Fundamental Tests		
Test	*Value*	*Results*
Kaiser-Meyer-Olkin Measure of Sampling Adequacy Test (KMO). If we find multicollinearity (extent to which a variable can be explained by other variables in the analysis) we may choose to exclude or combine variables to reduce this outcome. In the factor analysis we are able to calculate the Kaiser–Meyer–Olkin measure of sampling adequacy (KMO test) which is related to this. The KMO test is a helpful measure of whether the data is suitable for a factor analysis. As a rule of thumb, if the KMO test comes out **at 0.5** or higher, we can then continue with the factor analysis as our data is suitable for it. There is one more test we can undertake before performing. (Hinton et al. 2004, p.342). The higher the value the better.	0.602>0.05	**OK**
Bartlett test of sphericity. Statistical test for the overall significance of all correlations within a correlation matrix. (Hair et al. 2014,p.90). We want the Bartlett test to be significant as this indicates that it is worth continuing with the factor analysis as there are relationships to investigate. There is no point in undertaking a factor analysis when we don't think there is anything of interest to find. Lets us know if there is a relationship between the variables. If no relationship is found then there is no point in proceeding with the factor analysis. We may simply have too few participants for us to find the effects we are looking for and therefore insufficient power for a factor analysis. A p value < 0.05indicates that it makes sense to continue with the factor analysis. Since we have found p < 0.001 we can conclude that there are relationships between our variables..(Hinton et al., 2004,p.342, 349)	Sig.0.250 >0.05	**OK**
Communality. Total amount of variance an original variable shares with all other variables included in the analysis. With component analysis, implies that all the variance is common or shared. (Hair et al. 2014,p.91)	1	**OK**

Exploratory Factor Analysis Conditions: Fundamental Tests		
Test	*Value*	*Results*
Rotation Method: VARIMAX. The most popular orthogonal factor rotation (process of manipulation or adjusting the factor axes to achieve a simpler and pragmatically more meaningful factor rotation) methods focusing on simplifying the columns in a factor matrix. Generally considered superior to other orthogonal factor rotation methods in achieving a simplified factor structure). **Extraction Method**: principal component analysis with variance extraction**>=0.6**.(Hair et al. 2014,p.93, 108).	Rotation method: VARIMAX. Principal Component Analysis, with Variance Extraction >=0.6;	OK

Source: SPSS 20 IBM, Hair et al. 2014; Hinton et al., 2004 with own adaption.

Results

In order to answer the question: *which is the empirical model proposed for the Open Innovation (**OIN**)* ?, we applied the reduction of variables by means of exploratory factor analysis (**EFA**); and looking for variability in one variable common to other variables, as this indicates that they are linked by an underlying factor. At first, SPSS 20 IBM assumes (in a principal component analysis) that 100 % of the variance of each variable is common variance, so gives each variable a communality of 1.000. However, when it has extracted the factors it works out how much of the variability of each variable really can be explained by the extracted factors, and gives an updated value of communality (Hinton et al., 2004, p. 349). See **Table 7.**

Table 7
Communalities

Exploratory Factor Analysis Conditions: Communalities		
Test	*Value*	*Extraction*
LSP	1.000	.844
T&M	1.000	.851
P&S	1.000	.783
COM	1.000	.742
INC	1.000	.861
KC&A	1.000	.883
OIO	1.000	.874
MKS	1.000	.861
VP	1.000	.783
CRM	1.000	.728
CHM	1.000	.851
RVS	1.000	.957
CRM	1.000	.728
KYA	1.000	.873
CST	1.000	.851
PTS	1.000	.849
STR	1.000	.852
TEC	1.000	.800
NEW	1.000	.878
RSK	1.000	.752
OIEC	1.000	.861
TIEC	1.000	.844
GOV	1.000	.957

Extraction Method: Principal Component Analysis.
Source: SPSS 20 IBM with own adaption.

By observing our example we can see that all the variance of **LSP** is initially given a communality value of 1.000, but after extracting the factors we find it has a communality of 0.844. This indicates that 84 % of its variability is explainable by the factors. Using our criterion of selecting eigenvalues over 1, we can see from the highlighted numbers in the Total Variance Explained table that three components (or variables) have been produced that have eigenvalues greater than this amount (Hinton et al. 2004). See **Table 8.**

Table 8
Total Variance Explained

Exploratory Factor Analysis Conditions: Total Variance Explained									
Component	*Initial Eigenvalue*			*Extraction Sums of Squared Loadings*			*Rotation Sums of Squared Loadings*		
	Total	*% Of variance*	*Cumulative %*	*Total*	*% Of variance*	*Cumulative %*	*Total*	*% Of Variance*	*Cumulative %*
1	**11.220**	**47.785**	**47.785**	11.220	47.785	47.785	9.082	39.489	39.489
2	4.600	20.001	67.786	4.600	20.001	67.786	4.733	20.577	60.066
3	3.113	11.668	**79.454**	3.113	10.688	79.454	3.429	19.388	79.454
4	.991	4.300	83.754						
5	.983	4.272	88.026						
6	.860	3.738	91.764						
7	.688	2.991	94.756						
8	.525	2.282	97.038						
9	.205	.893	97.930						
10	.162	.704	98.634						
11	.112	.485	99.119						
12	.071	.307	99.426						
13	.058	.252	99.678						
14	.042	.182	99.860						
15	.032	.140	100.000						
16	5.696E-016	2.477E-015	100.000						

Exploratory Factor Analysis Conditions: Total Variance Explained

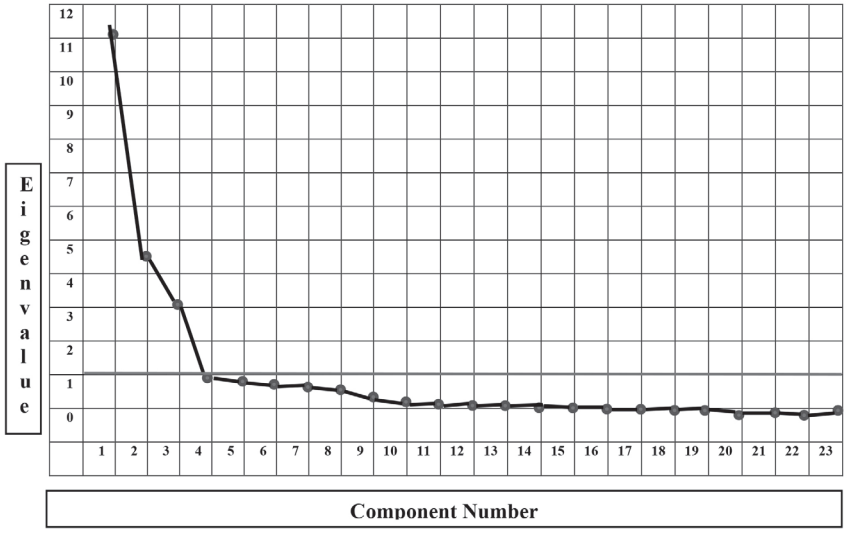
Component	*Initial Eigenvalue*			*Extraction Sums of Squared Loadings*			*Rotation Sums of Squared Loadings*		
	Total	*% Of variance*	*Cumulative %*	*Total*	*% Of variance*	*Cumulative %*	*Total*	*% Of Variance*	*Cumulative %*
17	3.888E-016	1.690E-015	100.000						
18	1.314E-017	5.713E-017	100.000						
19	-4.570E-018	-1.987E-017	100.000						
20	-4.607E-017	-2.003E-016	100.000						
21	-8.046E-017	-3.498E-016	100.000						
22	-9.424E-017	-4.097E-016	100.000						
23	-5.276E-016	-2.294E-015	100.000						

Extraction Method: Principal Component Analysis.
Source: SPSS 20 IBM with own adaption.

To understand the last table, we'll describe it as:

- The Initial Eigenvalues Total column shows the eigenvalues we are interested in. Only three factors have eigenvalues greater than 1.
- The % of Variance column shows how much variance each individual factor can explain. Had we had chosen to select all factors that accounted for more than 5 % of variance, we would have had three factors. If this was the case we would produce another factor analysis but this time select that we want three factors eigenvalues over 1.
- The Cumulative % column shows the amount of variance accounted for by each consecutive factor added together.
- From our example we can see that factor 1 has an eigenvalue of 11.220, which accounts for 47.785 % of the variance. Our criterion for factor selection is eigenvalues greater than 1, so we therefore have three factors which can explain a cumulative 79.454 per cent of the variance in the data.
- You can see that the Extraction Sums of Squared Loadings values are exactly the same as the Initial Eigenvalues, however only the three factors that have been extracted are shown. The rotation method changes the eigenvalues and variances explained by each factor but keeps the total variance the same. The extracted factors are shown in the Rotation Sums of Squared Loadings column.
- The Scree Plot is then shown in **Graph 1**. The factors are the X-axis and the eigenvalues are the Y-axis. The factor with the highest eigenvalue is the first component and the second component has the second highest eigenvalue. Remember that by observing where the line starts to level out is a criterion for selecting how many factors to extract.

Graph 1
The Scree Plot



Source: SPSS 20 IBM

The screen plot depicts the amount of variance explained by each factor and can aid judgment regarding factor extraction.

From our case, we can see that our plot is starting to level out at the 3 dimensions. The scree plot indicates that 3 dimensions could be chosen. We might wish to re-run the factor analysis specifying 3 dimensions.

The Component Matrix details the factor loadings onto our three factors before they have been rotated. As we have selected the Principal Component Analysis with a Varimax rotation, the Rotated Component Matrix gives us a clearer picture than the Component Matrix of our factor loadings onto the three factors. See **Table 9.**

Table 9
Rotated Component Matrix (a)

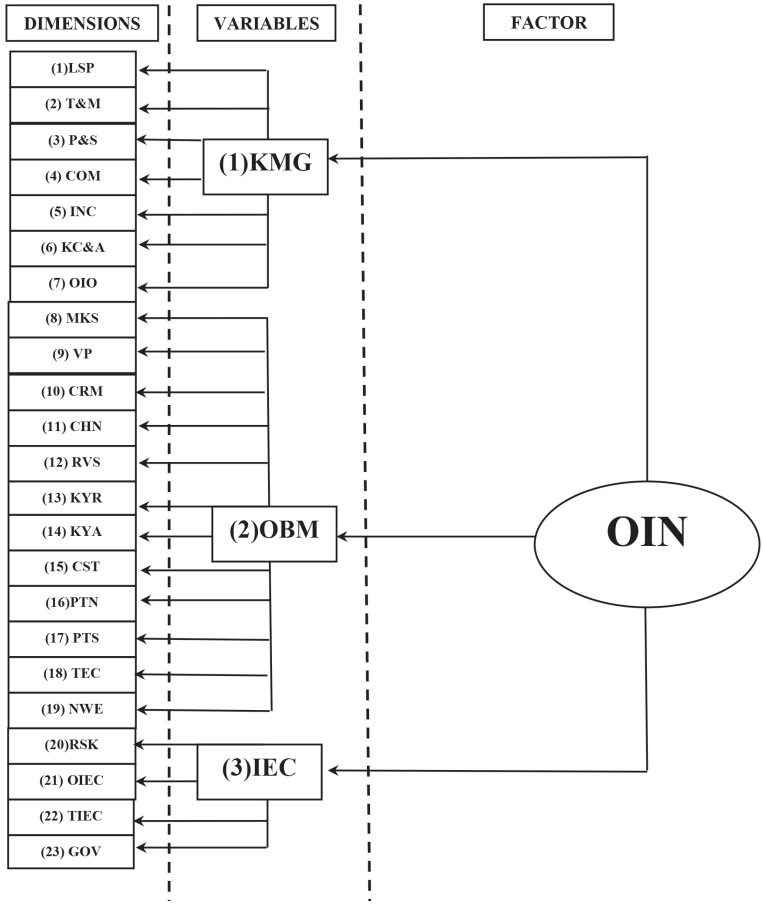
ID	*Variable's Proposed name by the ITSMZG specialists*	*Dimension*	*Component (Variable)*		
			1	*2*	*3*
1	Knowledge Management (KMG)	LSP	**.635**	.592	-.292
2		T&M	**.843**	-.045	.372
3		P&S	**-.673**	.381	-.239
4		COM	**.806**	.206	.209
5		INC	**.918**	.079	-.110
6		kc&a	**.928**	-.063	-.022
7	Open Business Model (OBM)	OIO	-136	**-.717**	.539
8		MKS	.118	**.879**	-.110
9		VP	-.673	**.981**	-.239
10		CRM	-.265	**.729**	.147
11		CHM	.143	**-.845**	.372
12		RVS	-.198	**.852**	.131
13		CRM	-.265	**.729**	.147
14		KYA	.351	**.659**	-.394
15		CST	.143	**-.945**	.372
16		pts	-.328	**.471**	-.085
17		STR	-.129	**.595**	.452
18		TEC	.326	**.621**	.133
19		NEW	.612	**.916**	.067
20	Innovation Ecosystem (IEC)	RSK	.026	-.072	**.759**
21		OIEC	.118	.079	**-.910**
22		TIEC	.135	.592	**-.892**
23		gov	-.198	.352	**.831**

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
(a). Rotation converged in 15 iterations.

We now have a much clearer picture of our three factors. Rotation has shown that different variables load onto different factors. We can now look at the variables loading onto each factor and choose suitable names for factors.

Variable 1 seems to be related to variables that assess Knowledge Management (KMG); Variable 2 is related to the Open Business Models (OBM); Variable 3 is involving all about Innovation Ecosystem (IEC). Therefore, the final reduced empirical model is showed in **Scheme 2**.

Scheme 2
The final reduced conceptual model
of oin with its underlying variables



Source: own.

Discussion

It's important to consider that Mexico is an economic emerging country and all the best practices about OIN by the specialist in ITSMZG, are still with insufficient awareness of their practice or even worse, they are still ignored. Hence, the importance of this study to identify the main underlying variables to determine an empirical model able to predict the best groupings, to adapt, to apply and to get improvements in the model.

According the final results showed in **Table 9** the underlying variables of OIN in the ITSMZG are identified as:

1. For Knowledge Management (KMG) as an agent who *"covers any intentional and systematic process or practice of acquiring, capturing, sharing, and using productive knowledge, wherever it resides, to enhance learning and performance in organizations"*(Scarbrough, Swan & Preston, 1999 cited in OECD, 2003) we purpose the following dimensions: We obtained informal practices (underlying variable KMG) with direct observable dimensions such as:

- The leadership (LSP) as the most important factor applied, because there was a great awareness in the knowledge management practices with the responsibility of managers and executives, with explicit criteria for assessing worker performance, practices, with wide responsibility of non-management workers and the best practices were non a unique responsibility of the knowledge management officer (OECD, 2003; Asakawa et al., 2010; Hughes& Wareham, (2010); West& Bogers, 2014); Mejia-Trejo et al., 2013).
- The Training and Mentoring, (T&M) although the importance to the Firm to encourage experienced workers to transfer their knowledge to new or less experienced workers, or provide informal training related to KMG, or to encourage the workers to continue their education by reimbursing tuition fees for successfully completed work-related courses, or offer off-site training to workers in order to keep skills current, to get provided formal training related to KMG practices and formal mentoring practi-

ces, including apprenticeships, were not considered significant to improve the model of KMG for the specialist of ITSMZG.

- The policies and strategies (P&S), because high correlations founded in policies or programs improve worker retention, values system or culture intended to promote knowledge sharing and written KMG (internal-external) policy or strategy. (OECD, 2003; Asakawa et al., 2010; Hughes & Wareham, 2010; West& Bogers, 2014; Mejia-Trejo et al., 2013).
- By other hand, the specialists of ITSMZG recognized the communication of knowledge COM as an important factor to be developed, where the workers are sharing knowledge updating all the databases of their projects officer (OECD, 2003; Asakawa et al.,2010; Hughes& Wareham, 2010; West& Bogers,2014) and they are sharing knowledge in collaborative work in virtual teams (Chatenier et al.,2010; OECD, 2003).
- It's evident that a real program of INC must to promote the knowledge based on: Knowledge sharing rewarded with monetary incentives and/or non-monetary incentives, (OECD, 2003; Allarakhia et al., 2010) or the existence of a reward system to support the flow of know how between units external an internal or dual embedded (OECD, 2008c; Frost, 2001).
- Finally, at the same time knowledge capture & acquisition (KC&A). is revealed as an important dimension, where the managers and employees recognized to have several sources of external knowledge based on: Partnerships with external parties alliances, joint ventures, joint development, acquisition or sale of knowledge, contracts in R&D, licensing, corporate venturing (for example, in the equity investments in university spin offs or in venture capital investment funds) (Gassman & Enkel,2004: OECD, 2003; Goglio-Primard, & Crespin –Mazet, 2014; Keup & Gassman, 2009). Also, we found that the capture and acquisition of knowledge is based on decisions about the measure of remarkable improvement and performance of the KM (Parmented, 2010; Lichtenthaler, 2015; Chien-Tzu & Wan Fen,2014).

2. For OBM side we consider the Osterwalder & Pigneur (2010) definition of business model: "*A business model describes the rationale of how an organization creates, delivers, and captures value"* So, with the increased adoption of open innovation practices, *"open business models"* have emerged as a new design theme (Chesbrough, 2006). As a parts of the open business model, we obtained informal practices (underlying variable OBM) with direct observable dimensions such as:

- The open innovation orientation OIN, that confirms if the innovation is oriented more to exploration or more to exploitation (Beckman et al. 2004; Chien-Tzu & Wan Fen,2014) including if the OIN is based on: purchase of technology, joint venturing and alliances; joint development; contract R&D; licensing; collaborations with universities; equity in university spin offs; equity in venture capital investment funds (EIRMA, 2003; OECD, 2008c; Chiaroni, et al., 2010).
- Other important dimension is the market segmentation MKS that determines the real needs of its consumers, classifying them on: mass market; niche market; segmented; diversified; multisided platforms-markets (Osterwalder & Pigneur, 2010) and if they're practicing surveillance on their current market for discovering and developing new markets or licensing other Firm's Market (OECD, 2008c; Chesbrough, 2003).
- We have to see how the concept of value proposition VP is appreciated by the specialist of ITSMZG that is presented by the: newness; performance; customization; design; brand; price; cost reduction; risk reduction; accessibility, convenience/usability (Osterwalder & Pigneur,2010) and how is based on User Innovation (Create Value) as a tool of Open Innovation (Capture Value) (Von Hippel, 2005);Chesbrough, 2003); Vander Borgh et al., 2012).
- The customer relationship CRM, where is pretty recognized the vital importance to have a process seeking to deliver requirements to their consumers by: Personal assistance, dedicated personal assistance, self service, automated service, communities, (Osterwalder & Pigneur, 2010; OECD,2008c) and the co-creation (Rayna & Styriukova, 2014; Osterwalder & Pigneur, 2010).

- Also, the ITSMZG specialist considered the channels of distribution (CHM) as an important factor of the open business model including the seeking to be very closed to the delivery of the services to their costumers by own channels and/or partner channels (Osterwalder & Pigneur, 2010; OECD, 2008c).
- About the revenues for intellectual property rights (RIPR) there is still lack of a clear politics of how to get revenues by: financial assets licensing and/or building a Intellectual Capital Portfolio to exploitation; usage fee; subscription fees; lending/renting/leasing; licensing; brokerage fee; advertising (Osterwalder & Pigneur, 2010); OECD, 2008c) trade secrets; patent pools; cross-licensing; physical key resources (buildings, labs, sites, network etc.) (OECD, 2008 c).
- By other hand, we have that key resources (KYR) including physical key resources (buildings, labs, sites, network etc.); intellectual key resources (relationships, databases, information systems, etc.); human key resources (its personnel); financial key resources (Osterwalder & Pigneur, 2010) the rapid shift of industry and technology borders, to pose new business models; the knowledge as a factor of competitive advantage; more interdisciplinary cross boarder research more partnership for innovation (Osterwalder & Pigneur, 2010; Gassman, 2006); Asakawa et al., 2010).

  Also, it's proposed the key activities (KYA), that reveals to the specialist of the ITSMZG the importance to consider the: production key activities; problem solving key activities; platform network key activities (Osterwalder & Pigneur, 2010) the use of all yours R&D located under cluster and networks innovation systems with geographical proximity because the spillovers often occur by this (OECD, 2008c; Bathelt et al., 2004; Enkel et al., 2009; Whelan, et al., 2010) ; the activities for a great awareness to invest in own R&D because the importance of absorptive capacity (Cohen & Levinthal, 1990; OECD, 2008c); the activities for R&D investments in other countries, because is more the available the pool of scientist, clusters and academic institutes, than the near to markets and production facilities (Schwaag, 2006; INSEAD et al., 2006; Thursby & Thursby, 2006); the technology sourcing mainly, in locating the R&D activities outside the home country,

and the geographic dispersion a means of knowledge creation rather than knowledge diffusion (Kuemmerle,1997; Dunning & Narula, 1995); share of codified information and co-ordination of activities among different parties because is easier for innovations that can be pursued independently (autonomous innovation); activities to have benefits only realized in conjunction with complementary innovations (the product lifecycle is long; less attractive) (Chesbrough & Teece (2002).

- Other important dimension proposed is the cost (CST), as a warning indicator that is involving how the OBM minimizes their costs by means of: cost-driven; value-driven; fixed costs; variable costs; economies of scale; economies of scope (Osterwalder & Pigneur, 2010; Remneland-Wikhamn & Knights, D., 2012).
- In the sense of the partnership, the study revealed (PTS) being remarkable aspects of how the OBM is seeking partners to support: The optimization and economy of scale global industries results, powerful standards and dominant designs (Globalization); the reduction of risk and uncertainty, and acquisition of particular resources and activities (Osterwalder & Pigneur, 2010, Gassman, 2006) ; the new developments in and around their industry is based on an industry characterized by rather short technology life cycles; the external partners (suppliers, customers, universities, etc.) even in a cross countries, in an innovation ecosystem (Cook, 2005; Gassman, 2006); the relation amongst: University-Industry-Government (the triple helix) because the collaborative innovation activities stimulates innovation; even more you're considering the social aspect (quadruple helix) benefits; the use venturing to find external partners for commercializing innovations that are not used internally (divestment, spin-out, spin-off) (Etzkowitz & Leydesdorff, 1995; Tidd,2006; OECD, 2008c; Miller et al., 2016).. These aspects are of recent introduction in the ITS-MZG.
- -The dimension: technology (TEC) for the specialist in the ITS-MZG considered important of how an OBM is implementing the technology based on a market point of view and the internal/ external resources, such as:

The internal technology for their current market, new markets, for other Firm's market; the internal/external venture handling technology to its current market; to the new markets to the other Firm's Market; the external technology insourcing to their current market; to new markets; to the other Firm's market; the external technology for their current market; for the new markets for other Firm's market (Chesbrough, 2003; Lichtenthaler & Holger, 2009).

The looking for external technology to bring to the company; the permanent surveillance for IPR of other technologies, or how is implementing the technology opportunistically; in formal and systematic way; considering alternatives technologies with enough incentives to address an incremental product improvement; more proven technologies than new ones because they represent more benefits (Chesbrough & Kardon-Crowter, 2006).

One of the most important dimensions that our model propose in the OBM is the strategy (STR) involving topics about the OBM design based on: Efficiency-Centric Open Business Model; User-Centric Open Business Model; Collaborative Open Business Model; Open Platform Business Model (Saebi & Foss, 2013); or how is the IPR protected by means of: preventing copy; preventing other companies from patenting (e.g. prevent blocking) ; prevent lawsuits; to use for negotiations; the enhance of reputation; to generate licensing revenue; to measure the performance (Asakawa et al., 2010) to get competitive advantage (Rohrbeck, et al., 2009); the industrial trade secrecy (OECD, 2008c); the measure of remarkable improvement and performance of the OBM (Lichtenthaler, 2015)

- Finally for OBM, it's proposed the new entrepreneurships (NWE) as the ability to get : *spin in* as an investment in technology start-ups (e.g. university spin offs); *spin out* as divesting internally developed technologies relates to the inside-out aspect of open innovation; *spin off* as the company no longer maintains a stake in the project/company. More about OBM, please see Mejía-Trejo (2017).

3. For Innovation Ecosystem (IEC) it's considered as: *"a network of interconnected organizations, organized around a focal firm or a platform, and incorporating both production and use side participants, and focusing on the development of new value through innovation"* (Deloitte, 2015). We obtained informal practices (underlying variable IEC) with direct observable dimensions such as:

The risk (RSK) for specialists in ITSMZG as a dimension for warning of how they: avoid the risk of costs using innovation intermediaries; management of the creation of cross-licensing agreements involving the exchange of two or more patent portfolios to allow mutual use of patents by multiple patent holders in order to avoid risk of patent infringement; consider the theft of IPR as the most important risk to global open innovation networks even with external partners that may later become competitors transparency (Sieg et al., 2010); involve similar companies that focus on tactical innovation issues where the success depends on their ability to share experience, disclose information and develop trust and; involve collaboration between companies from a single industry or adjacent industries that co-operate to explore and create new products and processes; involve collaboration between companies from different industries that co-operate to explore and create new products and processes, where sharing of information and risk; involve heterogeneous companies that focus on tactical innovation issues where the success depends on their ability to share experience, disclose information and develop trust and transparency (Tidd, 2006).

- The opportunities of innovation ecosystem (OIEC), where the specialist in ITSMZG, considered significant the IEC benefits from recognizing: the potential of innovation depends on how well knowledge flows (OECD, 2008c) ; to be a part of an innovation ecosystem that influences their national or regional innovation system (Nelson, 1993); maximizing the transference of tacit knowledge residing in national innovation system (Bathelt, et al.,2004); the ability to leverage R&D developed outside (Goglio-Primard, & Crespin –Mazet,2014); extended reach and capability for new ideas and technologies and create value through the knowledge (Van der Borgh, et al., 2012; Fichter, 2009; Lichtenthaler, 2009); the opportunity to refocus some internal

> resources on finding, screening and managing implementation; the improved payback on internal R&D through sales or licensing of otherwise unused intellectual property; a greater sense of urgency for internal groups to act on ideas or technology; the ability to conduct strategic experiments with less risk ; over time, the opportunity to create a more innovative culture.(Goglio-Primard, & Crespin –Mazet, 2014)

It's interesting to see how the counterpart is a driver of IEC, this is, the threats of innovation ecosystem (TIEC), involving the specialist in ITSMZG in how they perceive or experience the open innovation network threats from: the extra costs of managing co-operation with external partners; the lack of control; the adverse impact of flexibility; the overdependence on external parties; the potentially opportunistic behavior of partners (Goglio-Primard, & Crespin –Mazet, 2014).

Finally, the governance (GOV), that recognize the need to have written rules to exchange the information in the innovation ecosystem; the participation in the election of central governance system; the development of operating procedures, that include standards for collecting, storing, and sharing data (Deloitte, 2015); and the ability to make decisions based on the measure of remarkable improvement and performance of the dimensions (Lichtenthaler, 2015)

Conclusion

The 400 specialists of the ITSMZG were questioned about: *which is the empirical model proposed for the Open Innovation (OIN) ?* This question is due, the ITSMZG interest to know how the main dimensions of OIN can be reduced, to get an empirical scale to conform a reliable model to be applied in the sector. We determined a complete useful OIN Model, when:

1. The Specific Question (SQ1): *Which are the indicators proposed for the general empirical model?* It was applied the literature review, and by AHP we proposed the general empirical model showed in the **Scheme 2** and the final questionnaire (**see Appendix**).

2. The Specific Question (SQ2): *Which are the underlying dimensions and variables of the final empirical model?*
This was solved, using **Table 9** and the Appendix with the next variables description of Open Innovation Factor (OIN):
The next variables list: KMG. Knowledge Management ; OBM. Open Business Model; IEC.Innovation Ecosystem.
The next dimensions list:
» For KMG side: LSP.Leadership ; T&M.Training and Mentoring; P&S. Policies and Strategies; COM.
Communication ; INC.Incentives; KC&A.Knowledge capture & acquisition;
» For OBM side: OIO.Open Innovation Orientation; MKS. Market Segmentation; VP.Value Proposition; CRM.
Customer Relationship; CHM.Channels of Distribution; RIPR. Revenue Streams for Intellectual Property Rights; KYR.Key Resources; KYA.Key Activities; CST. Cost; PTS.Partnership; TEC. Technology; STR.Strategy; NWE.New Entrepreneurships.
» For IEC side: RSK.Risk; OIEC.Opportunities of Innovation Ecosystem ; TIEC.Threats of Innovation
Ecosystem; GOV.Governance

3. The Specific Question (SQ3): *Which are the cumulative effects of the underlying variables in the model, as a variance explained?* It is showed in the **Table 8** that the cumulative effect of the underlying variables in the model, as a variance explained is **79.454**

4. Our hypotheses **H1, H2, H3 were rejected** as follows:
H1: The dimensions of: LSP, COM, T&M, P&S, INC, KCA, OIO have enough significant variance to be grouped in an independent variable, that we can call Knowledge Management **was rejected because OIO belongs to OBM.**
H2: The dimensions of: MKS, VP, CRM, CHM, RIPR, KYA, KYR, PTS, STR, NWE, have enough significant variance to be grouped in an independent variable, that we can Open Business Model **was rejected, because the empirical model must include the dimensions: OIO and TEC.**
H3: The dimensions of: RSK, OIEC, TIEC, TEC, GOV have enough significant variance to be grouped in an independent varia-

ble, that we can call Innovation Ecosystem **was rejected, because the dimension TEC belongs to OBM.**

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Appendix

The Final Questionnaire

Open innovation Factor (OIN)		
Knowledge Management (KMG) Factor		
Variables	*Indicator*	*Author(s)*
(1) LSP	1.KM practices were a responsibility of managers and executives	OECD (2003); Asakawa et al. (2010); Hughes & Wareham, (2010); West & Bogers (2014); Mejia Trejo et al. (2013)
	2.KM practices were explicit criteria for assessing worker performance	
	3.KM practices were a responsibility of non-management workers	
	4.KM practices were responsibility of the KMO	
(2) T&M	5.Firm encouraged experienced workers to transfer their knowledge to new or less experienced workers	
	6.Firm provided informal training related to KM	
	7.Firm encouraged workers to continue their education by reimbursing tuition fees for successfully completed work-related courses	
	8.Firm offered off-site training to workers in order to keep skills current	
	9.Firm provided formal training related to KM practices	
	10.Firm used formal mentoring practices, including apprenticeships	

Open innovation Factor (OIN)		
Knowledge Management (KMG) Factor		
Variables	*Indicator*	*Author(s)*
(3) P&S	11.Policies or programs intended to improve worker retention	OECD (2003); Asakawa et al. (2010); Hughes & Wareham, (2010); West & Bogers (2014); Mejia Trejo et al. (2013)
	12.Values system or culture intended to promote knowledge sharing	
	13.It's written KM (internal-external) policy or strategy	
(4) COM	14.Workers is sharing knowledge with written documentation	
	15.Workers is sharing knowledge by regularly updating all the databases of their projects	
	16.Workers is sharing knowledge in collaborative work in virtual teams	Chatenier et al. (2010); OECD 2003
(5) INC	17.Knowledge sharing is rewarded with monetary incentives	OECD(2003); Allarakhia et al. (2010)
	18.Knowledge sharing is rewarded with non-monetary incentives	
	19.You have a reward system to support the flow of know how between units external an internal or dual embededness	OECD (2008)
(6) KC&A	20.You have a source of external knowledge based on: partnerships with external parties (alliances, joint ventures, joint development, acquisition or sale of knowledge (contract, R&D, licensing), corporate venturing (equity investments in university spin offs or in venture capital investment funds) etc.)	Gassman & Enkel (2004): OECD (2003); Goglio Primard, & Crespin –Mazet (2014); Keup & Gassman (2009)
	21.You have a source of internal knowledge based on: in house innovations.	
(7)PKMG	22. The capture and acquisition of knowledge is based on decisions about the measure of remarkable improvement and performance of the KM	Parmented (2010); Lichtenthaler (2015); Chien-Tzu & Wan Fen (2014)

Open innovation Factor (OIN)		
Knowledge Management (KMG) Factor		
Variables	*Indicator*	*Author(s)*
Open Business Model (OBM) Factor		
Variable	Indicator	Author(s)
(8) OIO	23.Select the right answer -Your OBM is oriented more exploration in innovation -Your OBM is oriented more to exploitation in innovation	Beckman et al. (2004); Chien-Tzu & Wan Fen (2014)
	25.Put the order to the following sentences where 1 is the most important Your OBM in open innovation mode is based on: -Purchase of technology -Joint venturing and alliances -Joint development -Contract R&D -Licensing -Collaborations with universities -Equity in university spin offs -Equity in venture capital investment funds -Purchase of technology	EIRMA (2003); OECD(2008);
(9)MKS	26.Put the order to the following sentences where 1 is the most important Your OBM determines the real needs of its consumers, classifying them on: -Mass market -Niche market -Segmented -Diversified -Multisided platforms-markets	Osterwalder & Pigneur, (2010)
	27. Put the order to the following sentences where 1 is the most important Your OBM is only focused an makes surveillance for: -Your current market -Discovering and developing new markets -Licensing other Firm's Market	OECD (2008); Chesbrough (2003)

Open innovation Factor (OIN)		
Knowledge Management (KMG) Factor		
Variables	*Indicator*	*Author(s)*
(10)VP	28. Put the order to the following sentences where 1 is the most important Your OBM offers VP through -Newness -Performance -Customization -Design -Brand -Price -Cost reduction -Risk reduction -Accessibility, -Convenience/usability	Osterwalder & Pigneur, (2010)
	29. Your OBM lead the VP based on User Innovation (Create Value) as a tool of Open Innovation (Capture Value)	Von Hippel (2005); Chesbrough (2003); Van der Borgh et al. (2012)
(11)CRM	30.Put the order to the following sentences where 1 is the most important Your OBM is seeking to deliver requirements to your costumers applying: -Personal assistance -Dedicated personal assistance -Self service -Automated service -Communities	Osterwalder & Pigneur, (2010); OECD (2008)
	-Co-creation	Rayna & Styriukova (2014); Osterwalder & Pigneur, (2010)

Open innovation Factor (OIN)		
Knowledge Management (KMG) Factor		
Variables	*Indicator*	*Author(s)*
(12)CHM	31. Put the order to the following sentences where 1 is the most important Your OBM is seeking to be very closed to the delivery of the services to your costumers using: -Its own channels -Its partner's channels	Osterwalder & Pigneur, (2010); OECD (2008)
(13)RIPR	32. Put the order to the following sentences where 1 is the most important Your OBM applies revenue stream of IPR by mean of: -Financial assets licensing and/or building a Intellectual Capital Portfolio to exploitation -Usage fee -Subscription fees -Lending/renting/leasing -Licensing -Brokerage fee -Advertising	
	33.Put the order to the following sentences where 1 is the most important Your OBM applies revenue stream of IP by mean of : -Trade secrets -Patent pools -Cross-licensing	OECD (2008)
(14)KYR	33.Put the order to the following sentences where 1 is the most important Your OBM use all yours: -Physical key resources (buildings, labs, sites, network etc.) -Intellectual key resources (relationships, databases, information systems, etc.) -Human key resources (its personnel) -Financial key resources	Osterwalder & Pigneur, (2010)

Open innovation Factor (OIN)		
Knowledge Management (KMG) Factor		
Variables	*Indicator*	*Author(s)*
(14)KYR	34. Put the order to the following sentences where 1 is the most important Your OBM considers: -The rapid shift of industry and technology borders, to pose new business models	Gassman (2006); Asakawa et al. (2010)
	-The knowledge as a factor of competitive advantage.	
	-That a more interdisciplinary cross boarder research more partnership for innovation	
(15)KYA	35. Put the order to the following sentences where 1 is the most important Your OBM uses all yours: -Production key activities -Problem solving key activities -Platform network key activities	Osterwalder & Pigneur, (2010)
	- R&D located under cluster and networks innovation systems with geographical proximity because the spillovers often occur by this.	OECD (2008); Enkel et al.(2009)
	36. Put the order to the following sentences where 1 is the most important Your OBM is making activities for: -A great awareness to invest in own R&D because the importance of absorptive capacity	OECD (2008)
	-For R&D investments in other countries, because is more the available the pool of scientist, clusters and academic institutes, than the near to markets and production facilities	Schwaag (2006);
	-For attracting technology sourcing mainly, in locating the R&D activities outside the home country, and the geographic dispersion a means of knowledge creation rather than knowledge diffusion	
	-For attracting the share of codified information and co-ordination of activities among different parties because is easier for innovations that can be pursued independently (autonomous innovation).	Chesbrough & Teece (2002)

Open innovation Factor (OIN)		
Knowledge Management (KMG) Factor		
Variables	*Indicator*	*Author(s)*
(15)KYA	-To have benefits only realized in conjunction with complementary innovations,. Your product lifecycle is long. Less attractive	Chesbrough & Teece (2002)
(16)CST	37.Put the order to the following sentences where 1 is the most important Your OBM minimizes your cost through: -Cost-driven -Value-driven -Fixed costs -Variable costs, -Economies of scale -Economies of scope	Osterwalder & Pigneur, (2010); Remneland-Wikhamn & Knights, D. (2012)
(17)PTS	38. Put the order to the following sentences where 1 is the most important Your OBM is seeking partners to support: -Optimization and economy of scale global industries results, powerful standards and dominant designs. (Globalization) -Reduction of risk and uncertainty, and acquisition of particular resources and activities	Osterwalder & Pigneur, (2010); OECD (2008); Gassman (2006)
	-New developments in and around their industry owing is based on an industry characterized by rather short technology life cycles	OECD (2008b); Osterwalder & Pigneur, (2010);
	-Suppliers, customers, universities, etc.) even in a cross countries, in an innovation ecosystem.	Gassman (2006);
	39.Your OBM is seeking the relation amongst: University-Industry-Government (the triple helix) because the collaborative innovation activities stimulates innovation; even more you're considering the social aspect (quadruple helix) benefits	Etzkowitz & Leydesdorff, (1995); Tidd (2006); OECD (2008); Miller et al. (2016)
	40.Your OBM seeking use venturing to find external partners for commercializing innovations that are not used internally (divestment, spin-out, spin-off)	

Open innovation Factor (OIN)		
Knowledge Management (KMG) Factor		
Variables	*Indicator*	*Author(s)*
(18)TEC	41. Put the order to the following sentences where 1 is the most important You're implementing internal technology for your: -Current market -New markets -Other Firm's market	Chesbrough (2003)
	42. Put the order to the following sentences where 1 is the most important You're implementing internal/external venture handling technology to: -Your current market -The new markets -The other Firm's Market 43. Put the order to the following sentences where 1 is the most important You're implementing external technology for: -Current market -New markets -Other Firm's market	
	44. Put the order to the following sentences where 1 is the most important You're implementing external technology insourcing to: -Your current market -To the new markets -The other Firm's market	

Open innovation Factor (OIN)		
Knowledge Management (KMG) Factor		
Variables	*Indicator*	*Author(s)*
(18)TEC	45.You're on permanent surveillance for external technology to bring to the company 46.You're on permanent surveillance for IPR of other technologies 47. Put the order to the following sentences where 1 is the most important You're implementing: -Technology opportunistically -Technology in formal and systematic way. -Alternatives technologies -Technologies with enough incentives -Technologies to address an incremental product improvement -More proven technologies than new ones -More proven technologies more than trying to develop entirely new -External technologies because they represent more benefits -Internal technologies because they represent more benefits	Chesbrough,& Kardon-Crowter, (2006)
(19)STR	48.Put the order to the following sentences where 1 is the most important Your STR is designed on: - Efficiency-Centric Open Business Model ; hence you pose Market-Based Innovation Strategies) -User-Centric Open Business Model; hence you pose Crowd-Based Innovation Strategies -Collaborative Open Business Model; hence you pose Collaborative Innovation Strategies. - Open Platform Business Model; hence you pose Network-Based Innovation Strategies	Saebi & Foss (2013); Gassmann et al.2010); Yun-Hwa& Kuang-Peng (2010); Hopkins et al. (2011)
	49.Put the order to the following sentences where 1 is the most important Your STR to do IPR protection registration is due: -To preventing copy	Cohen et al. (2002); Asakawa et al. (2010)
	-To preventing other companies from patenting (e.g. prevent blocking)	
	-To prevent lawsuits	
	-To use for negotiations	

Open innovation Factor (OIN)		
Knowledge Management (KMG) Factor		
Variables	*Indicator*	*Author(s)*
19)STR	-To enhance of reputation	Cohen et al. (2002); Asakawa et al. (2010)
	-To generate licensing revenue	
	-To measure the performance	
	-To get competitive advantage	Rohrbeck, et al. (2009.)
	50.Your strategy to protect your IPR is based entirely by the industrial trade secrecy	OECD (2008)
(20)NEW	51.You've got *spin in* as: an investment in technology *start-ups* (e.g. university *spin offs*)	OECD (2008)
	52.You've got *spin out* as: divesting internally developed technologies relates to the *inside-out* aspect of open innovation	
	53.You've got *spin off* as: the company no longer maintains a stake in the project/company.	
(21) POBM	54.Your strategy is based on about the measure of remarkable improvement and performance of the OBM	Parmented (2010); Lichtenthaler (2015); Chien-Tzu & Wan Fen (2014)
Innovation Ecosystem (IEC) Factor		
(22) RSK	55.You avoid the risk of costs using innovation intermediaries	OECD (2008); Sieg et al. (2010)
	56.Your management of the creation of cross-licensing agreements involving the exchange of two or more patent portfolios to allow mutual use of patents by multiple patent holders in order to avoid risk of patent infringement	
	57.Your innovation network considers the theft of IPR as the most important risk to global open innovation networks even with external partners that may later become competitors	

Open innovation Factor (OIN)		
Knowledge Management (KMG) Factor		
Variables	*Indicator*	*Author(s)*
(22) RSK	58. Put the order to the following sentences where 1 is the most important Your innovation network involves: -Similar companies that focus on tactical innovation issues where the success depends on their ability to share experience, disclose information and develop trust and transparency -Collaboration between companies from a single industry or adjacent industries that co-operate to explore and create new products and processes -Collaboration between companies from different industries that co-operate to explore and create new products and processes, where sharing of information and risk -Heterogeneous companies that focus on tactical innovation issues where the success depends on their ability to share experience, disclose information and develop trust and transparency	Tidd (2006)
(23)OIEC	Put the order to the following sentences where 1 is the most important 59. You've got open innovation network: -For opportunity from recognizing the potential of innovation depends on how well knowledge flows	OECD (2008)
	-For the benefits from maximizing the transference of tacit knowledge residing in national innovation system	
	-For benefits from the ability to leverage R&D developed outside	Docherty (2006); OECD (2008) Goglio-Primard, & Crespin-Mazet (2014)
	-For the benefits from extended reach and capability for new ideas and technologies and create value through the knowledge	Van der Borgh, et al. (2012);

Open innovation Factor (OIN)		
Knowledge Management (KMG) Factor		
Variables	*Indicator*	*Author(s)*
(23)OIEC	-For the benefits from: the opportunity to refocus some internal resources on finding, screening and managing implementation;	Docherty (2006); OECD (2008): Goglio-Primard, & Crespin-Mazet (2014)
	-For the benefits from : the improved payback on internal R&D through sales or licensing of otherwise unused intellectual property;	
	-A greater sense of urgency for internal groups to act on ideas or technology;	
	-For the benefits from : the ability to conduct strategic experiments with less risk	
	-For the benefits from: over time, the opportunity to create a more innovative culture	
(24)TIEC	-Threats from: the extra costs of managing co-operation with external partners	
	60. Put the order to the following sentences where 1 is the most important You've perceived or experienced open innovation network threats from: -The lack of control	
	-The adverse impact of flexibility	
	-The overdependence on external parties	
	-The potentially opportunistic behavior of partners	
(25)GOV	61.You recognize the need to have written rules to exchange the information in the innovation ecosystem	Deloitte (2015); Chatenier et al. (2010);
	62.You participate in the election of central governance system	
	63.You participate in the development of operating procedures, that include standards for collecting, storing, and sharing data	
(26) PIEC	64. You consider the governance is able to take decisions based on the measure of remarkable improvement and performance of the IEC	Parmented (2010); Lichtenthaler (2015); Chien Tzu & Wan Fen (2014)

Source: own.

Digital Broadband and Open Innovation: First Insights in Information Technologies Sector

ABSTRACT. Purpose. The study is aimed to disclose how Digital Broadband (DBD) is affecting the practice of Open Innovation (OIN) in the Information Technologies Sector of Metropolitan Zone of Guadalajara, Mexico (ITSZMG) to achieve a model, for the improvement of relationships.
Methodology. It is a descriptive, exploratory, correlational, cross-sectional, qualitative-quantitative research. As a qualitative study, it is based on a deep literature review after which, we used Delphi Panel with Analytic Hierarchy Process (AHP), determining our main factors: DBD (1 factor/ 6 variables/43 indicators) and OIN (3 factors/23 variables/161 indicators) in a questionnaire Likert scale, involving 600 ITSZMG specialists at 200 SMEs. The survey was on the period of September-December 2016. As a quantitative study, we applied Confirmatory Factor Analysis using EQS 6.2 software.
-The value of this study, is to propose a generalized model involving the relationship between DBD-OIN for ITSZMG, and identify the underlying variables and their relationships to make suggestions about how to be more innovative, among the firms in the sector.
-Final results: 5/6 DBD variables have significant positive effect on 18/23 OIN variables.
This implies opportunities to develop the model.
-Conclusions: We obtained an empirical model capable of identifying its own DBD-OIN relationships in order to be, a more innovative firm in the ITSZMG.
Keywords: Digital Broadband; Open Innovation; Information Technologies; Mexico.

RESUMEN. Objetivo. El estudio está orientado a descubrir cómo la Banda Ancha Digital (DBD) está afectando la práctica de la Innovación Abierta (OIN) en el Sector de las tecnologías de Informa-

ción de la Zona Metropolitana de Guadalajara, México (ITSZMG), para lograr un modelo que mejore sus relaciones.
Metodología. Es una investigación descriptiva, exploratoria, correlacional, transversal, cualitativa-cuantitativa. Como investigación cualitativa, se basó en una amplia revisión de la literatura tras la cual, se usó el Panel Delphi en conjunto con el Proceso de Análisis Jerárquico (AHP), determinando nuestros principales factores: DBD (1 factor/6variables/43 indicadores) y OIN (3 factores/ 23 variables/ 161 indicadores), en un cuestionario en escala de Likert, involucrando a 600 especialistas en 200 firmas Pyme de la ITSZMG. El levantamiento de datos fue en el periodo de Septiembre-Diciembre 2016.Como investigación cuantitativa, se aplicó Análisis Factorial Confirmatorio, usando el software EQS 6.2.
El valor del estudio, es el proponer un modelo generalizado involucrando las relaciones entre DBD-OIN para la ITSZMG, e identificar las variables subyacentes y sus relaciones para realizar recomendaciones sobre cómo ser más innovador, entre las firmas en el sector.
Los resultados finales: 5/6 variables del DBD, tuvieron un efecto positivo sobre 18/23 variables de la OIN. Esto significa oportunidades de desarrollo del modelo,
Conclusiones: Obtuvimos un modelo empírico capaz de identificar sus propias relaciones DBD-OIN para lograr ser, un firma de mayor innovación abierta en la ITSZMG.
Palabras Clave: Banda Ancha Digital; Innovación Abierta; Tecnologías de Información; México.

Introduction

Jalisco, Mexico, has the most representative cluster of Information Technologies Sector located into the Metropolitan Zone of Guadalajara, Mexico (ITSMZG), headquarters of the Mexico's '*Ciudad Creativa Digital*'. The ITSMZG has around 200 IT Firms that export 2,000 million USD annually on high value-added service and generate 20,000 jobs in the state (Economista, 2016). At the same time, Mexico has a Digital Broadband (DBD) recent policy, available since 2013, with 2015 data ranking reports (ITU-UNESCO, 2016) for instance: Fixed-Broadband Subscriptions per 100 inhabitants, ranked in the place 52/138 among other issues; all these data are considered

a great opportunity to develop the OIN factor. The DBD even increases the promotion of innovations in small and medium enterprises (SMEs) and the productivity with significant savings by reducing the transaction costs. We remind that the SMEs in Mexico are the main source of jobs because they're representing the 99.8% of all companies in Mexico, which generates 52% of gross domestic product and 72% of jobs in the country.

Problem, Research Question and Rationale of the Study

We have two remarkable factors, firstly the ITSZMG that is characterized as a sector with advanced OIN practices and secondly the DBD that is considered by the Mexican government as a support and guarantee for its development (Estrategia Digital, 2013). Thus, we determined as a problem, to propose a construct that involves the relationship between the OIN and the DBD, determining and analyzing all the determinant factors related in order to improve all the process of OIN based on DBD to be adapted and applied in the ITSZMG.

So, our research question is posed as: what is the relationship between DBD on OIN in ITSMZG? The rationale of the study is due the ITSMZG interest to know how the main factors of DBD are influencing the OIN process, to identify the weak relationships and to do several suggestions about reinforcement of such relationships proposed, for improvement of the model.

The Specific Research Questions (SRQ) are:

SRQ1. *What are the variables proposed for the general conceptual model?;*

SRQ2. *What are the relationships of these variables?;*

SRQ3. *What are the most relevant variables of the model?*

Searching The Variables of the construct

The subjects under study were all the 600 ITSMZG specialists, including: SME CEOs (120), back office/ front office managers (120), soft-

ware designers (120), professors (120) and directors of business consultant firms (120) all of them grouped in the cluster.

To achieve the proposal of variables of the construct, we went through a literature review of more than 40 papers about models regarding the OIN and SMEs, selecting the main factors, variables and indicators of each one, and listed in a matrix table per author. **See Table 1.**

Table 1
Authors and variables related with the oin Factor

[Number]Author	*Variables Identified*
[1] OECD (2003)	(1) LSP; (2) T&M; (3) P&S; (4) COM
[3]Asakawa y Sawada. (2010)	
[8] West & Bogers (2014)	
[7] Mejia-Trejo et al. (2013)	
[15]Chatenier et al. (2010)	(4) COM
[1] OECD (2003)	(5) INC
[4] Allarakhia et al. (2010)	
[2] OECD (2008)	
[5] Gassman y Enkel (2004)	(6) KC&A
[1] OECD (2003)	
[6] Goglio-Primard, y Crespin –Mazet (2014)	
[9] Keup y Gassman (2009)	
[10] Parmented (2010)	(7) PKMG
[11]Lichtenthaler (2015)	
[12]Chien-Tzu y Wan Fen (2014)	
[13]Beckman et al. (2004)	(8) OIO
[12]Chien-Tzu y Wan Fen (2014)	
[14]EIRMA (2003)	
[2] OECD (2008c)	
[16] Osterwalder y Pigneur, (2010)	(9) MKS
[38] Saebi & Foss (2013)	
[2] OECD (2008c)	
[17]Chesbrough (2003)	(9) MKS

[Number]Author	*Variables Identified*
[16] Osterwalder y Pigneur, (2010)	(10) VP
[19]Von Hippel (2005)	
[17]Chesbrough (2003)	
[20]Van der Borgh et al. (2012)	
[16] Osterwalder y Pigneur, (2010)	(11) CRM
[2] OECD (2008c)	
[21]Rayna y Styriukova (2014);	
[16] Osterwalder y Pigneur, (2010);	(12) CHM
[2] OECD (2008c)	(13) RIPR
[17] Chesbrough (2003)	
[25]Chesbrough y Teece (2002)	
[30] Chesbrough,y Kardon-Crowter, (2006)	
[16] Osterwalder y Pigneur, (2010)	(14) KYR
[22]Gassman (2006);	
[3] Asakawa y Sawada. (2010)	
[16] Osterwalder y Pigneur, (2010)	(15) KYA
[2]OECD (2008c)	
[23]Enkel et al.(2009)	
[24]Schwaag (2006)	
[25]Chesbrough y Teece (2002)	
[16] Osterwalder y Pigneur, (2010)	16 (CST)
[26]Remneland-Wikhamn y Knights, D. (2012)	
[16] Osterwalder y Pigneur, (2010);	17 (PTS)
[2] OECD (2008c)	
[22]Gassman (2006)	
[27]Etzkowitz y Leydesdorff, (1995)	
[28]Tidd (2006)	
[29]Miller et al. (2016)	
[17]]Chesbrough (2003)	18 (TEC)
[40] Hopkins et al. (2011)	
[30] Chesbrough,y Kardon-Crowter, (2006)	
[31]Cohen et al. (2002)	19(STR)
[3] Asakawa y Sawada. (2010)	
[32]Rohrbeck,et al. (2009)	
[39] Yun-Hwa & Kuang-Peng H.(2010)	19(STR)
[2] OECD (2008c)	
[2] OECD (2008c)	20(NWE)
[14] EIRMA (2003	

[Number]Author	*Variables Identified*
[10]Parmented (2010)	21(POBM)
[11[Lichtenthaler (2015)	
[12]Chien-Tzu y Wan Fen (2014)	
[2] OECD (2008c)	22(RSK)
[33]Sieg et al. (2010)	
[28]Tidd (2006)	
[2] OECD (2008c);	23(OIEC)
[34]Nelson (1993)	
[37]Gassmann et al. (2010)	
[35]Docherty (2006)	
[6] Goglio-Primard, y Crespin –Mazet (2014)	
[20]Van der Borgh, et al. (2012)	
[36[Holmes y Smart (2009)	
[35]Docherty (2006);	24 (TIEC)
[36] Holmes y Smart (2009)	
[2] OECD (2008c)	
[6[Goglio-Primard, y Crespin –Mazet (2014)	
[18]Deloitte (2015)	25(GOV)
[15]Chatenier et al. (2010)	
[10]Parmented (2010)	26(PIEC)
[11[Lichtenthaler (2015)	
[12]Chien-Tzu y Wan Fen (2014)	

Notes: (1)LSP.Leadership ; (2) T&M.Training and Mentoring; (3) P&S. Policies and Strategies; (4) COM.Communication ; (5) INC.Incentives ; (6) KC&A.Knowledge capture & acquisition; (7) PKMG. Performance of KMG; (8) OIO.Open Innovation Orientation; (9) MKS.Market Segmentation; (10) VP.Value Proposition; (11) CRM. Customer Relationship; (12) CHM.Channels of Distribution; (13) RIPR.Revenue Streams for Intellectual Property Rights; (14) KYR.Key Resources; (15) KYA.Key Activities; (16) CST. Cost ; (17) PTS.Partnership; (18) TEC.Technology ; (19) STR. Strategy; (20) NWE.New Entrepreneurships; (21) POBM Performance of OBM; (22) RSK.Risk; (23) OIEC.Opportunities of Innovation Ecosystem ; (24) TIEC.Threats of Innovation Ecosystem; (25) GOV.Governance; (26) PIEC. Performance of IEC. (27) Source: own.

We proceeded to summarize variables vs authors to prepare the account of academic vision. **See Table 2.**

Table 2
Variables representing the OIN underlying factor

ID	*Variables*	*Authors numbered as the Table 2*																						*Total*
		1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	***15***	***16***	***17***	***18***	***19***	***20***	***21***	***22***	***23***	*Frequency*
1	LSP	X		X				X	X																4
2	T&M	X		X				X	X																4
3	P&S	X		X				X	X																4
4	COM	X		X				X	X							X									5
5	INC	X	X		X																				3
6	KC&A	X				X	X			X															4
7	PKMG										X	X	X												3
8	OIO		X										X	X	X										4
9	MKS		X														X	X							3
10	VP																X	X		X	X				4
11	CRM		X														X					X			3
12	CHM																X								1
13	RIPR		X															X							2
14	KYR			X													X						X		3
15	KYA		X																					X	2
16	CST																X								1
17	PTS		X														X						X		3
18	TEC																	X							1
19	STR		X	X																					2
20	NWE		X												X										2
21	POBM										X	X	X												3
22	RSK		X																						1
23	OIEC		X				X														X				3
24	TIEC		X				X																		2
25	GOV															X			X						2
26	PIEC										X	X	X												3

Table 2 (cont.)
Variables representing the OIN underlying factor

ID	*Variables*	*Authors numbered as the Table 2*																*Total Frequency*
		24	*25*	*26*	*27*	*28*	*29*	*30*	*31*	*32*	*33*	*34*	*35*	*36*	*37*	*38*	*39*	*40*	
1	LSP																		4
2	T&M																		4
3	P&S																		4
4	COM																		5
5	INC																		3
6	KC&A																		4
7	PKMG																		3
8	OIO																		4
9	MKS															X			4
10	VP																		4
11	CRM																		3
12	CHM																		1
13	RIPR		X					X											4
14	KYR																		3
15	**KYA**	X	X																4
16	CST			X															2
17	PTS				X	X	X												6
18	TEC							X										X	3
19	STR								X	X							X		5
20	NEW																		2
21	POBM																		3
22	RSK					X					X								3
23	OIEC											X	X	X	X				7
24	TIEC												X	X					4
25	GOV																		2
26	PIEC																		3
	TOTAL																		94

Source: own.

After this, we proceeded to the qualitative analysis of this research applying focus group with Delphi Panel and Analytic Hierarchy Process (AHP, Saaty, 1997) to 6 ITSMZG specialists, in the following proportion: (SME CEOs: 1; back office/ front office managers: 1; software designers: 1 and professors : 3 as an academic vision) focusing on everyone's attention and experience, in order to ask for some suggestions to get the best grouping of factors and variables and the best names to associate them to the OIN and DBD construct.

The results were, for the OIN factor: Knowledge Management (KMG), Open Business Models (OBM), and Innovation Ecosystem (IEC). **See Table 3.**

Table 3
Focus Group by Delphi Panel and AHP to determine the main groups of Variables of OIN

Objective	*Open INNOVation (OIN) Factor*						
	ID	*Name of the factor suggested by expert vision for grouping of the variables*	*Variables*	*Factor as academic vision*		*AHP weighing as expert vision (%)*	*%Difference (Academic Vision-Empirical vision)*
				Frequency	*%*		
Alternatives	1	**KMG**	**LSP**	4	4.26	6.9	-2.64
	2		**T&M**	4	4.26	6.8	-2.54
	3		**P&S**	4	4.26	5.4	-1.14
	4		**COM**	5	5.32	5.4	-0.08
	5		**INC**	3	3.19	5.0	-1.81
	6		**KC&A**	4	4.26	4.9	-0.64
	7		**PKMG**	3	3.19	2.9	0.29
	8	**OBM**	**OIO**	4	4.26	5.2	-0.94
	9		**MKS**	4	4.26	4.6	-0.34
	10		**VP**	4	4.26	4.7	-0.44
	11		**CRM**	3	3.19	4.6	-1.41
	12		**CHM**	1	1.06	4.5	-3.44
	13		**RIPR**	4	4.26	4.9	-0.64
	14		**KYR**	3	3.19	4.2	-1.01
	15		**KYA**	4	4.26	4.8	-0.54
	16		**CST**	2	2.13	3.9	-1.77
	17		**PTS**	6	6.38	2.1	4.28
	18		**TEC**	3	3.19	3.0	0.19
	19		**STR**	5	5.32	2.0	3.32
	20		**NWE**	2	2.13	2.3	-0.17
	21		**POBM**	3	3.19	1.9	1.29
	22	**IEC**	**RSK**	3	3.19	2.5	0.69
	23		**OIEC**	7	7.45	2.0	5.45
	24		**TIEC**	4	4.26	3.0	1.26
	25		**GOV**	2	2.13	1.5	0.63
	26		**PIEC**	3	3.19	1.0	2.19
Total				94	100	100	

Source: own.

Finally, we used the same procedure for DBD variables, with results showed as: User (USR), Access (AXS), Network (NET), Regulation (REG), Cost & Benefits (C&B), QoS (Quality of Service). **See Table 4**.

Table 4
Panel Delphi and AHP to determine
the main group of Variables of DBD

Objective	*Digital broadband (DBD) factor*		
	ID	*Variable*	*AHP Weighing*
Alternatives	1	**USR.** User	0.20
	2	**AXS.** Access	0.20
	3	**NET.** Network	0.20
	4	**REG.** Regulation	0.15
	5	**C&B.** Costs-Benefits	0.16
	6	**QoS.** Quality of service	0.09
Total			1.000

Source: own.

Thereby, we proceeded to explain every single factor and variable to determine our general conceptual model of OIN, through the literature review. For practical analysis, we excluded the PKMG, POBM and PIEC dimensions due, these are performance key dimensions of each variable. Hence, we proceeded to explain each of these factors and variables to determine our general conceptual model of OIN and DBD, through deep literature review.

Literature review

The OIN is defined as "*a distributed innovation process based on purposively managed knowledge flows across organizational boundaries*" (Chesbrough & Bogers, 2014). But, how is affected in the digital era? One of the insights, is the DBD, defined by the OECD (2008a) as: "*typically used to denote an Internet connection with download speeds faster than traditional dial-up connections (at 64* kbit/s*)*" and it is a

key driver of economic growth and national competitiveness (Kim, et al.,2010). So, our model proposed here consists in:

Knowledge Management (KMG)
According the OECD (2003): "*It covers any intentional and systematic process or practice of acquiring, capturing, sharing, and using productive knowledge, wherever it resides, to enhance learning and performance in organizations"*. Hence, we propose a model based on a strong leadership (LSP) of its members (OECD, 2003; Mejía-Trejo et al., 2013) able to establish different mechanisms of communications (COM) to transmit the explicit and tacit knowledge, including training the personnel and mentoring the apprentices (T&M) with policies and strategies (P&S) about rewards and incentives to the personnel (INC) in inbound and outbound knowledge frontiers of the Firm (OECD, 2003; Asakawa et al., 2010; Hughes& Wareham, 2010; West& Bogers 2014). For a best knowledge capture and acquisition (KC&A) (Gassman & Enkel, 2004; OECD 2003; Goglio-Primard, & Crespin –Mazet, 2014; Keup & Gassman, 2009), the incentives to the personnel are recommended (OECD, 2003; Allarakhia et al., 2010).

Therefore, our hypothesis is:

H1. The Higher level of DBD, the higher level of KMG in OIN of ITS-MZG

Open Business Model (OBM)
We consider the Osterwalder& Pygneur (2010) definition of business model: "*A business model describes the rationale of how an organization creates, delivers, and captures value"* So, with the increased adoption of open innovation practices, *"open business models"* have emerged as a new design theme (Chesbrough, 2007; Chesbrough,2007). Therefore, we propose an OBM concept associated with KMG necessary to potentiate the OI Orientation (OIO) by the definition of exploring it, as the experimenting with new alternatives and/or exploiting it, as the refining and extending of the existing knowledge (Chien-Tzu & Wan Fen, 2014,) and what kind of driver is using, such as: the purchase of technology, licensing, purchase of technology, etc. (OECD, 2008b).

The market segmentation (MKS) as basis to define the services and products specialized to offer to the customer (Osterwalder & Pigneur, 2010) and it represents the opportunity to analyze, different applications of the technology besides the current market such as the discovering and developing new markets or for licensing other Firm's Market (OECD, 2008b; Chesbrough 2003). The value proposition (VP) is the core of any business, so it should be emphasized in different forms, such as: branding, performance, newness, etc. (Osterwalder & Pigneur, 2010; Mejía-Trejo et al., 2013) and make the user a source of innovation *to create value*, as a tool to *capture value* (Chesbrough 2003). The customer relationship management (CRM) as a tool, must be applied in different channels (CHM) (own & partners), in all its different forms, such as: personal service, automated-service, self-service, etc. (Osterwalder & Pigneur, 2010; OECD, 2008b) emphasizing the co-creation (Rayna & Styriukova, 2014) in network. The revenues streams (RIPR) represent a great chance, for the organizations based on de intellectual property rights (IPR) protection as: patents, trademarks and copyrights, for commercializing them using patent pools or cross-licensing portfolios, for instance (OECD, 2008b).

The key resources (KYR) must be recognized (Osterwalder & Pigneur, 2010) involving tangible (buildings, infrastructure, labs, etc.) and intangible (data, information, talent personnel, etc.) assets. The Key Activities (KYA) mainly the R&D network, turns out to be more productive based on absorptive capacity features, knowledge and technology (OECD, 2008b). The minimum of the costs (CST), like fixed-cost, variable-cost, economy-scale, economy-scope, etc. (Remneland-Wikhamn & Knights, D. 2012).

The Partnerships (PTS) represents a solid base to do business, involving the relationship University-Government-Organization-Society (Quadruple Helix) (OECD, 2008b, Miller et al., 2016) The technology (TEC), due its capacity to incorporate it in an external or internal way to the organization and aimed to the current or different markets (Chesbrough, 2003).The strategy (STR) applied in different ways: Market-Based Innovation; Crowd-Based Innovation Strategies or Collaborative Innovation; Network-Based Innovation Strategies (Gassmann et al.2010) according different final goals to

implement, such as: improvement of revenues, performance, competitive advantage, or even more, ensure the secrecy, etc. (OECD, 2008b). Finally, the new entrepreneurships (NWE) successfully achieved are a good indicator of any OBM, such as the *spin-in*, *spin-out* and *spin-off* in certain period. (Mejía-Trejo, 2017)

Hence, our hypothesis:

H2. The higher level of DBD, the higher level of OBM in OIN of ITSMZG

Innovation Ecosystem (IEC)

It is considered as: *"a network of interconnected organizations, organized around a focal firm or a platform, and incorporating both production and use side participants, and focusing on the development of new value through innovation"* (Autio &Thomas, 2014). This IEC in our model is proposed with the next elements to analyze: Types of risk (RSK) such as: cost, the infringement litigation with other companies in a similar and/or different product markets, etc. (OECD, 2008b). The opportunities (OIEC), based on: the potential on how well knowledge flows and the system is connected, a greater sense of urgency for internal groups to act on ideas or technology (OECD, 2008b; Lichtenthaler 2009). The threats (TIEC) such as: the extra costs of managing co-operation with external partners, the lack of control, the potentially opportunistic behavior of partners, (Goglio-Primard, & Crespin –Mazet,2014), the adverse impact of flexibility, overdependence of partners, etc. (Lichtenthaler 2009). A system of governance (GOV) capable to be elected and recognized, as a key factor for applying the principles of behavioral rules that support and regulate all the transactions by mean of written rules, the process of election of central governance, establishing roles and responsibilities to take decisions, etc.

Our hypothesis:

H3. The higher level of DBD higher level of IEC in OIN of ITSMZG

Digital Broadband (DBD)

One of the insights, is the DBD, defined by the OECD (2008c) as: "typically used to denote an Internet connection with download speeds faster than traditional dial-up connections (at 64 kbit/s)" and

it is a key driver of economic growth and national competitiveness (OECD, 2008c;Kim, et al.,2010; Rohrbeck et al. 2009). So, our model proposed here, consists of:

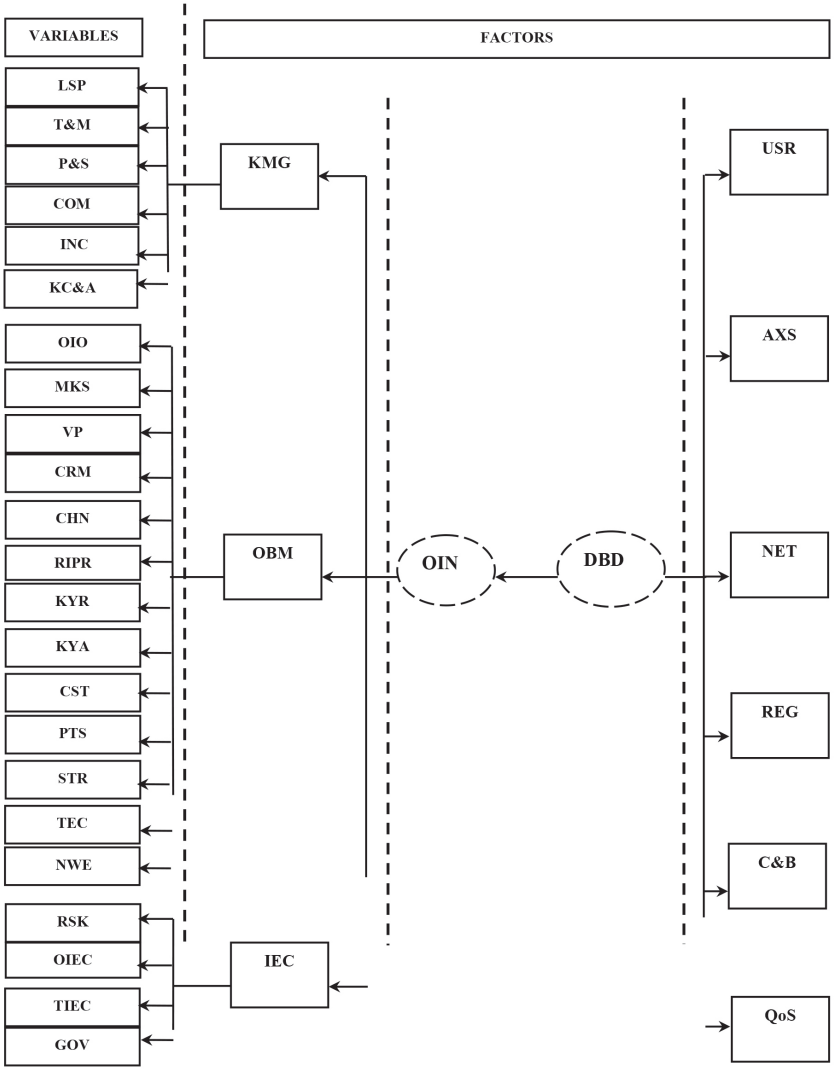
The user (USR), as one of the most important and powerful agent in our conceptual model, because it is an active element involving: surveillance for security/privacy based on protocols and standards, the empowerment of SMEs and users by DBD, the tendency of users with evolving skills to create contents with diversity and new habits in the consumer, (OECD, 2008a; Bianchi et al. 2010) to find out a major communication in your IEC, major communication with the government, etc. increasing the needs of DBD (Wunsch-Vincent & Vickery (2007); Müller-Seitz.& Reger, 2009; OECD, 2006), taking and planning competitive advantage (Kim et al.2010;OECD, 2008b).

About access (AXS), as the ability to connect the backbone network of the telecom operator by mean to use the last mile (wire an non-wireless) (OECD,2008b; Kim et al. 2010) specially asking about Internet: coverage, flexibility, time, speed, cost-benefits ratio, technologies, type of device (fixed and/or mobile).According the network (NET), as the transmission media characterized by: interoperability, speed, connection, with minimum errors (OECD, 2008b; Kim, 2010). The best practices of regulation (REG) by the government (and associations), such as: the actions balance the interests of suppliers and users, protection of IPR about new contents, the promotion of competition in digital model business (OECD, 2006; Biggs & Kelly, 2006), research & science, education, culture, health, lower prices, etc. providing the greatest benefits for users in different markets, introducing new technologies for access to the net and the universal broadband services (OECD, 2006; Biggs & Kelly, 2006; Sing & Raja (2008). It is a fact about the relation cost per benefits (C&B) increases with regulation and low prices showing in DBD : subscriptions, the network readiness, best offerings of services, etc. (Horrigan & Duggan, 2015; ITU-UNESCO, 2016) with high quality of service standards (QoS) and service level agreements (Kim et al.,2010). Therefore, our hypothesis:

H4. The higher level of DBD, the higher level of OIN of ITSMZG

Hence, we proposed the general conceptual model (see **Scheme 1**)

Scheme 1
General Conceptual Model



Source: own.

Notes: LSP.Leadership ; T&M.Training and Mentoring; P&S. Policies and Strategies; COM.Communication ; INC.Incentives ; KC&A. Knowledge capture & acquisition; OIO.Open Innovation Orientation; MKS.Market Segmentation ; VP.Value Proposition; CRM.Customer Relationship; CHM.Channels of Distribution; RIPR.Revenue Streams for Intellectual Property Rights; KYR.Key Resources; KYA. Key Activities; CST. Cost ; PTS.Partnership; TEC.Technology ; STR. Strategy; NWE.New Entrepreneurships. RSK.Risk; OIEC.Opportunities of Innovation Ecosystem ; TIEC.Threats of Innovation Ecosystem; GOV.Governance; DBD.Digital Broadband; USR.User; AXS. Access.NET.Network; REG.Regulation; C&B.Cost& Benefits; QoS. Quality of Service

And the Final Questionnaire (**see Table 5**)

Table 5
Final Questionnaire

Variables	*Indicator*	*Author(s)*
Open innovation Factor (OIN) Factor		
Knowledge Management (KMG) Factor		
(1) LSP	1.KM practices were a responsibility of managers and executives	OECD (2003); Asakawa et al. (2010); Hughes& Wareham, (2010); West & Bogers (2014); Mejia-Trejo et al. (2013)
	2.KM practices were explicit criteria for assessing worker performance	
	3.KM practices were a responsibility of non-management workers	
	4.KM practices were responsibility of the KMO	
(2) T&M	5.Firm encouraged experienced workers to transfer their knowledge to new or less experienced workers	
	6.Firm provided informal training related to KM	
	7.Firm encouraged workers to continue their education by reimbursing tuition fees for successfully completed work-related courses	
	8.Firm offered off-site training to workers in order to keep skills current	
	9.Firm provided formal training related to KM practices	
	10.Firm used formal mentoring practices, including apprenticeships	

Variables	*Indicator*	*Author(s)*
(3) P&S	11.Policies or programs intended to improve worker retention	OECD (2003); Asakawa et al. (2010); Hughes& Wareham, (2010); West & Bogers (2014); Mejia-Trejo et al. (2013)
	12.Values system or culture intended to promote knowledge sharing	
	13.It's written KM (internal-external) policy or strategy	
(4) COM	14.Workers is sharing knowledge with written documentation	
	15.Workers is sharing knowledge by regularly updating all the databases of their projects	
	16.Workers is sharing knowledge in collaborative work in virtual teams	OECD 2003
(5) INC	17.Knowledge sharing is rewarded with monetary incentives	OECD(2003); Allarakhia et al. (2010)
	18.Knowledge sharing is rewarded with non-monetary incentives	
	19.You have a reward system to support the flow of know how between units external an internal or dual embeddedness	OECD (2008c); Frost (2001)
(6) KC&A	20.You have a source of external knowledge based on: partnerships with external parties (alliances, joint ventures, joint development, acquisition or sale of knowledge (contract, R&D, licensing), corporate venturing (equity investments in university spin offs or in venture capital investment funds) etc.)	Gassman & Enkel (2004): OECD (2003); Keup & Gassman (2009)
	21.You have a source of internal knowledge based on: in house innovations.	
Open Business Model (OBM) Factor		
(7) OIO	22.Your OBM is oriented more exploration in innovation	Beckman et al. (2004); Chien-Tzu & Wan Fen (2014)
	23.Your OBM is oriented more to exploitation in innovation	
	24.Your OBM in open innovation mode is based on: purchase of technology	EIRMA (2003); OECD(2008c
	25.Your OBM in open innovation mode is based on: joint venturing and alliances	
	26.Your OBM in open innovation mode is based on: joint development	

Variables	*Indicator*	*Author(s)*
(7) OIO	27.Your OBM in open innovation mode is based on: contract R&D	EIRMA (2003); OECD(2008c
	28.Your OBM in open innovation mode is based on:: licensing	
	29.Your OBM in open innovation mode is based on: collaborations with universities	
	30.Your OBM in open innovation mode is based on: equity in university spin offs	
	31.Your OBM in open innovation mode is based on: equity in venture capital investment funds	
	32.Your OBM in open innovation mode is based on: purchase of technology	
(8)MKS	33.Your OBM determines the real needs of its consumers, classifying them on: mass market	Osterwalder & Pigneur, (2010)
	34.Your OBM determines the real needs of its consumers, classifying them on: niche market	
	35.Your OBM determines the real needs of its consumers, classifying them on: segmented	
	36.Your OBM determines the real needs of its consumers, classifying them on: diversified	
	37.Your OBM determines the real needs of its consumers, classifying them on: multisided platforms-markets	
	38.Your OBM is only focused an makes surveillance on your current market	OECD (2008c); Chesbrough (2003); Chesbrough (2006)
	39.Your OBM only makes surveillance for discovering and developing new markets	
	40.Your OBM only makes surveillance for licensing other Firm's Market	
(9)VP	41. Your OBM offers VP through newness	Osterwalder & Pigneur, (2010)
	42. Your OBM offers VP through performance	
	43. Your OBM offers VP through customization	
	44. Your OBM offers VP through, design	
	45. Your OBM offers VP through brand	
	46. Your OBM offers VP through price	
	47. Your OBM offers VP through cost reduction	
	48. Your OBM offers VP through risk reduction	
	49. Your OBM offers VP through accessibility,	

Variables	*Indicator*	*Author(s)*
(9)VP	50. Your OBM offers VP through convenience/ usability	Osterwalder & Pigneur, (2010)
	51.Your OBM lead the VP based on User Innovation (Create Value) as a tool of Open Innovation (Capture Value)	Von Hippel (2005); Chesbrough (2003); Van der Borgh et al. (2012)
(10)CRM	52. Your OBM is seeking to deliver requirements to your consumers by: personal assistance	Osterwalder & Pigneur, (2010); OECD (2008c)
	53. Your OBM is seeking to deliver requirements to your consumers by: dedicated personal assistance	
	54. Your OBM is seeking to deliver requirements to your consumers by: self service	
	55. Your OBM is seeking to deliver requirements to your consumers by: automated service	
	56. Your OBM is seeking to deliver requirements to your consumers by: communities	
	57 Your OBM is seeking to deliver requirements to your consumers by: co-creation	Rayna & Styriukova (2014); Osterwalder & Pigneur, (2010)
(11)CHM	58. Your OBM seeking to be very closed to the delivery of the services to your costumers by own channels	Osterwalder & Pigneur, (2010); OECD (2008c)
	59. Your OBM seeking to be very closed to the delivery of the services to your costumers by partner channels	
(12)RIPR	60.Your OBM applies revenue stream of IPR by mean of: financial assets licensing and/or building a Intellectual Capital Portfolio to exploitation	
	61.Your OBM applies revenue stream of IPR by mean of: usage fee	
	62.Your OBM applies revenue stream of IPR by mean of: subscription fees	
	63.Your OBM applies revenue stream of IPR by mean of: lending/renting/leasing	
	64.Your OBM applies revenue stream of IPR by mean of: licensing	

Variables	*Indicator*	*Author(s)*
(12)RIPR	65.Your OBM applies revenue stream of IPR by mean of: brokerage fee	Osterwalder & Pigneur, (2010); OECD (2008c)
	66.Your OBM applies revenue stream of IPR by mean of: advertising	
	67.Your OBM applies revenue stream of IP by mean of trade secrets	OECD (2008c)
	68.Your OBM to facilitate the revenue stream makes patent pools	
	69.Your OBM to facilitate the revenue stream makes cross-licensing	
(13)KYR	70.Your OBM use all yours: physical key resources (buildings, labs, sites, network etc.)	Osterwalder & Pigneur, (2010)
	71.Your OBM use all yours: intellectual key resources (relationships, databases, information systems, etc.)	
	72.Your OBM use all yours: human key resources (its personnel)	
	73.Your OBM use all yours: financial key resources	
	74.Your OBM considers the rapid shift of industry and technology borders, to pose new business models	Gassman (2006); Asakawa et al. (2010)
	75.Your OBM considers the knowledge as a factor of competitive advantage.	
	76.Your OBM considers that a more interdisciplinary cross boarder research more partnership for innovation	
(14)KYA	77.Your OBM uses all yours: production key activities	Osterwalder & Pigneur, (2010)
	78.Your OBM uses all yours: problem solving key activities	
	79.Your OBM uses all yours: platform network key activities	
	80.Your OBM use all yours R&D located under cluster and networks innovation systems with geographical proximity because the spillovers often occur by this.	OECD (2008c); Bathelt et al. (2004); Enkel et al.(2009); Whelan, et al. (2010)

Variables	*Indicator*	*Author(s)*
(14)KYA	81.Your OBM making activities for a great awareness to invest in own R&D because the importance of absorptive capacity	Cohen & Levinthal, (1990); OECD (2008c)
	82. Your OBM making activities for R&D investments in other countries, because is more the available the pool of scientist, clusters and academic institutes, than the near to markets and production facilities	Schwaag (2006); INSEAD et al. (2006); Thursby & Thursby (2006)
	83.Your OBM attracting technology sourcing mainly, in locating the R&D activities outside the home country, and the geographic dispersion a means of knowledge creation rather than knowledge diffusion	Kuemmerle (1997)
	84.Your OBM attracting the share of codified information and co-ordination of activities among different parties because is easier for innovations that can be pursued independently (autonomous innovation).	Chesbrough & Teece (2002)
	85.Your OBM making activities to have benefits only realized in conjunction with complementary innovations,. Your product lifecycle is long. Less attractive	
(15)CST	86.Your OBM minimizes your cost through: cost-driven	Osterwalder & Pigneur, (2010); Remneland-Wikhamn & Knights, D. (2012)
	87.Your OBM minimizes your cost through: value-driven	
	88.Your OBM minimizes your cost through: fixed costs	
	89.Your OBM minimizes your cost through: variable costs,	
	90.Your OBM minimizes your cost through: economies of scale	
	91.Your OBM minimizes your cost through:, economies of scope	
(16)PTS	92.Your OBM seeking partners to support: optimization and economy of scale global industries results, powerful standards and dominant designs. (Globalization)	Osterwalder & Pigneur, (2010); OECD (2008c); Gassman (2006)

Variables	*Indicator*	*Author(s)*
(16)PTS	93.Your OBM seeking partners to support: reduction of risk and uncertainty, and acquisition of particular resources and activities	Osterwalder & Pigneur, (2010); OECD (2008c); Gassman (2006)
	94- Your OBM seeking partners to support: new developments in and around their industry owing is based on an industry characterized by rather short technology life cycles	OECD (2008b); Osterwalder & Pigneur, (2010);
	95. Your OBM seeking external partners (suppliers, customers, universities, etc.) even in a cross countries, in an innovation ecosystem.	Gassman (2006);
	96.Your OBM seeking the relation amongst: University-Industry-Government (the triple helix) because the collaborative innovation activities stimulates innovation; even more you're considering the social aspect (quadruple helix) benefits	Etzkowitz & Leydesdorff, (1995); Tidd (2006); OECD (2008c); Miller et al. (2016)
	97.Your OBM seeking use venturing to find external partners for commercializing innovations that are not used internally (divestment, spin-out, spin-off)	
(17)TEC	98.You're implementing internal technology for your current market	Chesbrough (2003); Lichtenthaler & Holger (2009).
	99.You're implementing internal technology for the new markets	
	100.You're implementing internal technology for other Firm's market	
	101.You're implementing internal/external venture handling technology to your current market	
	102.You're implementing internal/external venture handling technology to the new markets	
	103.You're implementing internal/external venture handling technology to the other Firm's Market	
	104.You're implementing external technology insourcing to your current market	
	105.You're implementing external technology insourcing to the new markets	
	106.You're implementing external technology insourcing to the other Firm's market	
	107.You're implementing external technology for your current market	

Variables	*Indicator*	*Author(s)*
(17)TEC	108.You're implementing external technology for the new markets	Chesbrough (2003); Lichtenthaler & Holger (2009).
	109.You're implementing external technology for other Firm's market	
	110.You're on permanent looking for external technology to bring to the company	Chesbrough,& Kardon-Crowter, (2006)
	111.You're on permanent surveillance for IPR of other technologies	
	112.You're implementing technology opportunistically	
	113.You're implementing technology in formal and systematic way.	Chesbrough,& Kardon-Crowter, (2006)
	114.You're implementing alternatives technologies	
	115.You're implementing technologies with enough incentives	
	116.You're implementing technologies to address an incremental product improvement	
	117.You're implementing more proven technologies than new ones	
	118.You're implementing more proven technologies more than trying to develop entirely new	
	119.You're implementing external technologies because they represent more benefits	
	120.You're implementing internal technologies because they represent more benefits	
(18)STR	121.Your OBM is designed on Efficiency-Centric Open Business Model ; hence you pose Market-Based Innovation Strategies)	Saebi & Foss (2013); Gassmann et al.2010); Hopkins et al. (2011)
	122.Your OBM is designed on User-Centric Open Business Model; hence you pose Crowd-Based Innovation Strategies	
	123.Your OBM is designed on Collaborative Open Business Model; hence you pose Collaborative Innovation Strategies.	
	124.Your OBM is designed on Open Platform Business Model; hence you pose Network-Based Innovation Strategies	
	125.Your strategy to do IPR protection registration is due: preventing copy	Cohen et al. (2002); Asakawa et al. (2010)

Variables	*Indicator*	*Author(s)*
(18)STR	126. Your strategy to do IPR protection registration is due: preventing other companies from patenting (e.g. prevent blocking)	Cohen et al. (2002); Asakawa et al. (2010)
	127.Your strategy to do IPR registration is due: prevent lawsuits	
	128.Your strategy to do a IPR protection registration is due: to use for negotiations	
	129. Your strategy to do a IPR registration is due: the enhance of reputation	
	130. Your strategy to do a IPR registration is due: to generate licensing revenue	
	131. Your strategy to do IPR protection registration is due: to measure the performance	
	132. Your strategy to do IPR protection registration is due: to get competitive advantage	Rohrbeck,et al. (2009.)
	133.Your strategy to protect your IPR is based entirely by the industrial trade secrecy	OECD (2008c)
(19)NEW	134.You've got *spin in* as: an investment in technology *start-ups* (e.g. university *spin offs*)	OECD (2008c)
	135.You've got *spin out* as: divesting internally developed technologies relates to the *inside-out* aspect of open innovation	
	136.You've got *spin off* as: the company no longer maintains a stake in the project/company.	
(20) RSK	137.You avoid the risk of costs using innovation intermediaries	OECD (2008c); Sieg et al. (2010)
	138.Your management of the creation of cross-licensing agreements involving the exchange of two or more patent portfolios to allow mutual use of patents by multiple patent holders in order to avoid risk of patent infringement	
	139.Your innovation network considers the theft of IPR as the most important risk to global open innovation networks even with external partners that may later become competitors	

Variables	*Indicator*	*Author(s)*
	140.Your innovation network involves similar companies that focus on tactical innovation issues where the success depends on their ability to share experience, disclose information and develop trust and transparency	Tidd (2006)
	141.Your innovation network involves collaboration between companies from a single industry or adjacent industries that co-operate to explore and create new products and processes	
	142.Your innovation network involves collaboration between companies from different industries that co-operate to explore and create new products and processes, where sharing of information and risk	
	143.Your innovation network involves heterogeneous companies that focus on tactical innovation issues where the success depends on their ability to share experience, disclose information and develop trust and transparency	
(21)OIEC	144. You've got open innovation network opportunity from recognizing the potential of innovation depends on how well knowledge flows	OECD (2008c); Bathelt et al. (2004)
	145. You've got open innovation network benefits from recognizing to be a part of an innovation ecosystem that influences your national or regional innovation system	Lundvall, (1992); Nelson (1993)
	146. You've got open innovation network benefits from maximizing the transference of tacit knowledge residing in national innovation system	Bathelt, et al. (2004)
	147.You've got open innovation network benefits from the ability to leverage R&D developed outside	OECD (2008c)
	148.You've got open innovation network benefits from extended reach and capability for new ideas and technologies and create value through the knowledge	Van der Borgh, et al. (2012); Fichter (2009); Lichtenthaler (2009)
	149.You've got open innovation network benefits from: the opportunity to refocus some internal resources on finding, screening and managing implementation;	OECD (2008c): Fichter, (2009); Goglio-Primard, & Crespin – Mazet (2014)

Variables	*Indicator*	*Author(s)*
(21)OIEC	150.You've got open innovation network benefits from : the improved payback on internal R&D through sales or licensing of otherwise unused intellectual property;	OECD (2008c): Fichter, (2009); Goglio-Primard, & Crespin – Mazet (2014)
	151.You've got open innovation network benefits from : a greater sense of urgency for internal groups to act on ideas or technology;	
	152.You've got open innovation network benefits from : the ability to conduct strategic experiments with less risk	
	153.You've got open innovation network benefits from: over time, the opportunity to create a more innovative culture	
(22)TIEC	154.You've perceived or experienced open innovation network threats from: the extra costs of managing co-operation with external partners	
	155.You've perceived or experienced open innovation network threats from: the lack of control	
	156.You've perceived or experienced open innovation network threats from: the adverse impact of flexibility	
	157.You've got perceived or experienced open innovation network threats from: the overdependence on external parties	
	158.You've got perceived or experienced open innovation network threats from: the potentially opportunistic behavior of partners	
(23)GOV	159.You recognize the need to have written rules to exchange the information in the innovation ecosystem	Deloitte (2015)
	160.You participate in the election of central governance system	
	161.You participate in the development of operating procedures, that include standards for collecting, storing, and sharing data	
	Digital broadband (DBD) factor	
(1)USR	1.As user, you're on permanent surveillance of security & privacy of protocols & standards that support the DBD of your innovation ecosystem.	OECD (2008a); Bianchi et al. (2010)

Variables	*Indicator*	*Author(s)*
(1)USR	2.As user, you consider that SMEs tend to be empowered by the DBD enabling them to compete with larger firms in an increasing number of markets and purchase services they previously could not afford.	OECD (2008a); Bianchi et al. (2010)
	3.As user, you consider that is also more likely to have multiple business links, and multiple links with broadband technology improve labor productivity. Firms with a high broadband equipped labor share have higher productivity.	
	4.As user you're prone to use open source very often to create web sites, blogs, podcasting, virtual communities, digital arts, apps, etc., facilitating the user-driven innovation to create new content; in other words, they are user-innovators and collectively develop new products (Create Value or *democratizing the innovation*)	OECD (2003); OECD (2008a); Wunsch-Vincent & Vickery (2007); Müller-Seitz.& Reger (2009)
	5.As user, you consider that the DBD enables technologies and platforms, products and services, skills and jobs continue to emerge, bringing about new and increasingly user-driven ways of consuming, producing and innovating	OECD (2008a)
	6.As user, you consider the broadband tend to get user-autonomy, increasing participation diversity. These result in lower entry barriers, distribution costs and user costs and greater diversity of works as digital shelf space is almost limitless.	
	7.As user, you have high skills of your personnel to use DBD	OECD (2006)
	8.As user, you appreciate that content is creating new user habits and a shift in focus from 'customer' to 'user. Digital technologies enable individuals to create and use their own digital content and create social, cultural, and/or economic value for themselves, their communities, or their country.	
	9.As user, you're finding out what is going on it your innovation ecosystem	Kim et al. (2010)
	10.As user, you're communicating with internal/ external providers and/or partners	
	11.As user, you're finding out all news about its core research	

Variables	*Indicator*	*Author(s)*
(1)USR	12.As user, you're sharing your views with others about key issues	Kim et al. (2010)
	13.As user, you're communicating with government officials about issues	
	14.As user, you're improving your own infrastructure and/or the last mile network	
	15.As user, you realized that Internet connections are increasingly available as an important option for users.	OECD (2008b)
(2)AXS	16.About Internet access increases user flexibility in time and location of use, it can be expected to add additional benefits over and above those from fixed location Internet access	
	17.As access in the last mile you appreciate an excellent coverage, time and speed of digital access technologies (fiber, DSL, WIMAX, LTE, PLC, UMTS HSPA, etc.) of your telecom operator	
	18.As access, the PC is the most important device used to connect to the network	Kim et al. (2010)
	19.As access, the notebook is the most important device used to connect to the network	
	20.As access, the smartphone, tablets and mobile are the most important devices used to connect to the network	
(3)NET	21.As network, the interoperability of broadband services and applications on various networks and platforms is of increasing importance as users ask for the same products over different platforms.	OECD (2008b)
	22.As network speed, you appreciate a correct average speed (User's general perception of the average level of Internet communication speed and service delay)	Kim (2010)
	23.As network speed, you appreciate a correct variation in speed (User's general perception of the variation of service speed (jitter, zapping delay, etc.))	
	24.As a network connection., you appreciate a correct connection availability (Availability of channels and/or ports designated to a specific service request)	

Variables	*Indicator*	*Author(s)*
	25.As a network connection, you appreciate a correct connection stability (How well the connection is maintained without reconfiguring the user's network environment)	Kim (2010)
(4)REG	27.You appreciate about best practices of regulation in your country that business and regulatory environments are balanced: the interests of suppliers and users, in areas such as the protection of intellectual property rights and digital rights management without disadvantaging innovative e-business models;	OECD (2006)
	28.You appreciate about best practices of regulation in your country the content types created by network users also receives increasing government attention, through public sector information for commercial re-use, research & science, education, culture, health	
	29.You appreciate about best practices of regulation in your country the regulatory frameworks that balance the interests of suppliers and users, in areas such as the protection of intellectual property rights, and digital rights management without disadvantaging innovative e-business models.	
	30.You appreciate about best practices of regulation in your country, promoting the competition. Multiple play can increase competition, lower prices, and drive growth—but can only begin in markets with low entry barriers. Regulatory frameworks that establish level competitive playing fields will thus provide the greatest benefits for users.	Biggs & Kelly (2006); Sing & Raja (2008)
	31.You appreciate about best practices of regulation in your country, relying more on market forces. Regulation should move toward allowing innovation and competition on a level playing field, then step back from intervening unless there are market failures.	Sing & Raja (2008)
(4)REG	32.You appreciate about best practices of regulation in your country,, allowing new technologies to contribute everything they have to offer. Service providers should be allowed to fully use their networks and reduce costs—increasing business viability and making markets more efficient.	Sing & Raja (2008)

Variables	*Indicator*	*Author(s)*
	33.You appreciate about best practices of regulation in your country a tendency to get universal service based on broadband	
(5)C&B	34.About the monthly cost of broadband subscription, is too expensive	Horrigan & Duggan (2015)
	35.About the cost, you have other options for internet access out of business less expensive	
	36.About maintenance cost of the internal infrastructure, is too expensive	
	37.About cost, the tablets and smartphones does everything online that you need, less expensive	
	38.About the cost, the service neither is available or speed is unacceptable	
(6)QoS	39.As a user experience, you've got a remarkable profitability of your broadband service DBD to create and keep on a solid business and innovation ecosystem.	ITU-UNESCO (2014)
	40.As a user experience, you've got a remarkable sustainability of your broadband service DBD to create and keep on a solid business and innovation ecosystem.	
	41.As a user experience, you've got a remarkable affordability of your broadband service DBD to create and keep on a solid business and innovation ecosystem	
	42.As QoS, service error rate has a correct frequency of disconnections, service failure or degradation due to extensive packet loss (packet loss ratio), number of retransmissions, lack of responses, etc.	Kim et al. (2010)
	43.As a QoS you have a correct Service Level Agreement for your innovation ecosystem	

Source: own.

Notes: LSP.Leadership ; T&M.Training and Mentoring; P&S. Policies and Strategies; COM.Communication ; INC.Incentives ; KC&A.Knowledge capture & acquisition; OIO. Open Innovation Orientation; MKS.Market Segmentation ; VP.Value Proposition; CRM.Customer Relationship; CHM.Channels of Distribution; RIPR.Revenue Streams for Intellectual Property Rights; KYR.Key Resources; KYA.Key Activities; CST. Cost ; PTS.Partnership; TEC.Technology ; STR.Strategy; NWE.New Entrepreneurships s. RSK.Risk; OIEC.Opportunities of Innovation Ecosystem ; TIEC.Threats of Innovation Ecosystem; GOV.Governance; DBD.Digital Broadband; USR.User; AXS.Access.NET. Network; REG.Regulation; C&B.Cost& Benefits; QoS.Quality of Service

Methodology

We started the study involving 600 ITSZMG specialists (including: SME CEOs (120), back office/ front office managers (120), software designers (120), professors (120) and directors of business consultant firms (120) at 200 SMEs all of them grouped in the cluster "*Ciudad Creativa Digital*) during the period of September-December 2016. The data collection was made through the support of a previous agreement (type: triple helix) among the ITSZMG-PROSOFT (*Programa para el Desarrollo de la Industria del Software y la Innovación.*)-University of Guadalajara. The participants were distributed firstly, in the AHP-Delphi Focus Group, and secondly, in different seminar panels to do the survey of data in four modules: KMG, OBM, IEC and DBD.

We made the quantitative analysis of the research, in order to evaluate the reliability and validity of the measurement scales, using Confirmatory Factor Analysis (CFA) with the maximum likelihood method in EQS 6.2 software (Byrne, 2006). Similarly, the reliability of the proposed measurement scales is evaluated from Cronbach's alpha coefficient and the composed reliability index (CRI) (Bagozzi & Yi, 1988). All the values from the scale exceeded the recommended level of 0.7 for Cronbach's alpha as well as the CRI that provides an evidence of confidence that justifies the internal reliability of the scales (Hair et al., 2014). Accordingly, other methods of estimation were used when it is assumed that the normality is present. For this, we followed the suggestions from Chou, et al. (1991) and Hu, et al. (1992) for the correction of the estimation model used. In this way, the robust statistics (Satorra & Bentler, 1988) will be used to provide a better evidence of the statistical adjustments.

The adjustments used, were: the Normalized Adjustment Index (NFI), Not-Normalized Adjustment Index (NNFI), Comparative Adjustment Index (CFI) and the Root Mean Square of Error Approximation (RMSEA) (Byrne, 2006; Hair et al., 2014). The NFI, NNFI and CFI values between 0.80 and 0.89 represent a reasonable adjustment (Segars & Grover, 1993), and a value that is equal or higher to 0.90 is an evidence of a good fit (Byrne, 2006). The RMSEA values that are inferior to 0.080 are acceptable (Hair et al., 2014). The CFA results are presented in Table 6

Table 6
Internal Consistence and Convergent Validity Evidence of the Theoretical Model

Factors		*Variables*	*Factor Loading >0.6 (a)*	*Robust t-Value*	*Average Factor Loading*	*Cronbach's Alpha >=0.7 (b)*	*CRI> 0.7 (b)*	*AVE> 0.5 (c)*
OIN	**KMG**	**LSP**	**0.957*** **	1.000a	0.747	0.758	0.887	**0.824**
		T&M	0.682***	10.235				
		P&S	0.702**	11.367				
		COM	0.892***	13.339				
		INC	**0.570*** **	10.074				
		KC&A	0.677***	11.206				
	OBM	**OIO**	0.602***	1.000a	0.708	0.720	0.931	**0.878**
		MKS	0.785***	9.855				
		VP	0.890***	10.398				
		CRM	0.952***	9.710				
		CHM	0.892***	9.663				
		RIPR	**0.590*** **	11.224				
		KYR	0.665***	12.345				
		KYA	0.654***	9.212				
		CST	0.602***	10.278				
		PTS	0.777***	9.999				
		STR	**0.579*** **	10.016				
		TEC	0.645***	10.001				
		NWE	**0.567*** **	7.998				
	IEC	**RSK**	**0.500*** **	1.000a	0.701	0.718	0.801	**0.682**
		OIEC	0.902***	11.098				
		TIEC	0.704***	11.606				
		GOV	0.698***	12.007				
DBD		**USR**	0.786***	1.000a	0.757	0.730	0.893	**0.835**
		AXS	0.887***	13.765				
		NET	0.897***	9.765				
		REG	0.602***	8.098				
		C&B	0.789***	9.111				
		QoS	**0.580*** **	11.233				

Results: (S-BX^2) = 453.672; df=112; p < 0.000; NFI = 0.825; NNFI = 0.895; CFI = 0.883; RMSEA = 0.019

Conclusion: the relationship among KMG, OBM and IEC factors and variables have good adjustment and a good fit to the data

Notes: (a) Parameters constrained to the value in the identification process. *** = p < 0.0, (Bagozzi & Yi, 1988).

(b) According Hair et al. (2014)

(c) Average Variance Extracted (AVE), according (Fornell & Larcker, 1981).

Conclusion: These values indicate that there are enough evidence of convergent validity and reliability, which justifies the internal reliability of the scales (Hair et al., 2014).
Source: Own.

The theoretical model provides a good fit of data (S-BX^2 = 453.672; df=405; p < 0.000; NFI = 0.825; NNFI = 0.895; CFI = 0.883; RMSEA = 0.019). As evidence of the convergent validity, the results from the CFA indicate that all the items of the related factors are significant (p < 0.001), the size of all the standardized factorial loads are superior to 0.60 (Bagozzi & Yi, 1988) and the average of the standardized factorial loads of every factor exceed without any problems the value of 0.70 (Hair et al., 2014). Finally, the average variance extracted (AVE) was calculated for every pair of constructs, which results in an AVE that is superior to the 0.50 (Fornell and Larcker, 1981).

In regard to the evidence of discriminant validity, the measurement is given in the following ways:

1. With a confidentiality interval of 95%, none of the individual elements of the latent factors from correlation matrix contain the value 1.0 (Anderson & Gerbing, 1988).
2. The variance extracted between each pair of constructs is superior to its corresponding AVE (Fornell & Larcker, 1981). **See Table 7.**

Table 7
Discriminant Validity Measuring of the Theoretical Model

Factors	*KMG*	*OBM*	*IEC*	*DBD*
KMG	**0.824**	0.073	0.116	0.185
OBM	0.130-0.410	**0.878**	0.336	0.160
IEC	0.180-0.500	0.440-0.720	**0.682**	0.423
DBD	0.330-0.530	0.340-0.460	0.590-0.710	**0.835**

Note: The diagonal represents the AVE, whereas above the diagonal part presents the Variance (the correlation squared). Below the diagonal, is shown the correlation estimation of the factors with a confidence interval of 95%.
Source: Own.

Based on these criteria, it can be concluded that the different measurements used in this paper show enough evidence of reliability as well as convergent and discriminant validity.

Results

In order to prove the hypotheses, a structural equations modeling with EQS 6.2 software by means of CFA of second order was applied (Byrne, 2006) and the theoretical model was analyzed to prove the structure of the model and to get the results that could allow the contrast of the established hypotheses. The nomological validity of the theoretical model was analyzed by the chi-square performance test in which the theoretical model was compared with the measurement model. The results indicate that there are significant differences of the theoretical model are good in the explanation of the relations observed between the latent constructs (Anderson & Gerbing, 1988). See Table 8.

Table 8
Structural Equation Modeling Results from the Theoretical Model

Hypotheses	*Path*	*Standardized path Coefficients*	*Robust t-Value*
H1. The higher level of DBD, the higher level of KMG in OIN of ITSMZG. The model has significant positive effect.	DBD→KMG	0.599***	4.229
H2. The higher level of DBD, the higher level of OBM in OIN of ITSMZG. The model has significant positive effect.	DBD→OBM	0.556***	3.987
H3. The higher level of DBD, the higher level of IEC in OIN of ITSMZG. The model has significant positive effect.	DBD→IEC	0.654***	6.417
H4. The higher level of DBD, higher level of OIN of ITSMZG	DBD→OIN	0.670***	7.087

Results: S-BX2=566.20; df = 210; $p < 0.000$; NFI = 0.810; NNFI = 0.820; CFI = 0.899; RMSEA = 0.069.
Note: *** = $p < 0.01$. Conclusion: The model has significant positive effect among the Factors
Source: Own.

Discussion

Mexico is an emerging country and all the best practices about DBD on OIN by the specialist in ITSMZG, are still with insufficient awareness of their practice or even more, they are still ignored. Hence, the importance of this study to identify the strength and weak relationships to determine a general conceptual model able to predict the best correlations and to improve the model. According the final results showed in Table 4 (only the factor loading > 0.6):

There are important issues to consider as a result of the visions comparison: academics vs. experts (See Table 3). For instance, OIEC is cited as 7.45 % importance of academics vision vs, 2% of experts' vision (5.45 as % difference amongst them). Revising the case of PTS with 6.38 % importance of academics vision vs. 2.1 % importance of experts' vision (4.28 as % difference amongst them). Other similar case is the variable CHM with 1.06% importance of academic version vs. 4.5% importance of experts' vision (-3.44 as % difference amongst them). Thus, we obtained the three main variables with higher academic differences and chances to be developed in the final OIN to be more practical to the experts' vision.

The main influences of the DBD on OIN practices in the ITSMZG showed positive effects for KMG factor such as the leadership (LSP), as the most important variable applied because there was a great awareness in the knowledge management practices and the communication of this (COM). This is a result of how workers are on training and mentoring (T&M) programs with policies and strategies (P&S) to promote the knowledge capture and acquisition (KC&A). However, it's important to be developed (factor loading <0.6), the promotion of incentive programs (INC) supported in reward systems to reinforce the flow of know how between units.

The main influences of the DBD on OIN practices in the ITSMZG showed positive effects for OBM factor in the open innovation orientation (OIN) due it is just starting in some new activities, such as: the purchase of technology, joint venturing and alliances. The market segmentation (MKS), is a real practice of needs detection of their consumers with a permanent surveillance of the current and potential market and the constant revision of the value proposition (VP)

to create it through the user as a tool to capture value, reinforcing the customer relationship (CRM) to be close of them through several branches of distribution (CHM) including own channels and/or partner channels. Therefore, exist a permanent awareness to optimize the key activities (KYA) and the key resources (KYR) resulting in a remarkable reduction of costs (CST). The partnership, (PTS) is a key factor of the OBM because the reduction of risk and uncertainty, acquisition of particular resources and activities mainly the quadruple helix relationship. The technology (TEC) is a strategic resource due the importance of how is acquired and implemented, based on a market point of view and the internal/external resources. However, it's important to be developed (factor loading <0.6), the revenues for intellectual property rights (RIPR) because the lack of clear policies of how to get revenues for commercializing, and the link with strategy (STR) to protect the IPR to get competitive advantage. Finally, is necessary to improve the new entrepreneurships (NWE) indicator, as the ability to get: spin in, spin out and/or spin off businesses.

The main influences of the DBD on OIN practices in the ITSMZG showed positive effects for IEC factor in the opportunities of innovation ecosystem (OIEC), where the benefits are from several issues, such as: how well knowledge flows to influence their national or regional innovation system or how to create value through the knowledge, among others. The threats of innovation ecosystem (TIEC) are affecting the perception or experience of the open innovation network threats from: the extra costs of managing co-operation with external partners; the lack of control; the adverse impact of flexibility, etc. The governance (GOV) is well done applied in the exchange of information for the innovation ecosystem, recognizing both, the OIEC and TIEC just in time, for planning the actions in advance.

However, it's important to be developed (factor loading <0.6), the risk (RSK) as a variable for warning of how avoid the risk of costs using innovation intermediaries; management of the creation of cross-licensing agreements, etc.

For DBD, due the firms are on permanent surveillance of security, privacy of protocols and standards, the user (USR) becomes in the main beneficiary. Firms with a high broadband equipped labor share, have higher productivity. The results are lower entry barriers,

and lower distribution costs to the final user. Digital technologies enable individuals to create and use their own digital content and create social, cultural, and/or economic value for themselves, their communities, or their country, improving their own infrastructure (the last mile network). The Internet connections are increasing the demand of availability as an important option for users, and therefore, is increasingly the importance of the access (AXS), with user flexibility in time and location of use, depending of speed of digital access technologies (fiber optics, DSL, WIMAX, LTE, PLC, UMTS HSPA, etc.) from their telecom operators to several different devices that are connected to the network, such as: PC, notebook, the smartphone, tablets and/or other mobile devices.

There are two important consequences: one of these, is that network (NET) must be adequate for the interoperability of broadband services and applications in several platforms to provide a correct average speed, speed variation and availability of connection and stability with compliance of all the regulations and policies (REG) and allowing finally, the competition promotion, lower prices, trusting more on market forces. The second one, are the costs & benefits (C&B) for using the DBD for instance, the monthly cost of broadband subscription or maintenance cost of the internal infrastructure.

However it's important to be developed (factor loading <0.6), the quality of service (QoS), as a remarkable profitability to be improved in sustainability and affordability of their DBD service to create and keep a solid business and innovation ecosystem; service error rate, service failure or degradation due to extensive packet loss, number of retransmissions, lack of responses, etc.

Despite all above mentioned, 5/6 DBD factors have positive effect on 18/23 OIN factors.

Conclusion

Hence, we concluded the following important issues:

The results of the study are important and useful for the ITSMZG specialists, because the purpose of the OIN-DBD model is to identify

weak relationships, as opportunities to make suggestions on reinforcing such identified relationships, for model improvement.

Regarding the Specific Research Question (SRQ1). *What are the variables proposed for the general conceptual model?* It was applied the literature review and proposed the general conceptual model showed in the Scheme 1 and the final questionnaire (see Table 5), based on AHP and Delphi techniques. This allowed us to obtain an academic and expert vision, with a great opportunity to identify and conciliate the importance of the variables among these visions, into the factors of OIN-DBD model, to do improvements on it.

About the Specific Research Question (SRQ2). *What are the relationships of these variables?* the findings with Confirmatory Factor Analysis (CFA), reveal the most important factors interacting with factors loading >0.6 (see Table 6). This study concluded in a proposition of DBD-OIN general conceptual model with the relationship of USR-AXS-NET-REG-C&B-QoS representing the DBD underlying factor affecting the KMG-OBM-IEC representing the OIN underlying factor.

The Specific Research Question (SRQ3). *What are the most relevant variables of the model?* It is showed in the same Table 6 that leadership (LSP) in knowledge management (KMG), is the most important variable in the empirical model. So, it represents to the ITSMZG an indicator very desirable to maintain, but not the only one into the model.

Our hypotheses (H):

H1. Higher level of DBD higher level of KMG in OIN of ITSMZG.
H2. Higher level of DBD higher level of OBM in OIN of ITSMZG.
H3. Higher level of DBD higher level of IEC in OIN of ITSMZG.
H4. Higher level of DBD higher level of OIN of ITSMZG.

Showed in Table 8, each one of them with significant positive effect among the factors confirms our general conceptual model.

Therefore, our suggestions for ITSMZG to reinforce the weakness relationships revealed in this current study (low factor loading levels <=0.6, see Table 6), are showed in the discussion section, such as INC(0.570), RIPR (0.590), STR (0.579), NEW (0.567),RSK (0.500),QoS (0.580).

So, concluding in a practical contribution, we can say that: incentives to the personnel, revenues for intellectual property rights, strategy, new entrepreneurships, risk in the open innovation, they are must be improved, for future studies of the ITSMZG Managers.

For other hand, as a knowledge contribution, we can say that with the use of structural equation modeling we are able to propose a OIN-DBD model, enough to identifying the own underlying relationships to improve such model.

The limitations of this study are that customers, suppliers, etc. of the ITSMZG specialists were not questioned. Therefore, other studies could include them, and even more, from other regions of the country.

For future studies, we recommend the use of variable reduction techniques, such as exploratory factor analysis such as the Varimax main component method, was suggested as a refinement of the model.

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Innovation and Digital Marketing in Guadalajara, Mexico

ABSTRACT. **Purpose**. The Innovation (**INNOV**) process is considered as a driver to increase the competitiveness in the Digital Marketing (**DM**) sector; however, many firms ignore how their own **DM** resources and capabilities affect the **INNOV** process. So, through a **DM-INNOV** proposed conceptual model, the aim of this study is to determine which are the main factors of **INNOV** are affected from **DM,** in Guadalajara, México.

Design/methodology/approach. **The design** is based on **INNOV** process model, construct published previously by Mejía-Trejo et al. (2014) and complemented with the **DM** model construct proposed here, with variables which are tested for validity and reliability through a pilot survey in order to get the final model. The study subjects were the most important customers of Monster Online (a Mexican company, specialized in **DM**) and analysed by inferential statistics determining the Cronbach's Alpha reliability in a pilot test and multiple linear regression (**MLR**) based on **Stepwise Method** using SPSS 20 program. **The methodology** is proposed as a descriptive, exploratory, correlational and a transversal study, based on documentary research to obtain a final questionnaire using the Likert scale applied to the total population: **900** Monster's Online relevant CEO clients. So, we proposed:

1. For **DM**: Web integration (**WBI**); Web Experience (**WBE**); Web Strategy (**WBS**) and Technological Resources (**TRS**)

2. For **INNOV** process by Mejía-Trejo's et al. (2014) conceptual model with: Innovation Value Added (**IVADD**); Innovation Income Items (**IIIT**); Innovation Process (**INPROC**); Innovation Performance (**IPERF**); Innovation Feedback Items (**IFEED**); Innovation Outcome Items or Results of Innovation (**IOIT**).

The approach is based on the importance to relate the **DM** on **INNOV** process to determine their main factors that are affected and generate more innovation in the **DM** sector

Originality/Value. This article is aimed to determine the main factors that drive the **DM** on **INNOV** process to get more, about this, by

mean of original theoretical models as a product of the principal related theories about **DM** and **INNOV** process. The **Value** of the study, is to obtain a first settlement for a generalized model able to be applied in other sectors in Mexico.
Practical implications. The results obtained, will allow us measuring the level of correlation amongst the variables in study, and discover how the main factors of **INNOV** process are influenced for **DM** components.
Keywords: Digital Marketing, Innovation, Innovation in Marketing

1. Introduction

Internet is the cornerstone for the currently marketers. (Chaffey Ellis-Chadwick, 2014; Wierenga, B., 2008) due they have implemented new tools based on **INNOV** process (OCDE,2005) creating several competitive advantages (Porter, 2001). Hence, marketers are forced to figure out new ways about how to detect new needs and how the consumers, find the products and services in real time (Forrester, 2009). This article aims to find the determinants that drive the innovations (**INNOV**) due the digital marketing (**DM**) by mean of a theoretical model, checked empirically to make an assessment of each one of their components. The structure of this study begins with the **INNOV** model construct published previously by Mejía-Trejo et al. (2014) complemented with the **DM** model construct proposed here, with variables which are tested for validity and reliability through a pilot survey in order to get the final model. We selected the 900 most important CEOs customers of Monster Online (a Mexican company, specialized in **DM**) and analysed by inferential statistics to conclude a description of the final results highlighting those indicators that are opportunities for improvement in the **INNOV** by **DM**.

2. Problem, Hypotheses and Rationale of the Study

The problem is proposed in a General Question (**GQ**): which are the components of **INNOV** that drives **DM**? The rationale of the study is due the interest of marketing companies like Monster Online to

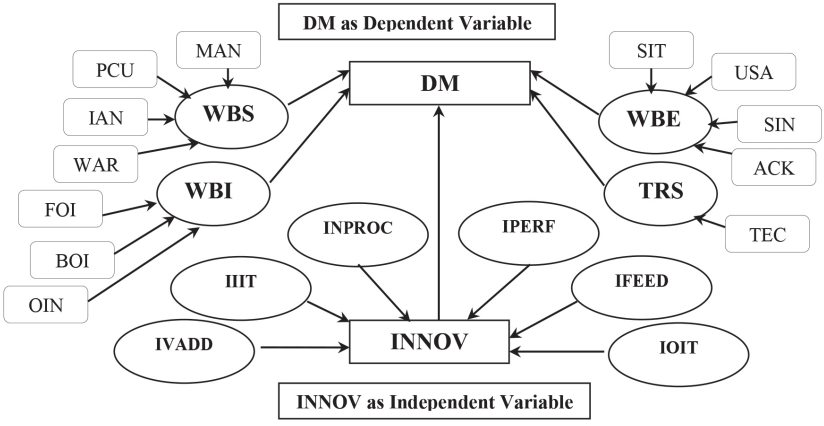
identify the determinants of **INNOV** produced by **DM**. The Specific Questions (**SQ**): **SQ1**.Which are the variables and indicators of the general conceptual model?; **SQ2**.Which are the relationships of these variables?; **SQ3**.Which are the most relevant variables of the model?. Hypothesis (**H**): About the currently importance, by the firms like Monster Online about the **INNOV**, it is presented in **less than 50%** of the variability in its **DM** results..

3. Literature Review

We made it in two parts. First, around the definition of **DM** as a tool that helps to the marketers, to characterize the profile, the behavior and satisfaction of the customers using Internet (Chaffey, Ellis-Chadwick, 2014). This is complemented with the concept of Marketing Innovation (OCDE, 2005) paragraph 171 where is distinguishing features compared to other changes in a Firm's marketing instruments in the implementation of a marketing method not previously used by the firm. It must be part of a new marketing concept or strategy that represents a significant departure from the firm's existing marketing methods. The new marketing method can either be developed by the innovating firm or adopted from other firms or organizations. These methods can be implemented for both new and existing products. In this sense, we recognize the importance of the Technological Resources (**TRS**) defined as technological issues and services to be offered in the administration of e–commerce, with direct impact in the internet growth in the world (Chaffey, Ellis-Chadwick, 2014). The proposed indicators are gathering in Technology (**TEC**) based on concepts such as: Management Programs (Wells et al. 2011; Villamizar et al., 2012); Payment Systems & Security (Busch et al.,2013) and Architecture & Hosting (Iantrmsky, 2012). Web Integration (**WBI**) will be understood as the synergistic process that is necessary to achieve the objectives of the organization. This synergy can be developed between physical and virtual organization (Chaffey, Ellis-Chadwick, 2014). The indicators are: Conventional Strategies & Activities of Marketing (Kotler, 2009; Lamb, et al. 2006; Brondmon, 2002) which are carried by employees of the company to the customer and grouped

in Integration Front Office Front Office Integration. (**FOI**.); Synergy in Operations (Birogul et al. 2011), which are carried by company employees into the company and are grouped in Back Office Integration (**BOI**); Commercial Partners (Min, et al., 2008) and Logistics (Lee,2012) placed in Others in Integration (**OIN**). Web Experience (**WBE**) here the firm's website is the primary source of customer experience and therefore the most important element of communication in DM, as it is the primary source of interaction and transaction with the consumer web (Chaffey, Ellis-Chadwick, 2014). The indicators are: Domain (Cuesta, 2010); Interface (Zhenhai, 2012); Design and Aesthetic (Cuesta, 2010) gathered in Site (**SIT**); easy to use (Constantinides, 2002), identifying the Usability (**USA**); Comments (Zhenhai, 2012) belonging to the Social Influence (**SIN**); and finally, the Number of Visits (Cohan,2000) grouped in Acknowledgment (**ACK**).Web Strategy (**WBS**) has important consequences for the site's identity, position, atmosphere, etc. to differentiate the site and create a website with a unique proposition that appeals to the target market, offer customer value strengthen competitive advantage (Chaffey, Ellis-Chadwick, 2014). The indicators are: the Competitors (Juárez, 2012; Lytras, et al.,.2009; Osterwalder & Pigneur, 2010; Porter, 2001); the Potential Market and the Marketing trends (Fernández,2010; Anwar et al.,2013) belonging to Market Analysis (**MAN**); Behavior (García & Díaz, 2010), Customer Needs (Hendrix, 2014) grouped in Potential Customers (**PCU**); Human Resources, Values, Mission, Visión (Daft, 2007;), grouped in Internal Analysis (**IAN**); Finally, the indicator Web Activity Rol (**WAR**) (Treesinthuros, 2012). As a second part of the model construct, we have the **INNOV** process as a matter of study divided in several stages proposed based on Mejía-Trejo (et al., 2014) as: Innovation Value Added (**IVADD**); Innovation Income Items (**IIIT**); Innovation Process (**INPROC**); Innovation Performance (**IPERF**); Innovation Feedback Items (**IFEED**); Innovation Outcome Items or Results of Innovation (**IOIT**). Hence, according all mentioned above, we proposed the General Conceptual Model. See **Scheme 1.**

Scheme 1
General Conceptual Model



Source: Own by Authors adaptation.

4. Analysis of Results

Table 1
Final Questionnaire

Digital marketing (DM)			
VAR	*IND*	*Question (by the approach: The Firm)*	*Author(s)*
(1)WBS	(1)MAN	1.At the start of a new project, makes a recognition of their potential competitors.	Juárez (2012); Lytraset al.,(2009); Osterwalder & Pigneur, (2010); Porter (2001)
		2.Constantly analyzing their environment, seeking to identify potential competitors, both physical and virtual.	
		3.Knows and uses its competitive advantage.	
		4.Knows competitive advantages of its natural competitors.	
		5. Knows competitive advantages of its competitors on the net.	
		6. At the start of a new project, estimates the number of potential customers.	Fernández (2010); Anwar et al.(2013)
		7.Seeks to be at the forefront of market trends.	
	(2)PCU	8. At the start of a new project. estimates the customer profile.	García & Díaz, (2010);
		9. Knows and satisfies the customer needs according their requirements	Hendrix (2014)
	(3)IAN	10.Makes a thorough analysis before hiring a new element to the team.	Daft (2007);
		11.Takes into account the capabilities and skills of team members to assign a work.	
		12. Knows and apply the values of the organization.	
		13. Has a clear mission and helps carry it out every day.	
		14. Has a clear vision and helps carry it out every day.	

Digital marketing (DM)			
VAR	*IND*	*Question (by the approach: The Firm)*	*Author(s)*
(1)WBS	(4)WAR	15.Takes the role about their product and services as information	Treesinthuros, (2012)
		16. Takes the role about their product and services as about what and how products and services are.	
		17. Takes the role about their product and services as media communication	
		18. Takes the role about their product and services as promotion	
		19. Takes the role about their product and services are a combination of all mentioned above.	
(2)WBI	(5)FOI	20. Seeks synergy in the conventional marketing activities	Kotler (2009); Lamb et al.(2006); Brondmon (2002); Wierenga, B.. (2008).
		21. The employees, whose are responsible for receiving payments, schedule visits and survey in the field, also are in charge of these activities on the web.	
	(6)BOI	22. Activities such as receiving payments, schedule visits and survey in the field, are able to be replicated in an online environment.	Birogul et al., (2011);
		23. The level of service offered in physical environment, is the same that is offered by using a web service.	
	(7)OIN	24. Involves Outsourcing in their activities.	Min et al.(2008)
		25. Provides tools to the Outsourcing to join it in the web activities. (Such as logistics, payment, promotions, etc.).	Lee (2012):
(3)WBE	(8)SIT	26. The website of the company makes: promotion, price, sales catalogs, distribution points, etc.	Cuesta (2010)
		27. The website serves as a platform for communication, interaction and transaction with the web customer.	Zhenhai, (2012); Malik & Huet, (2011)

Digital marketing (DM)			
VAR	*IND*	*Question (by the approach: The Firm)*	*Author(s)*
(3)WBE	(8)SIT	28. The website shows a nice design that invites you to discover all that it contains	Cuesta (2010)
	(9)USA	29. The website is designed with multiple interfaces criteria and is easy to use.	Constantinides, (2002)
	(10)SIN	30. The website is a site easy to make comments or questions.	
		31. The website uses the comments as a possible success predictor, of products or services	
	(11)ACK	32. Uses a strategy on how long the customer will be in the network and what they share in this.	Cohan, P. (2000); Lehman. & Vajpayee, (2011)
(4)TRS	(12)TEC	33.Uses specialized software to do all their core activities	Wells et al., (2011); Villamizar et al.(2012):
		34. Uses specialized platforms to manage different resources (such as Oracle, SAP, Lotus)	
		35. Considers the security of stored data as a priority.	Busch et al.,(2013)
		36. The organizational architecture is considered as a priority	Iantrmsky (2012); Ojala,. & Tyrvainen, (2011):
		37. Technological resources are considered as a priority	

Innovation (INNOV) (please see mejia-trejo's et al.,2014 For references and authors)			
VAR	*IND*	*Question*	*Author*
(5) IVADD	(13)VAEDC	38.The innovation increases the Emotions & Desire of the Customer	Chaudhuri (2006)
	(14) VACR	39.The Cost is the main constraint to increase the value	Bonel (et al., 2003)
		40.The Risk is the main constraint to increase the value	
	(15)VACUS	41.The innovation increases the Customer value	

Innovation (INNOV) (please see mejia-trejo's et al.,2014 For references and authors)			
VAR	*IND*	*Question*	*Author*
(5) IVADD	(16)VASHO	42.The Innovation increases the Shareholder value	Bonel (et al., 2003)
	(17)VAFRM	43.The innovation increases the value of the Firm	
	(18)VASEC	44.The innovation increases the value of the Sector	
	(19)VASOC	45.The innovation increases the value to the Society	
	(20)VAPVR	46.The innovation considers the relation price-value added	Gale & Chapman (1994)
(6)IIIT	(21)EIPH	47.Opportunity Identification	Kausch (et al. 2014)
		48.Opportunity Analysis	
		49.Idea Generation	
		50.Idea Selection	
		51.Concept Definition	
	(22)FFI	52.Use of sophisticated equipment to support innovation	Shipp (et al. 2008); McKinsey (2008)
		53.Invests in R&D+I	
		54. Staff to R& D+I	
	(23)EFFI	55.Makes efforts to use and / or generate Patents	Canibano (1999); Shipp (et al. 2008); Lev (2001); Howells (2000)
		56.Makes efforts to create and / or improve Databases	
		57.Makes efforts to improve the organizational processes	
		58.Makes efforts to use the most of knowledge and skills of staff	
		59. Decisions planning increases its availability to the risk	
		60.Makes efforts to discover New Market Knowledge	Popadiuk & Wei-Choo (2006)
		61.Makes efforts to study the Existing Market Knowledge	

Innovation (INNOV) (please see mejia-trejo's et al.,2014 For references and authors)			
VAR	*IND*	*Question*	*Author*
(7) INPROC	(24)RDI	62.Makes actions to improve existing processes of Research & Development + Innovation	Shipp (et al.,2008); McKinsey (2008); OECD (2005)
		63.Makes studies about Product Lifecycle	Gale & Chapman (1994)
	(25)DSGN	64.Makes actions to improve the existing design	OECD (2005)
		65.Employees have influence on their job	Nicolai (et al., 2011)
		66.Employees engaged in teams with high degree of autonomy	
		67.The strategy is based on Open Innovation concepts	Chesbrough (et. al 2006)
	(26)IPPFI	68.Makes actions to develop prototypes for improvement	Chesbrough (2006); McKinsey (2008)
	(27)IPPPIP	69.Makes improvement actions to pre-production	
	(28)MR	70.Makes to investigate market needs of obsolete products	Chesbrough (et. al. 2006);Rogers (1984)
		71.Makes to investigate the needs actions and / or market changes for innovators	
		72.Makes to investigate needs and / or market changes for early adopters	
		73.Makes to investigate needs and / or market changes for early majority	
		74.Makes to investigate needs and / or market changes for late majority	
		75.Makes to investigate needs and / or market changes for laggards	
		76.Makes to investigate the onset of a new technology	Afuah (1997)
		77.Makes to investigate the term of a technology	
	(29)NOVY	78.Decides actions to improve or introduce new forms of marketing	Lev (2001)

Innovation (INNOV) (please see mejia-trejo's et al.,2014 For references and authors)			
VAR	*IND*	*Question*	*Author*
(7) INPROC	(29)NOVY	79.Seeks to be new or improved in the World (Radical Innovation)	OECD (2005); Afuah (1997)
		80.Seeks to be new or improved to the Firm (Incremental Innovation)	
		81.Seeks to be new or improved in the region (Incremental Innovation)	
		82.Seeks to be new or improved in the industry (Incremental Innovation)	
	(30)TRAI	83.Makes actions to train the staff continuously (Incremental Innovation)	
	(31)TOINN	84.Makes actions to innovate in technology	
		85.Makes actions for innovation in production processes	
		86.Makes actions to improve or introduce new products forms	
		87.Makes actions to improve or introduce new forms of service	
		88.Makes actions to improve or introduce new organizational structures and functions	
		89.Innovation activities tend to be rather radical	
		90.Innovation activities tend to be incremental	
(8) IOIT	(32)NPSD	91.Detects the projected level of revenues generated by innovation	Shipp (et al. 2008);
		92.Detects the projected customer satisfaction level generated by innovation	McKinsey (2008)
		93.Detects the projected sales percentages levels generated by innovation	Lev (2001)
		94.Detects the level of the number of launches of new products/services in a period	McKinsey (2008)
		95.Detects the net present value of its portfolio of products/services in the market generated by the innovation	

Innovation (INNOV) (please see mejia-trejo's et al.,2014 For references and authors)			
VAR	*IND*	*Question*	*Author*
(9) IPERF	(33)PCBOI	96. Use of an indicator like: Innovation income / (Investment in Innovation) ?	Bermúdez-García (2010)
	(34)POIFCI	97.Use of an indicator like: Innovation Identified Opportunities / (Total Contributors on the Process)?	
	(35)PGIR	98.Use of an indicator like: Generated Ideas / (Market Knowledge Opportunities xTotal Contributors on Process)?	
	(36)PEOIG	99.Use of an indicator like: Number of Approved Ideas / (Number of Generated Ideas)?	
	(37)PIEP	100.Use of an indicator like:Number of Correct and Timely Prototype Terminated/(Total Prototyping Approved)?	
	(38)PIGR	101.Use of an indicator like: Number of Generated Innovations / (Identified Innovation Opportunities)?	
	(39)PINSI	102. Use of an indicator like: Number of unsuccessful innovations implemented/ (Total Innovation)?	
	(40)PTHP	103.Does exist any relationship among : university- government- industry, to develop the innovation?	Smith & Leydesdorff, (2010)
(10) IFEED	(41)IFCAP	104.Identify intellectual capital dedicated to innovation for its improvement	Lev(2001); Shipp (et al. 2008); Nicolai (et al., 2011)
	(42)IFPP	105. Identify the stages of new or improved process for upgrading	OECD (2005); Chesbrough (2006)
		106.Identify attributes of new or improved product/service for its improvement	
	(43)IFINN	107.Iidentify the stages of new or improved form of marketing for improvement	
		108.Identify the stages of new or improved technology for improvement	

Innovation (INNOV) (please see mejia-trejo's et al.,2014 For references and authors)			
VAR	*IND*	*Question*	*Author*
(10) IFEED	(43)IFINN	109.Identifies the stages of the new or improved structure and functions of the organization to its improvement	OECD (2005); Chesbrough (2006)
		110.Identifies the type of innovation (radical or incremental) that has given best results	
	(44)IFV	111.Iidentify the new or improved value proposition (benefits costs) for its completion; relation value-price	Bonel (et al.,2003)
	(45)FLINNO	112.The type of leadership that drives innovation is Transactional/ Transformational/Passive	Mejía-Trejo (et al., 2013), Gloet & Samson (2013)
		113.The type of leadership that drives innovation is Transformational	
		114.The type of leadership that drives innovation is Passive	

Notes: VAR. Variable; **IND.**Indicator
Source: Own.

The questionnaire confidence applied to **900 CEO's**, Monster's Online customers by Cronbach's Alfa Test= **0.707** (high reliability, according Hinton, 2004)

-**MLR** by Stepwise method showed **Table 2**:

Table 2
Pearson's Correlation Coefficient

Pearson's Correlation Coefficient		*DM*	*IVADD*	*IIIT*	*INPROC*	*IPERF*	*IFEED*	*IOIT*
	DM	1	**.741****	.300**	**.688****	.290**	.120**	.218**
	IVADD	.741**	1	.322**	-300**	.190**	.200**	.170**
	IIIT	.300**	.322**	1	.280**	.170**	.150**	.157**
	INPROC	**.688****	.300**	.280**	1	.156**	.180**	.160**
	IPERF	.290**	.190**	.170**	.156**	1	.150**	.130**
	IFEED	.120**	.200**	.150**	.180**	.150**	1	.110**
	IOIT	.218**	.170**	.157**	.160**	.130**	.110**	1

** Sig. Correlation in 0.01
Source: SPSS 20 as a research result.

5. Discussion and Conclusions

As a general rule, predictor variables can be correlated which each other as much as **0.8** before there is a cause of concern about multicollinearity (Hinton et al., 2004; Hair et al. 2014).

-Table 3 shows the set of variables entered/ removed by **Stepwise Method**.

Table 3
Variables Entered/Removed

Model	*Variables Entered*	*Variables Removed*	*Method*
1	IVADD		Stepwise (Criteria: Probability of F to enter <=.050, Probability of F to remove >=.100).
2	INPROC		

Dependent Variable: Digital Marketing (**DM**)
Source: SPSS 20 as a research result.

Notice that SPSS 20 has entered into the regression equation the **2 variables**: **IVADD**. **INPROC** that are significantly correlated with **DM.**

Table 4 shows the Model Summary where we can see **Model 1** and **Model 2**.

Table 4
Model Summary

Model	*R*	*R Square*	*Adjusted R Square*	*Std. Error of the Estimate*
1	.741a	.550	.490	5.234
2	.925b	.855	.350	3.221

a. Predictors: (Constant), **IVADD**
b. Predictors: (Constant), **IVADD, INPROC**
Source: SPSS 20 as a research result.

The R Square Value (**.550**) in the Model Summary shows the amount of variance in the dependent variable that can be explained by the independent variables. In this case:

Model 1. The independent variable **IVADD**, accounts **55%**, of the variance in the scores of the Digital Marketing (**DM**)

Model 2. The independent variables **IVADD**, **INPROC** together account **85.5%**, of the variance in the scores of the Digital Marketing (**DM**).

The R Value (**.741**) in **Model 1**, is the multiple correlation coefficient between the predictor variables and the dependent variable. As **IVADD** is the only independent variable in this model, we can see that the R value is the same vale as the Pearson's Correlation Coefficient in our pairwise correlation matrix.

In **Model 2**, the independent variables **IVADD, INPROC** are entered, generating a multiple correlation coefficient, **R=.925**

The adjusted R Square adjusts for a bias in R Square. With only a few predictor variables, the adjusted R should be similar to the R square value. We would usually take the R square value but we advise to take the adjusted R square value, when we have a lot of variables. The **Std. Error of the Estimate** is a measure of the variability of the multiple correlation.

Table 5 shows the results of Analysis of Variance (**ANOVA**).

Table 5
ANOVA (a)

Model	*Sum of Squares*	*DF*	*Mean Square*	*Test Statistic F Value*	*Sig. (p value)*
1 Regression	746.180	1	**746.18**	**37.900**	.010(b)
Residual	610.467	31	19.69		
Total	**1356.647**	32			
2 Regression	1149.018	2	574.509	**63.665**	.002(c)
Residual	270.737	30	9.024		
Total	1419.755	32			

a. Predictors: (Constant), **IVADD**
b. Predictors: (Constant), **IVADD, INPROC**
c. Dependent Variable: **DM**
Source: SPSS 20 as a result of the research.

The **ANOVA** tests the significance of each regression model to see if the regression predicted by the independent variables explains a significant amount of the variance in the dependent variable. As with any **ANOVA** the essential items of information needed are the **df**, the **F value (Regression/Residual)** and the **probability value**. Both the regression models explain a significant amount of the variation in the dependent variable.

Model 1= F(1,31)=**37.9**; **p<0.05** and
Model 2: F(2, 30)=**63.655**; **p<0.01**

Dividing the **Sums of Squares** by the degrees of freedom (**df**) gives us the **Mean Square or variance**. We can see **that the Regression explains significantly more variance than the error or Residua**l. We calculate R2 by dividing the Regression Sum of Squares by the Total Sum of Squares. The values for **model 1** have been used as an example.

746.18/1356.647= 0.550=R square (please, see Table 4).

Due to the Stepwise Method we had the **Table 6** that shows the calculus of Coefficients.

Table 6
Coefficients by Stepwise Method (A)

		Unstandardized Coefficients		*Standardized Coefficients*	*t.*	*Sig.*
Model		*B*	*Std. Error*	*Beta*		
1	(Constant)	**2.375**	15.209		.487	.904
	IVADD	**.679**	.351	.704	3.662	.010
2	(Constant)	**-3.658**	11.212		7.344	.830
	IVADD	**.677**	.267	.522	5.627	.010
	INPROC	**.522**	.162	.518	3.568	.012

a. Dependent Variable: **DM**
Source: SPSS 20 as a research result.

The Unstandardized Coefficients B column gives us the coefficients of the independent variables in the regression equation for each model.

Model 1: **DM = 2.375 +.679 IVADD;**
Model 2: **DM= -3.658+.677 IVADD+.522 INPROC**

The **Standardized Beta Coefficient** column informs us of the contribution that an individual variable makes to the model. The beta weight is the average amount the dependent variable increases when the independent variable increases by one standard deviation (all other independent variables are held constant). As these are standardized we can compare them. **t tests** are performed to test the two-tailed hypothesis that the beta value is significantly higher or lower than zero. This also enables us to see which predictors are significant. By observing the **Sig.** values in our example we can see that for **Model 1** the **IVADD** scores are significant ($p < 0.05$). However, with **Model 2** both **IVADD** scores ($p < 0.05$) and **INPROC** ($p < 0.05$) are found to be significant predictors (shaded values in the coefficients table). We advise on this occasion that you use **Model 2** because it accounts for more of the variance**. The Unstandardized Coefficients Std. Error** column provides an estimate of the variability of the coefficient.

When variables are excluded from the model their **beta values, t values** and **significance values** are shown in the **Excluded Variables** on **Table 7**.

Table 7
Excluded Variables (a)

Model	*Beta In*	*t.*	*Sig.*	*Partial Correlation*	*Collineartity Statistics*
					Tolerance
1 **IIIT**	.568 (b)	3.568	**.012**	.846	.938
IPERF	.344 (b)	1.445	.222	.638	.906
IFEED	-.344(b)	-1.474	.336	-.434	.895
IOIT	-.232(b)	-.937	.420	-.332	.800

Model	Beta In	t.	Sig.	Partial Correlation	Collineartity Statistics
					Tolerance
2 IPERF	.256 (c)	.909	.458	.335	.848
IFEED	-.248 (c)	-1.689	.292	-.549	.892
IOIT	-.024 (c)	-.056	.900	-.080	.865

(a) Dependent Variable: DM
(b) Predictors in the Model: (Constant) IVADD
(c) Predictors in the Model. (Constant) IVADD,INPROC
Source: SPSS 20 as a result of the research.

The **Beta In** value gives an estimate of the beta weight if it was included in the model at this time. The results of **t tests** for each independent variable are detailed with their probability values. From **Model 1** we can see that the **t value** for IIIT is significant (**p < 0.05**). However as we have used the Stepwise method **this variable has been excluded** from the model. As IIIT has been included in **Model 2** it has been removed from this table. As the variable IVADD scores is present in both models it is not mentioned in the **Excluded Variables** table. The **Partial Correlation** value indicates the contribution that the excluded predictor would make if we decided to include it in our model. **Collinearity Statistics Tolerance** values check for any collinearity in our data. As a general rule of thumb, **a tolerance value below 0.1 indicates a serious problem.**

Hence, in solving the Hypothesis and the questions proposed in this research, we obtained:

GQ: which are the components of Innovation (INNOV) that drives digital marketing (DM)? is solved by mean the results of the Theoretical Framework showing the **Scheme 1. General Conceptual Model** for DM: 4 Variables/ 24 Indicators /37 questions; for INNOV process, we used the Mejía-Trejo et al. (2014) with: 6 Variables/ 33 Indicators/ 77 questions.

About the Specific Questions, we obtained:

SQ1.Which are the variables, and indicators of the general conceptual model? We obtained **Table 1.Final Questionnaire** relating the DM and INNOV descriptors, mentioned above included the authors per item.

SQ2.Which are the relationships of these variables? We obtained **Table 2. Pearson's Correlation Coefficient** among the DM, and

the **INNOV** model (Mejía-Trejo et al., 2014) components: **IVADD, IIIE, INPROC, IPERF, IFEED, IOIT.** So, we obtained as a predictive equations of **DM**, as **Model 1: DM = 2.375 +.679 IVADD** and **Model 2: DM= -3.658+.677 IVADD+.522 INPROC** (**see Table 6**).

SQ3.Which are the most relevant variables of the model? We obtained: **IVADD** and **INPROC** (**see Tables: 3, 4, 5**); opposite of these were: **IIIT, IPERF, IFEED, IOIT** (**see Table 7**)

Hypothesis (**H**): About the currently importance, by the firms like Monster Online about the **INNOV**, it is presented **in less than 50%** of the variability in its **DM** results.. **Table 4**, **H** is **rejected** because **INNOV** (**85.5%>50%**) of our model detects the variability on the dependent variable **DM.**

Finally, we conclude for the Monster's Online 900 principal CEOs customers, perceived that the Firm efforts are aimed to develop **INNOV** based on : Innovation Value Added (**IVADD,** Chaudhuri, 2006; Bonel et al.,2003; Gale & Chapman, 1994) and Innovation Process (**INPROC**, Shipp et al., 2008; McKinsey, 2008; OECD, 2005; Gale & Chapman, 1994; OECD, 2005; Nicolai, et al., 2011; Chesbrough et. al 2006; Rogers, 1984; Afuah, 1997; Lev 2001) to Digital Marketing (**DM**), than the other **INNOV** factors.

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The relationship between Competitiveness and Digital Marketing Innovation, for a Digital Campaign Design. First insights based on a Panel Study in Mexico

ABSTRACT. The purpose, is aimed to proposed a construct relating the national competitiveness model (NCM) with our proposition of digital marketing innovation model (DMIM), for a digital campaign design. The methodology is based on a literature review using Delphi Panel with Analytic Hierarchy Process (AHP) among 200 (100 professors and 100 CEO) digital marketing specialists located at Guadalajara, Mexico. The results pointed out to a final questionnaire supporting a construct with 8 main variables of the NCM and 10 main variables involved into the DMIM for a Digital Campaign Design.
Keywords: Digital Marketing Innovation, Model; Competitiveness, Digital Campaign Design.

Introduction

According OECD (2005) innovation is: *"the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations".* Innovation aims at improving a firm's performance by gaining a competitive advantage. Regarding the marketing innovation: *"is the implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing".* As you see, the digital marketing is at itself, an innovation and a potential driver to improve the current place of Mexico's competitiveness

(51/138 countries, WEF 2017). In this sense, the web portal Millones de Voces (2017), reports a sector with more than 200 small and media enterprises (SMEs) firms located at Guadalajara, Mexico, and several recognized institutes that are teaching and training about digital marketing issues. This sector is very interested to obtain a propose of the DMIM capable to improve their competitiveness level based on the NCM. To achieve the proposal model, this work is divided into the explanation of: 1) Problem, hypotheses and rationale of the study; 2) Literature review 3) Methodology based on two visions: the academic and experts about digital marketing innovation and competitiveness to obtain a final DMIM to be related with NCM, and the design of the final questionnaire; 4) Results; 5) Conclusions; 6) Limitations and Future Studies.

Problem, Hypotheses and Rationale of the Study

So, our problem is described in a research question: ¿Which are the main variables of the DMIM capable to improve their competitiveness level based on the NCM.? To solve this, is necessary to propose a construct based on those two factors. Hence, regarding the DMIM we proposed the following specific questions: SQ1: are there differences between the academic vision vs. the experts vision?; SQ2: Which is the scheme of the model?; SQ3: Which are the variables involved in a final questionnaire?.

Literature review

The National Competitiveness Model (NCM)

Competitiveness is the ability and performance of a company, subsector or country to sell and supply goods and services in a given market, in relation to the ability and performance of other firms, sub-sectors or countries in the same market (IMCO, 2016; Kotler & Lane, 2006). As a part of the Quality National Prize (Premio Nacional de Calidad) Mexico has designed its own National Competitive-

ness Model (PNC, 2017) adopted here in this study, with the following variables showed in **Table 1**:

Table 1
National competitiveness model (NCM)

Item	*Variable*	*Description*
1	Leadership Transformer (**LDT**)	Leaders reflect on their behaviours and commitment to achieve the mission of organization, change and innovation; they communicate with their staff, motivate them in their development and overall well-being; they are aware of and they respond to their own growth opportunities.
2	Customer Value Generation (**CVG**)	The organization knows its clients intimately, knows what creates its value and responds with innovative proposals that ensure a memorable experience, follow the evolution of their needs and establish the basis for a constant alignment with them
3	Strategic Planning (**STP**)	The organization ensures the fulfilment of its vision and mission; analysing their environment, understanding their challenges, setting priorities, defining strategic objectives, aligning their resources and capabilities to ensure their execution, monitoring and evaluating expected results.
4	Guidance to change, innovation and continuous development (**CICD**)	The values of the organization lay the foundation for developing a culture focused on change, innovation and continuous improvement that is reflected in the way staff organize and engage to generate new ideas to respond to the challenges they face.
5	Social Commitment (**SCO**)	The organization assumes responsibility for the social and environmental environment in which it operates. This commitment is reflected in its initiatives to reduce its environmental footprint, promote the integral well-being of its personnel and respond to the social needs of its community.
6	Wellness and Inclusion (**W&I**)	The organization ensures the integration of all its staff through the creation of a shared identity and responding to their physical and emotional needs in the workplace as well as in the communities where they live.

Item	*Variable*	*Description*
7	Knowledge (**KNW**)	The organization collects, organizes, shares and analyses knowledge through the use of its resources and the skills of its staff, thereby generating the intellectual capital of the organization it capitalizes for the improvement and innovation of its products, services and processes.
8	Agility (**AGY**)	The organization responds quickly, adaptively and flexibly to the changes that occur in its internal and external environment.

Source: PNC (2017)

Digital Marketing Innovation

The competitiveness recognizes the potential of the innovation which is defined as a: "*implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations and it involves the innovation of: product, service, marketing, process and organization"* (OECD, 2015). In this sense, digital marketing is at itself, an innovation; thus, the importance to get the DMIM, from which we have concluded a definition in this research: *"as a process to design the strategy and tactics in a planned implementation, selecting a set of digital marketing tools. These should be based on mission-vision, the market segmentation, goal settings and value proposition of the firm, with the performance monitoring and the profitability of the digital campaign design, in a permanent way"* (Mejía-Trejo, 2017, Mejía-Trejo et al. 2016; Kannan. & Hongshuang,,2017; SmartInsights, 2017; Scuotto, Del Giudice & Carayannis, 2016; Egol, Peterson, & Stefan S.,2014; Kharchuk, Kendzor & Petryshyn, 2014). To determine the variables involved in the DMIM, we analysed 15 papers about this regard, concluding the **Table 2.**

Table 2
Searching the DMIM

No.	*Year*	*Authors (Year)*	*Definition of Digital Marketing*	*Main Digital Marketing Variables approaching*
1	2017	Mejía-Trejo	"…as a process to design the strategy and tactics in a planned implementation, selecting a set of digital marketing tools. These should be based on mission and value proposition of the firm, with the performance monitoring and the profitability of the digital campaign design, in a permanent way..."	Planning (PLN) Market (MKT) Strategy (STG) Goal Settings (GST) Tactics (TAC) Mission & Vision (MVS) Digital Marketing Tools (DMT) Value Proposition (VAL) Performance (PER) Profitability (PRO)
2	2016	Mejía-Trejo et al.	*"…is a function of Web Strategy, Web Technology, Web Integration and Web Experience"*	Web Strategy = Strategy (STG) Web Technology= Digital Marketing Tools (DMT) Web Integration (WBI) Web Experience (WBE)
3	2017	Kanang & Hongs-huang	"…an adaptive, technology-enabled process by which firms collaborate with customers and partners to jointly create, communicate, deliver, and sustain value for all stakeholders"	Market (MKT) Strategy (STG) Value (VAL) Digital Marketing Tools (DMT) Profitability (PRO)

No.	*Year*	*Authors (Year)*	*Definition of Digital Marketing*	*Main Digital Marketing Variables approaching*
4	2017	Smart Insights	"…is a function of Planning, Reach, Act, Convert and Engage"	Mission & Vision(MVS) Planning (PLN) Value Proposition (VAL) Goal Settings (GST) Market (MKT) Reach or awareness as a Tactics (TAC) Act or leads &sales as a Tactics (TAC) Engagement or retention customer for repetitive visits as a Tactics (TAC)
5	2016	Scuotto et al.	"…is a social networking sites as marketing tools …or on how these channels increase marketing communication effectiveness …"	Performance (PER)
6	2014	Egol et al.	"…can offer detailed data on and analysis of consumer behavior, as well as precise results about a marketing program's effectiveness, with a degree of detail and precision that previous generations of CMOs could hardly fathom."	Digital Branders as a Strategy (STG) Customer Experience Designers as a Strategy (STG) Demand Generators as a Strategy (STG) Product Innovators as a Strategy (STG)

No.	*Year*	*Authors (Year)*	*Definition of Digital Marketing*	*Main Digital Marketing Variables approaching*
7	2014	Kharchuk et al.	*"…has the marketing strategy… to conduct market analyze, segment the market, develop marketing approach, right product portfolio and finally marketing plan… Digital marketing begins from E-communication marketing strategies and ends with the usage of digital strategies orientated on customer online buying services, such as mobile marketing or smart finance.".*	Market (MKT) Strategy (STG) Value Proposition (VAL) Environmental Conditions (ENV) Organizational Innovation (OGI) Organizational Performance (OPR)
8	2014	Stokes	"…drives the creation of demand using the power of the Internet, and satisfies this demand in new and innovative ways. The Internet is an interactive medium. It allows for the exchange of currency, but more than that, it allows for the exchange of value"	Value Proposition (VAL) Strategy (STG)
9	2015	Marketo	"…is the endorsement of goods, services, and company brands through online media channels."	Digital Marketing Tools (DMT)
10	2015	Boelsen-Robinson et al.	"is the process of using new media to engage in promotional activities, and includes strategies such as the use of advergames, child-designated areas on websites and viral marketing"	Branding. Products, Selling Points as a Strategy (STG) Connectivity as a Digital Marketing Tools (DMT) Message as a Value Proposition (VAL)

No.	*Year*	*Authors (Year)*	*Definition of Digital Marketing*	*Main Digital Marketing Variables approaching*
11	2017	Brindle	"..the traditional split between offline and online marketing no longer stands, and they are no longer classed as separate, segmented activities, but must be integrated in order to deliver the optimum experience to the end user"	Market (MKT) Digital Marketing Tools (DMT)
12	2017	Martin	*"..the definition has rapidly expanded beyond websites and email to social, immersive experiences, and mobile. Now, digital marketing can be anything from an online banner ad to a sponsored Instagram post to long-form content marketing to augmented reality."*	Conversion as a Strategy (STG) Digital Marketing Tools (DMT) Performance (PER) Profitability (PRO)
13	2015	Hase Solutions	"is a function of mission, vision, goal settings, performance, tools, ROI, and strategy"	Mission & Vision (MVS) Goal Settings (GST) Performance (PER) Digital Marketing Tools (DMT) Profitability (PRO) Strategy (STG)
14	2013	WSI	"..is a huge step forward for the marketing industry, many business owners are in such a rush to get online that they fail to develop a proper strategy for the move into the digital space"	Digital Marketing Tools (DMT) Tactics (TAC) Strategy (STG) Performance (PER)
15	2012	Smith	" is a tool can help small firms to compete on more equal terms with larger rivals on marketing"	Strategies (STG)

Source: own.

Methodology

We made a matrix to show the DMIM variables according **Table 2**, and representing the academic vision approaching**. See Table 3.**

Table 3
DMIM variables as an academic vision approaching

DMIM Variables	*Number of Author (according Table 2)*															
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*Total*
PLN	X			X												2
MKT	X		X	X			X				X					5
GST	X			X									X			3
STG	X	X	X			X	X	X		X		X	X	X	X	11
TAC	X			X										X		3
MVS	X			X									X			3
VAL	X		X	X			X	X		X						6
PER	X				X							X	X	X		5
PRO	X		X									X	X			4
DMT	X	X	X						X	X	X	X	X	X		9
WBI		X														1
WBE		X														1
ENV							X									1
OGI							X									1
OPR							X									1
Total																56

Note: Planning (PLN); Market (MKT); Goal settings (GST); Strategy (STG);Tactics (TAC); Mission-Vision (MVS); Value Proposition (VAL); Performance (PER); Profitability (PRO); Digital Marketing Tools (DMT); Web Integration (WBI); Web Experience (WBE); Environmental Conditions (ENV); Organizational Innovation (OGI); Organizational Performance (OPR);
Source: own.

After this, we proceeded to apply the qualitative part of this research applying focus group with Delphi Panel and Analytic Hierarchy Process (AHP, Saaty, 1997) to the 200 specialists (100 professors and 100 CEO) in digital marketing as designers of digital campaigns, focusing the attention and experience of each one of them, in the

association of variables and the order suggested to be implemented to the DMIM. The results are showed in **Table 4**.

Table 4
Focus group by delphi panel and AHP to determine the main variables of DMIM

Objective	*Digital marketing innovation model*						
	ID	*Variable as academic vision (from Table 3)*	*Variable as academic vision (100 professors)*		*Variable as expert vision (100 CEOs)*		*%Difference (Academic Vision-Experts vision)*
			Frequency (from Table 3)	*AHP weighing (%) importance*	*Order suggested to be implemented*	*AHP weighing (%) importance*	
Alternatives	1	PLN	2	3.6	8	9.9	-6.3
	2	MKT	5	8.9	3	9.8	-0.9
	3	GST	3	5.4	4	9.9	-4.5
	4	STG	11	19.6	5	9.7	9.9
	5	TAC	3	5.4	6	5.8	-0.4
	6	MVS	3	5.4	1	4.7	0.7
	7	VAL	6	10.7	2	4.8	5.9
	8	PER	5	8.9	9	8.9	0.0
	9	PRO	4	7.1	10	6.8	0.3
	10	DMT	9	16.1	7	4.9	11.2
	11	WBI	1	1.8	-	4.8	-3.0
	12	WBE	1	1.8	-	5	-3.2
	13	ENV	1	1.8	-	5	-3.2
	14	OGI	1	1.8	-	5	-3.2
	15	OPR	1	1.8	-	5	-3.2
Total			56	100		100	

Source: own.

We excluded for this research, the variables as academic vision with AHP weighing (%) importance less than 2 for practical reasons. Therefore, we proceeded to explain each of these variables to deter-

mine our general conceptual model of DMIM in the order suggested to be implemented, as follows. See **Table 5.**

Table 5
DMIM variables involved

Order	*DMIM Variables*	*Indicator*	*Main question*	*Authors*
1	Mission-Vision **(MVS)**	Mission. It is a written declaration of an organization's core purpose and focus that normally remains unchanged over time. It is the cause of the firm's campaign, day-to-day operational objectives Vision. It is the effect of the firm's campaign. It express' the high-level goals for the future	Which is the mission and vision involved in the digital campaign?	Mejía-Trejo,2017; SmartInsights, 2017; Hase Solutions, 2015
2	Value Proposition **(VAL)**	It is the reason why customers turn to one company over another solving their problems or satisfying their needs. It consists of a selected bundle of products and/or services that caters to the requirements of a specific Customer Segment. In this sense, is an aggregation, or bundle, of benefits that a company others customers.	What is the value proposition inserted in the digital campaign?	Mejía-Trejo, 2017; Kanang & Hongshuang, 2017; SmartInsights, 2017; Kharchuk et al.,2014; Stokes, 2014; Boelsen-Robinson et al., 2014
3	Market **(MKT)**	It is all about of the market segmentation as target. It comprises the heart of any business model. Without (profitable) market, no company can survive for long. In order to better satisfy the market, a company may group them into distinct segments with common needs, common behaviors, or other attributes.	Which is the main market to be attended for the digital campaign?	Mejía-Trejo 2017; Smart Insights, 2017; Kanang & Hongshuang, 2017; Kharchuk et al. 2014; Brindle 2017.

Order	*DMIM Variables*	*Indicator*	*Main question*	*Authors*
4	Goal Settings (**GST**)	All digital marketing campaign requires objectives to be reached, for instance: -The branding positioning;-The number (real & potential) of customers database; -The sales; -The product & services (current and new ones) information	Which goals should we use for the digital campaign?	Mejía-Trejo,2017; SmartInsights, 2017; Hase Solutions 2015
5	Strategy (**STG**)	This stage represents the how to do, to achieve the GST, just like: --Awareness. Acquisition strategy to build awareness off-site and in offline media to drive to web presences -Engagement & Loyalty. Capture and retention as a growth strategy to build customer and fan relationships to encourage repeat visits and sales. -Desire & Experience. Strategy based on the sample and testing of a service or a product, with a novelty presentation to increase the sensations and emotions, in order to be acquired. -Effectiveness on Call to Action. Conversion strategy to achieve marketing goals of leads & sales on web presences and offline.	How to do, to achieve the goal settings for the digital campaign?	Mejía-Trejo, 2017 y 2016; Kanang & Hongshuang, 2017; Egol et al., 2014; Kharchuk et al.,2014; Stokes, 2014; Boelsen-Robinson et al., 2014; Martin, 2017; Hase Solutions, 2015; WSI,2013; Smith,2012

<table>
<tr><th>Order</th><th>DMIM Variables</th><th>Indicator</th><th>Main question</th><th>Authors</th></tr>
<tr><td>6</td><td>Tactics (TAC)</td><td>This represents all the activities to be implemented to follow the strategies, involving mainly, the use of the digital marketing tools (DMT), for instance:
<table>
<tr><td></td><td colspan="4">Strategy</td></tr>
<tr><td></td><td>Awareness</td><td>Engagement & Loyalty</td><td>Desire & Experience</td><td>Effectiveness on Call to Action</td></tr>
<tr><td rowspan="8">DMT</td><td>SEO/SEM</td><td>Content Marketing</td><td>Augmented Reality</td><td>Home & Site-Wide Page</td></tr>
<tr><td>Affiliate & Partner Marketing</td><td>Newsletters & eMail Marketing</td><td>Virtual Reality</td><td>Landing page design</td></tr>
<tr><td>On line Advertising</td><td>e-Contact Strategy</td><td>Wearable Marketing</td><td>Search and Browse Page</td></tr>
<tr><td>On line PR</td><td>Customer Service & Support</td><td></td><td>Basket and Checkout</td></tr>
<tr><td>Social Media</td><td>Mobile Marketing</td><td></td><td>Social Commerce</td></tr>
<tr><td></td><td>Social CRM</td><td></td><td></td></tr>
<tr><td></td><td>Blogging</td><td></td><td></td></tr>
</table></td><td>What activities must to implement the DMT we need to do for the digital campaign?</td><td>Mejía-trejo,2017; Smartinsights, 2017; wsi,2013</td></tr>
<tr><td>7</td><td>Digital Marketing Tools (DMT)</td><td>It involves all the digital marketing tools, like: Search Engine Optimization (SEO); Search Engine Marketing (SEM); Affiliate and Partner Marketing; Online advertising; Online Public Relations; Social Media Marketing; Home & Site-Wide Page Effectiveness; Landing Page Design Effectiveness; Search and Browse Page Efficiencies; Category and Product Page Efficiencies; Basket and Checkout Efficiency; Social Commerce; Content Marketing; Newsletters; eMail marketing; e-Contact Strategy; Customer and Service Support; Mobile Marketing; Augmented Reality; Virtual Reality; Wearable Marketing; Social CRM, etc.</td><td>What kind of digital marketing tools are we ready to use in the digital campaign?</td><td>Mejía-Trejo, 2017 y 2016; Kanang & Hongshuang, 2017; Marketo, 2015; Boelsen-Robinson et al.,2015; Brindle, 2017; Martin, 2017; Hase Solutions, 2015; WSI, 2013</td></tr>
</table>

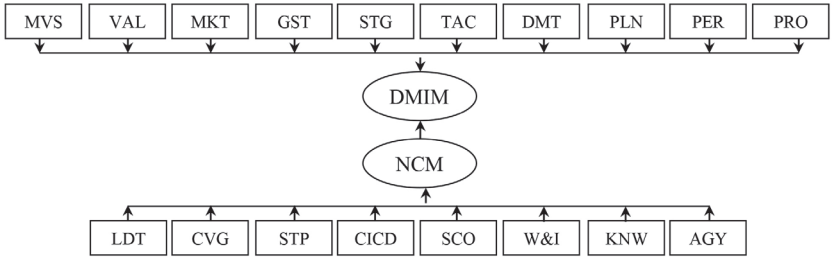
Order	*DMIM Variables*	*Indicator*	*Main question*	*Authors*
8	Planning **(PLN)**	This is the step where all the tools and techniques of the tactics is programmed logistically, to be implemented in the practice. This is your overall strategy for digital marketing. Defining a strategy to integrate communications across different customer touch points is often forgotten. Planning involves setting goals, creating a coherent strategy to achieve them and putting in place evaluation tools in place to make sure you're on track	What about the schedule and times to implement the digital marketing tools, for obtaining results in the digital campaign?	Mejía-Trejo,2017; SmartInsights, 2017
9	Performance **(PER)**	It implies to know how well the digital campaign is working on. Practically, it involves the measurement and assessment of all the previous stages, Its support is the web analytics to obtain a full control of the digital campaign	Which is the performance of the digital campaign?	Mejía-Trejo, 2017; Scuotto et al. 2016; Martin, 2017; Hase Solutions, 2015; WSI, 2013
10	Profitability **(PRO)**	It is expressed in terms of return on investment (ROI) about how the digital campaign is working on, at short, medium or long terms.	What is the return of investment for the digital campaign?	Mejía-Trejo, 2017; Kanang & Hongshuang, 2017; Martin, 2017; Hase Solutions, 2015

Source: own.

Results

The final DMMI-NCM *ex ante***,** is showed in **Figure 1.**

Figure 1
General conceptual of DMIM related with COM



Source: own.

And the final questionnaire proposed is shown in **Table 6.**

Table 6
Final questionnaire proposed

	National competitiveness model (NCM) factor		
Item	*Variable*	*Indicator (likert scale: 5)*	*Author*
1	Leadership Transformer (LDT)	Your firm is engaged to achieve its mission and vision, the change and innovation, with permanent communication with its staff, showing a real concern for its well-being. The firm is aware and responds to their own growth opportunities	PNC (2017)
2	Customer Value Generation (CVG)	Your firm knows its clients intimately, knows what creates its value and responds with innovative proposals that ensure a memorable experience, follow the evolution of their needs and establish the basis for a constant alignment with them for competitiveness.	

	National competitiveness model (NCM) factor		
Item	*Variable*	*Indicator (likert scale: 5)*	*Author*
3	Strategic Planning (STP)	Your firm ensures the fulfillment of its mission and vision, analyzing the environment, understanding the challenges, setting priorities, defining strategic objectives, aligning their resources and capabilities to ensure their execution, monitoring and evaluating expected results for competitiveness.	PNC (2017)
4	Guidance to change, innovation and continuous development (CICD)	Your firm considers the values of the organization, lay the foundation for developing a culture focused on change, innovation and continuous improvement that is reflected in the way that the staff is organized and engaged to generate new ideas and respond to the challenges they face for competitiveness.	
5	Social Commitment (SCO)	Your firm assumes responsibility for the social and the environmental issues in which it operates. This commitment is reflected in its initiatives to reduce its environmental footprint, promote the integral well-being of its personnel and respond to the social needs of its community for competitiveness.	
6	Wellness and Inclusion (W&I)	Your firm ensures the integration of all its staff through the creation of a shared identity and responding to their physical and emotional needs in the workplace as well as in the communities where they live for competitiveness.	
7	Knowledge (KNW)	Your firm collects, organizes, shares and analyses knowledge through the use of its resources and the skills of its staff, thereby generating the intellectual capital of the organization, capitalizing the improvement and innovation of its products, services and processes for competitiveness.	

	National competitiveness model (NCM) factor		
Item	*Variable*	*Indicator (likert scale: 5)*	*Author*
8	Agility (AGY)	Your firm responds quickly, adaptively and flexibly to the changes that occur in its internal and external environment for competitiveness.	PNC (2017)
9	Mission-Vision (MVS)	Your firm considers the mission and vision involved in the digital campaign for competitiveness. Your firm considers the trademark, as an strategic asset to be used in the digital campaign design for competitiveness	Mejía-Trejo,2017; Smart Insights, 2017; Hase Solutions, 2015
10	Value Proposition (VAL)	Your firm identifies and applies the value proposition in the digital campaign design for competitiveness	Mejía-Trejo, 2017; Kanang & Hongshuang, 2017; SmartInsights, 2017; Kharchuk et al.,2014; Stokes, 2014; Boelsen-Robinson et al., 2014
11	Market (MKT)	Your firm has an specific market segmentation as a target to be attended for the digital campaign for competitiveness.	Mejía-Trejo 2017; SmartInsights, 2017; Kanang & Hongshuang, 2017; Kharchuk et al. 2014; Brindle 2017.
12	Goal Settings (GST)	Your firm determines in the digital campaign design for competitiveness, as a goal to reach, to increase: -The branding positioning -The number (real & potential) of customers database -The sales -The product & services (current and new ones) information	Mejía-Trejo,2017; Smart Insights, 2017; Hase Solutions 2015

	National competitiveness model (NCM) factor		
Item	*Variable*	*Indicator (likert scale: 5)*	*Author*
13	Strategy (STG)	You firm determines in the digital campaign design for competitiveness, as strategies to apply: -Awareness -Engagement & Loyalty -Desire & Experience -Effectiveness on Call to Action	Mejía-Trejo, 2017 y 2016; Kanang & Hongshuang, 2017; Egol et al., 2014; Kharchuk et al.,2014; Stokes, 2014; Boelsen-Robinson et al., 2014; Martin, 2017; Hase Solutions, 2015; WSI,2013; Smith,2012
14	Tactics (TAC)	Your firm considers the use of Digital Marketing Tools for each strategy in the digital campaign for competitiveness, such as: -Awareness (SEO/SEM; Affiliate & Partner Marketing; On line Advertising; On line PR; Social Media) -Engagement & Loyalty (Content Marketing; Newsletters & eMail Marketing; e-Contact Strategy; Customer service & support; Mobile Marketing; Social CRM; Blogging) -Desire & Experience (Augmented Reality; Virtual Reality, Wearable Marketing) -Effectiveness on Call to Action (Home & Site-Wide Page; Landing page design; Search and Browse Page; Basket and Checkout; Social Commerce)	Mejía-trejo,2017; Smart Insights, 2017; wsi,2013

	National competitiveness model (NCM) factor		
Item	*Variable*	*Indicator (likert scale: 5)*	*Author*
15	Digital Marketing Tools (DMT)	Your firm is in constant surveillance to determine what kind of digital marketing tools are ready to use in the digital campaign design for competitiveness	Mejía-Trejo, 2017 y 2016; Kanang & Hongshuang, 2017; Marketo, 2015; Boelsen-Robinson et al.,2015; Brindle, 2017; Martin, 2017; Hase Solutions, 2015; WSI, 2013
16	Planning (PLN)	Your firm design a strong program, with schedule and times to implement the digital marketing tools, in order to obtain results in the digital campaign design for competitiveness	Mejía-Trejo,2017; SmartInsights, 2017
17	Performance (PER)	Your firm determines the KPIs for performance monitoring to determine on real time, the current performance of the digital campaign for competitiveness. Use of the Web Analytics.	Mejía-Trejo, 2017; Scuotto et al. 2016; Martin, 2017; Hase Solutions, 2015; WSI, 2013
18	Profitability (PRO)	Your firm makes profitability analysis, on permanent way to determine on real time, the current profitability of the digital campaign for competitiveness.	Mejía-Trejo, 2017; Kanang & Hongshuang, 2017; Martin, 2017; Hase Solutions, 2015

Source: own.

Conclusions

Starting from our research question: Which are the main variables of the DMIM capable to improve their competitiveness level based on the NCM.? To solve this, was necessary to propose a construct based on those two factors. The first factor is taken from the National Competitiveness Model (NCM), but the second factor was the result

of the Delphi Panel with Analytic Hierarchy Process (AHP) among 200 (100 professors and 100 CEO) digital marketing specialists located at Guadalajara, Mexico.

Regarding the specific question SQ1: are there differences between the academic vision vs. the experts vision?. There are important issues to consider as a result of the comparison of academic vision vs. experts vision (See **Table 4**). For instance, STG is cited as 19.6 % importance of academic vision vs, 9.7% of experts vision (9.9 as % difference amongst them). Revising the case of DMT with 16.1% importance of academic version vs. 4.9% importance of experts vision (11.2 as % difference amongst them). Other similar case is the variable VAL with 10.7% importance of academic version vs. 4.8% importance of experts vision (5.9 as % difference amongst them). By the way, these are the three main variables with higher academic differences and chances to be developed in the final DMIM to be more practical to the experts vision.

By other side, we obtained the higher experts differences (more than -2) with the academic vision as: PLN (-6.3); GST (-4.5). These are first insights to be developed as concepts and definitions in the academic vision to be implemented in a practical way for the experts. It's also important the point of view of the experts to implement the final DMIM variables, as we see in the same **Table 4.** This represents an opportunity to be assessed by the academic vision.

About SQ2: Which is the scheme of the model?, its solved with the **Figure 1** involving the use of the National Competitiveness Model (NCM) based on 8 variables: Leadership Transformer (LDT); Customer Value Generation (CVG); Strategic Planning (STP); Guidance to change, innovation and continuous development (CICD); Social Commitment (SCO); Wellness and Inclusion (W&I); Knowledge (KNW); Agility (AGY) and our Digital Marketing Innovation (DMIM) based on 10 variables: Planning (PLN); Market (MKT); Goal settings (GST); Strategy (STG);Tactics (TAC); Mission-Vision (MVS); Value Proposition (VAL); Performance (PER); Profitability (PRO) and Digital Marketing Tools (DMT).

A final questionnaire was designed with this construct between NCM-DMIM to solve our research question.

Finally the SQ3: Which are the variables involved in a final questionnaire? We proposed the **Table 6** as a first approaching to be implemented.

Limitations and future studies

The first limitation is the location of the survey which involved only the Guadalajara city. For future studies, it is important to consider other regions of Mexico.

The second limitation, is about the model of competitiveness. This could be designed with other variables involving other sources just like the Competitiveness Mexican Institute (IMCO, Instituto Mexicano de la Competitividad), or the SME Competitiveness Index (SMECO, 2017)

The third limitation is that the final questionnaire was applied to professors (academic vision) and directors or CEOs (expert vision), and the results could be different with operative managers, customers and/or suppliers to analyze the results obtained.

Also, it would be interesting to know how are the relationships among the variances of the variables of NCM and DMIM.

About future studies, it would be interesting to do some studies considering the DMIM as dependent variable to determine and analyze the variables more significant from the NCM. Finally, it would be interesting to do by exploratory factor analysis the search of reduction of both original variable models (NCM and DMIM) and confirmatory factor analysis to search underlying relationships among the NCM and DMIM variables through structural equations analysis, using techniques based on license software, such as: EQS, LISREL, AMOS.

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Leadership styles and e-Leadership skills for virtual teams, on the digital marketing innovation for SMEs. A Gender Empirical study

ABSTRACT. Purpose. This paper is aimed to propose a construct relating the national competitiveness model (**NCM**) with our proposition of digital marketing innovation model (**DMIM**) for a digital campaign design.

The design is a final questionnaire in Likert scale, applied during Jan.Apr. 2017 to the total population: 200 specialists (100 professors/100 **CEOs**) of digital marketing campaign designers in Guadalajara, México (called specialists).

The methodology is based on a documentary research to determine the variables related into **NCM-DMIM.** As a qualitative study, the variables obtained were analyzed by 10 specialists using Delphi Panel and Analytic Hierarchy Process (**AHP**). The results were two visions, among academics (professors) and the experts (**CEOs**) vision (called conceptual evidence) with different rates of importance and order of appearance of each determined variables of the **NCM-DMIM** construct. As a quantitative study (the empirical evidence), we practiced correlation and multiple linear regression techniques to determine the most important variables and their relationships in such construct.The **Findings** is the first settlement for a generalized model able to explain the variables involved in the relationship between **NCM-DMIM** construct. **The research limitations:** there are no previous models relating the main **NCM-DMIM** variables.

The social and practical implications are aimed to the marketing sector recommending improvements of **NCM-DMIM** relationships as a measuring tool.

The **originality** is the empirical disclosing of the main **NCM-DMIM** variables using an original theoretical model adapted to the context.

Keywords: e-Leadership Capabilities, Digital Marketing Innovation, SMEs, Gender.

1. Introduction

In this section we show the context and several aspects of the main terms, to determine the research question.

1.1 The leadership styles and e-leadership skills

There are a lot studies published about leadership styles (transformational, transactional, avoidant/passive) and gender (Eagly & Blair, 1990; Johnson & Powell, 1994; Burke & Collins, 2001; Patel & Buiting, 2013) and how is very acknowledged the effectiveness of transformational leadership, for instance to innovate (Eagly & Johanssen-Schmidt, 2001). This has been proved in a number of settings and in many countries around the world with models like multifactor leadership questionnaire (**MLQ5X**, Bass & Avolio, 2006) or solving conflicts (Wen-Long & Chun-Yi, 2013). In fact, the transformational leadership style is considered more aligned with the female than the male gender style (Eagly & Johanssen-Schmidt, 2001; Patel & Buiting, 2013).

The opposite of this, are the scarce works about leadership and gender, associated with information and communication technologies, that is evolving to a new concept: the e-leadership.

The e-leadership is the *" key to using new digital technologies for innovation and transformation, managed in a relevant organizational context and embedded in the business strategy"* (SMEsEC, 2015) considered as well as the *"accomplishment of a goal through the direction of human resources"*(EIDEC,2012). It is *"the new emerging context for examining leadership… it is defined as a social influence process mediated by advanced information technologies to produce a change in attitudes, feelings, thinking, behavior, and performance with individuals, groups, and/or organizations"* (Avolio, et al. 2001). The e-leadership is considered in the digital era, for: *"managers, entrepreneurs, and business executives must have e-competences to grow, export and be connected to the global digital markets. In a digital economy, e-leadership skills are*

essential. Effective e-leaders are capable of leading teams and managing technology systems in ways that achieve both local and global demands" (EIDEC, 2012). To achieve effectiveness in the e-leadership (SMESEC, 2015) is necessary to develop three important skills, such as: strategic leadership, business savvy and digital savvy (EIDEC, 2012; SMESEC, 2015).

In a literature review for e-leadership made it by Dasgupta (2011), he studied around seventy-seven journal articles and the term gender, only appeared in the works of: Bryant (et al.2009) and D'Souza and Colarelli (2010). So, the importance to determine the leadership style, the e-leadership skills and how are both manifested, according to the manager's gender.

1.2. Digital Marketing Innovation.

According OCDE (2005) innovation is: *"the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations"*. Regarding the marketing innovation: *"is the implementation of a new marketing method involving significant changes in product design or packaging, product placement, product promotion or pricing".* As you see, digital marketing is itself, an innovation with several and innovative tools, for instance: planning and building a website, planning the content, blogging, paying the advertisement, the social networking, emailing, making video, making the web analytics, etc. considered in the digital marketing innovation model by Mejía-Trejo (2017).

All mentioned above, representing a great opportunity to be explored and offer a field of how the leadership style, e-leadership skills and gender are influencing the digital marketing innovation.

1.3 The context of the SMEs

In the sense of these e-leadership capabilities in the real world of the marketing sector necessities and as an opportunity to apply all the concepts mentioned above, we can say that the small and medium sized enterprises (SMEs) play an important role within the emergent

economies just like Mexico (SMEsEC, 2015). For instance, according INADEM (2016), in Jalisco (a state of México), the size occupied personnel of the SMEs representing the 24.6% (see **Table 1**) and they have the 2.4% as economic unit participation.

Table 1
Economic Units in Jalisco State, Mexico

Size	*Economic Units*		*% Occupied Personnel* **
	*Quantity¨**	*Participation (%)***	
Micro	357321	97.6%	75.4
Small	7322	2.0	13.5
Media	1464	0.4	11.1
Total	366,107	100	100

Note: The total economic units in Mexico are: 5'039,911(IIEGJ,2017)
Source: * IIEGJ (2017); ** INADEM (2016) and with own adaptation

The 8,786/366,107 SMEs as economic units in Jalisco, Mexico are distributed in 20 activity areas (IIEGJ, 2017), and they require the implementation of digital marketing innovation activities through the leadership capabilities (EIDEC, 2012). In this sense, the web portal Millones de Voces (2017), reports a sector of digital marketing agencies with more than 200/8,786 SMEs firms located at Guadalajara, Jalisco Mexico. All of them have been working in virtual teams, saving costs of operations and all of them require to be aligned with the goals posed by their **CEOs.**

1.4. Objective: the research question

So far, one remarkable note is that, most of the studies are generalized with the gender issue.

Thus, we proposed the following research question: *Regarding the leadership style and e-leadership skills on digital marketing innovation for SMEs, how is by manager's gender?*

To solve the research question, this work proposes to use three known previously published models, such as: the multi-factor leadership questionnaire (**MLQ5X** by Bass & Avolio, 2006) the digital

skills for the SMEs (**DSSMES**, SMESEC, 2015) and the digital marketing innovation Model (**DMIM** by Mejía-Trejo, 2017).

This research is divided into the explanation of: rationale of the study; the literature review; the methodology based on the relationship of the three models; the design of the final questionnaire; the results; the conclusions; the limitations and future studies.

2. Development

In this stage, we shall show how this research is supported.

2.1 Rationale of the study

The research is important for the development of the SMEs through the marketing practices, due to the leadership style, e-leadership skills under manager's gender, might be different influence, over the digital marketing innovation. This represents the opportunity to disclose what stages of digital marketing innovation are willing to be developed, either with transformational or transactional leadership style, and how the e-leadership skills (strategic leadership, business savvy and digital savvy) are interacting by manager's gender, for the improvement of the digital marketing agencies SMEs sector. So, the subject of study are digital marketing agencies SMEs represented in 100 CEOs (50 male/50 female), requiring to know how their leadership styles, the e-leadership skills are interacting by manager's gender, for the improvement of their virtual teams.

2.2 Methodology

To solve the research question, as we said, it shall be necessary to involve the three mentioned models in a solid construct: The **MLQ5X** and **DSSMES** models as independent factors and **DMIM** as dependent factor, and to pose the following specific questions (**SQ**):

SQ1: *Which are the variables and factors involved in the final construct?;*

SQ2: *Which is the final questionnaire?;*

SQ3: *How are the main relationships between **MLQ5X-DSSMES** factors and the variables of **DMIM** factor, regarding the manager´s gender?*

Applying the equation of finite and known population (8,786 economic units) the sample size is approach 100 (96). So, the subject of study are digital marketing agencies SMEs represented in 100 CEOs (50 male/50 female), requiring to know how their leadership styles, the e-leadership skills are interacting by manager's gender, for the improvement of their virtual teams.

3. Literature review

We shall describe the 3 models mentioned above, as basis of this research.

3.1 MLQ5X . Multifactor Leadership Questionnaire Model (Bass & Avolio, 2006)

Leadership, According to **DRALE** (2017), means: 1. m. *lead.* 2. m. *Status of superiority which is a company, a product or an industry, within its scope*. Today, we have recognized the advantage represented transformational leadership in innovation processes, due to the work of Avolio & Bass (2004). Sample's report (2007), for example, has the following profile of transformational leader: *"creating greater alignment around strategic visions and missions, their behavioral factors are associated with increased sales, transformational leadership explains between 45% and 60% levels of organizational performance; create greater unit cohesion, commitment and lower turnover, predicted higher levels of innovation in teams of R&D products, transformational leaders create safer working environments"* and the female managers are found to exhibit a transformational leadership style, whereby, entails characteristics such as inspirational motivation, intellectual stimulation and individualized consideration and is suggested to benefit the innovation (Ritter-Hayashi et al. 2016).

Hence, we suggested to identify according the manager gender, the level of transformational and transactional leadership qualities

of the leaders of the **SME** organization using the tool known as the Multifactor Leadership Questionnaire (**MLQ5x**).

This questionnaire has 4 variables that identify the style of leadership currently is practicing into the **SME** by the **CEO** (Transformational/Transactional/Passive-Avoidant Behavior and Outcomes of Leadership style) with 12 dimensions and 45 indicators.(See **Figure 1, and Appendix**)

Hence, we proposed the **hypothesis 1:** *The style of leadership practiced by the females* ***SME CEOs*** *is more transformational than transactional or Passive-Avoidant styles.*

3.2. DSSMEs. Digital Skills for the SMEs Model (SMESEC, 2015)

According EIDEC (2012): "*The demand appears to be significant for e-leaders. Of the approximately 255,000 vacancies for the EU-27 in 2012, we find 76,000 vacancies for ICT management and business architecture skills. Furthermore, the gap is disproportionately affecting small and medium-size enterprise: 70% of vacancies can be found in SMEs which demand ICT skills in much greater numbers than large enterprises.*" Furthermore, is considered of crucial importance for companies and industry to reach the excellence in their business operation, being the key in the use of the new digital technologies for innovation and transformation, including the organizational context and deeply embedded in the business strategy. In this sense, the e-Leadership has to be described with several special skills required of an individual to initiate and achieve digital innovation. In other words, e-leadership is: *"a key ingredient to foster Europe's competitiveness and innovation potential"* (SMESEC, 2015). The model is described since the skills represented in the following three variables:

- Strategic Leadership (**STL**): Lead inter-disciplinary staff, and influence stakeholders across boundaries (functional, geographic)
- Business Savvy (**BSY**): Innovate business and operating models, delivering value to organizations.
- Digital Savvy (**DSY**): Envision and drive change for business performance, exploiting digital technology trends as innovation opportunities.

The questionnaire identifies what the e-leadership CEO skills are currently appearing in the **SME** (See **Figure 1, and Appendix**).

Hence, we proposed the **hypothesis 2:** *The e-leadership skills practiced by the females digital marketing agencies* ***SME CEOs*** *are more of strategic leadership skill than business savvy or digital savvy types.*

3.3. DMIM. Digital Marketing Innovation Model (Mejía-Trejo, 2017)

According the OCDE (2005) innovation is defined as a: "*implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations and it involves the innovation of: product, service, marketing, process and organization"* and, is not limited to the male gender. Several authors suggest the empowerment of the female innovation, for instance Ritter-Hayashi (et al. 2016): *"We suggest that the level of women's economic opportunity in the country, within which firms operate, moderates the effect of gender diversity on a firms' likelihood to innovate".* Akulava (2015) affirms: "*The results suggest that the propensity to innovate is higher among companies with a presence of a female owner…* the results *show that having a female as the only, or one of the, owner(s) increases the propensity of going into uncertainty and implementation of a new good/service by 4.5% in the CIS (Commonwealth of Independent States) region and 6.7% in the non-CIS block.".* It is a remarkable fact that this finding contradicts the literature on gender differences in the willingness to take on risk that mostly demonstrates that women, on average, are more risk-averse than men .

Other studies, complement the skills of female managers when they claim: *"the women entrepreneurs tended to focus their innovation efforts on business organization rather than on products and processes, more so than their male counterparts. They were also more likely to have cohesive and collaborative management structures…females seemed to be more active than their male counterparts in using ICT tools including the social media networking to market products and services",* furthermore: *"fewer women business obtained patents compared with their men business owners"* UNCTAD (2013), despite several external barriers, for female managers, such as: insufficient access to capital,

limited access to new markets and ICTs, cultural constraints, lack of capacity-building, access to education. etc.

However "*women score less than men when assessing the level of innovation of their own business"* (European Commission, 2008). Thus, is very important to promote female entrepreneurship and, in particular, seeking to support women innovators/inventors who wish to become entrepreneurs.

Regarding the digital marketing matter, this is itself an innovation, defining it through the **DMIM** as: *"a process to design the strategy and tactics in a planned implementation, selecting a set of digital marketing tools. These should be based on mission-vision, the market segmentation, goal settings and value proposition of the firm, with the performance monitoring and the profitability of the digital campaign design, in a permanent way"* (Mejía-Trejo, 2017, Mejía-Trejo et al. 2016, see **Table 2**). In this latest definition, we consider that exist several issues to be disclosed and aligned when the female manager is involved.

Table 2
DMIM variables description

Order	*DMIM Variables*	*Indicator*	*Main question*
1	Mission-Vision (MVS)	Mission. It is a written declaration of an organization's core purpose and focus that normally remains unchanged over time. It is the cause of the firm's campaign, day-to-day operational objectives Vision. It is the effect of the firm's campaign. It express' the high-level goals for the future	Which is the mission and vision involved in the digital campaign?
2	Value Proposition (VAL)	It is the reason why customers turn to one company over another solving their problems or satisfying their needs. It consists of a selected bundle of products and/or services that caters to the requirements of a specific Customer Segment. In this sense, is an aggregation, or bundle, of benefits that a company others customers.	What is the value proposition inserted in the digital campaign?

Order	*DMIM Variables*	*Indicator*	*Main question*
3	Market Segmentation **(MKT)**	It is all about of the market segmentation as target. It comprises the heart of any business model. Without (profitable) market, no company can survive for long. In order to better satisfy the market, a company may group them into distinct segments with common needs, common behaviors, or other attributes.	Which is the main market to be attended for the digital campaign?
4	Goal Settings **(GST)**	All digital marketing campaign requires objectives to be reached, for instance: -The branding positioning;-The number (real & potential) of customers database; -The sales; -The product & services (current and new ones) information	Which goals should we use for the digital campaign?
5	Strategy **(STG)**	This stage represents the how to do, to achieve the GST, just like: --Awareness. Acquisition strategy to build awareness off-site and in offline media to drive to web presences -Engagement & Loyalty. Capture and retention as a growth strategy to build customer and fan relationships to encourage repeat visits and sales. -Desire & Experience. Strategy based on the sample and testing of a service or a product, with a novelty presentation to increase the sensations and emotions, in order to be acquired. -Effectiveness on Call to Action . Conversion strategy to achieve marketing goals of leads & sales on web presences and offline.	How to do, to achieve the goal settings for the digital campaign?

<table>
<tr><th>Order</th><th>DMIM Variables</th><th>Indicator</th><th>Main question</th></tr>
<tr><td>6</td><td>Tactics (TAC)</td><td>This represents all the activities to be implemented to follow the strategies, involving mainly, the use of the digital marketing tools (DMT), for instance:
<table>
<tr><td></td><td colspan="4">Strategy</td></tr>
<tr><td></td><td>Awareness</td><td>Engagement & Loyalty</td><td>Desire & Experience</td><td>Effectiveness on Call to Action</td></tr>
<tr><td rowspan="8">DMT</td><td>SEO/SEM</td><td>Content Marketing</td><td>Augmented Reality</td><td>Home & Site-Wide Page</td></tr>
<tr><td>Affiliate & Partner Marketing</td><td>Newsletters & eMail Marketing</td><td>Virtual Reality</td><td>Landing page design</td></tr>
<tr><td>On line Advertising</td><td>e-Contact Strategy</td><td>Wearable Marketing</td><td>Search and Browse Page</td></tr>
<tr><td>On line PR</td><td>Customer Service & Support</td><td></td><td>Basket and Checkout</td></tr>
<tr><td rowspan="3">Social Media</td><td>Mobile Marketing</td><td></td><td>Social Commerce</td></tr>
<tr><td>Social CRM</td><td></td><td></td></tr>
<tr><td>Blogging</td><td></td><td></td></tr>
</table></td><td>What activities must to implement the DMT we need to do for the digital campaign?</td></tr>
<tr><td>7</td><td>Digital Marketing Tools (DMT)</td><td>It involves all the digital marketing tools, like: Search Engine Optimization (SEO); Search Engine Marketing (SEM); Affiliate and Partner Marketing; Online advertising; Online Public Relations; Social Media Marketing; Home & Site-Wide Page Effectiveness; Landing Page Design Effectiveness; Search and Browse Page Efficiencies; Category and Product Page Efficiencies; Basket and Checkout Efficiency; Social Commerce; Content Marketing; Newsletters; eMail marketing; e-Contact Strategy; Customer and Service Support; Mobile Marketing; Augmented Reality; Virtual Reality; Wearable Marketing; Social CRM, etc.</td><td>What kind of digital marketing tools are we ready to use in the digital campaign?</td></tr>
</table>

Order	*DMIM Variables*	*Indicator*	*Main question*
8	Planning **(PLN)**	This is the step where all the tools and techniques of the tactics is programmed logistically, to be implemented in the practice. This is your overall strategy for digital marketing. Defining a strategy to integrate communications across different customer touch points is often forgotten. Planning involves setting goals, creating a coherent strategy to achieve them and putting in place evaluation tools in place to make sure you're on track	What about the schedule and times to implement the digital marketing tools, for obtaining results in the digital campaign?
9	Performance **(PER)**	It implies to know how well the digital campaign is working on. Practically, it involves the measurement and assessment of all the previous stages, Its support is the web analytics to obtain a full control of the digital campaign	Which is the performance of the digital campaign?
10	Profitability **(PRO)**	It is expressed in terms of return on investment (ROI) about how the digital campaign is working on, at short, medium or long terms.	What is the return of investment for the digital campaign?

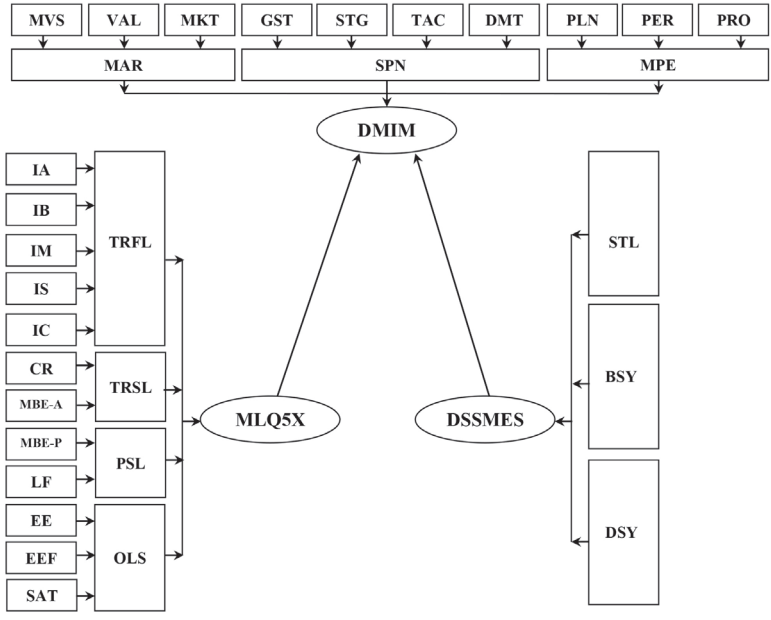
Source: own.

The questionnaire identifies what elements are considered by the **CEO** in a digital campaign design for the **SME** (See **Figure 1, and Appendix**).

Hence, we proposed the **hypothesis 3:** *The transformational leadership style and the strategic leadership as e-Leadership skill, practiced by the females digital marketing agencies* ***SME CEOs*** *have a remarkable impact on the goal settings, strategy and planning variables of digital marketing innovation model than the rest ones.*

Therefore, the final **MLQ5X-DSSMES-DMIM** *ex ante***,** is showed in **Figure 1.**

Figure 1
General Conceptual Model of MLQ5X, DSSMES and dmim ex ante



Notes: **DMIM:** Digital Marketing Innovation Model; MVS: Mission-Vision; VAL: Value Proposition; MKT.Market Segmentation; GST: Goal Settings; STG: Strategy; TAC: Tactics; DMT: Digital Marketing Tools; PLN; Planning; PER: Performance; PRO: Profitability; MAR: Market; SPN: Strategic Planning; MPE: Performance

MLQ5X: Multi-Factor Leadership Questionnaire; IA: Idealized Influence Idealized Attributes; IB: Idealized Influence Idealized

Behaviors; IM: Inspirational Motivation; IS: Intellectual Stimulation; IC: Individual Consideration; CR: Contingent Reward; MBE-A: Management by Exception: Active; MBE-P: Management by Exception: Passive; LF: Laissez-Faire; EE: Extra Effort;

EEF: Effectiveness; SAT: Satisfaction; TRFL: Transformational Leadership; TRSL: Transactional Leadership; PSL: Passive / Avoidant Leadership; OLS: Outcomes of Leadership Style

DSSMES: Digital Skill SMEs; STL: Strategic Leadership; DSY: Digital Savvy; BSY: Business Savvy

Source: own.

The final questionnaire proposed (shown in the **Appendix**) containing the **NCM** variables and **DMIM** variables, was applied as a pilot

with 10 specialist in digital marketing campaign designers, located at Guadalajara, Mexico, to probe the confidence test. We obtained the **Table 3.**

Table 3
Cronbach's Alpha Test

Cronbach's Alpha	*N of Variables*
.804	11

Source: SPSS 20 as a result of the research and adapted by the author.

The final questionnaire (8 variables corresponding to **NCM** as dependent factor and 10 variables corresponding to **DMIM** as an independent factor) as a survey, was applied to 200 specialists (100 professor and 100 CEOs) as digital marketing campaign designers, located at Guadalajara, Mexico, during January to April 2017. We also obtained the Pearson's Correlations amongst the variables, showed at **Table 4.**

Table 4
Pearson's correlations

	NCM	MVS	VAL	MKT	GST	STG	TAC	DMT	PLN	PER	PRO
NCM	1	**.492***	.195*	0.051	-0.07	0.096	.195*	**.714***	0.059	-0.061	.195*
MVS	.492*	1	**.269***	.204*	-0.04	.183*	**.269***	**.218***	.185*	-0.085	.269*
VAL	.195*	.269*	1	**.540***	0.032	**.630***	1.000*	**.762***	**.726***	-.282*	1.000*
MKT	0.051	.204*	.540*	1	.419*	**.773***	.540*	.424*	.315*	-0.06	.540*
GST	-0.074	-0.04	0.032	.419*	1	**.513***	0.032	0.046	-0.003	**.470***	0.032
STG	0.096	.183*	.630*	.773*	.513*	1	.630*	**.475***	**.425***	-0.055	**.630***
TAC	.195*	.269*	1.000*	.540*	0.032	.630*	1	.762*	**.726***	-.282*	1.000*
DMT	.714*	.218*	.762*	.424*	0.046	.475*	.762*	1	.661*	-.193*	**.762***
PLN	0.059	.185*	.726*	.315*	-0	.425*	.726*	.661*	1	-.218*	**.726***
PER	-0.061	-0.09	-.282*	-0.06	.470*	-0.06	-.282*	-.193*	-.218*	1	-.282*
PRO	.195*	.269*	1.000*	.540*	0.032	.630*	1.000*	.762*	.726*	-.282*	1

*. The correlation has significance of 0.01 (bilateral)
Source: SPSS 20 as a result of the research and adapted by the author.

We practiced Multiple Regression Analysis by Stepwise Method to obtain the set of variables entered/removed (a) (see **Table 5**).

Table 5
Variables entered/removed

Model	*Variables Entered*	*Variables Removed*	*Method Stepwise*
1	**DMT**		Criteria: Probability of- F-to-enter<= .050, Probability of- F-to-remove >=.100
2	**MVS**		

Dependent Variable: **NCM**
Source: SPSS 20 as a result of the research and adapted by authors.

The Model Summary is showed at **Table 6.**

Table 6
Model Summary

Model	*R*	*R Square*	*Adjusted R Square*	*Std. Error for estimate*
1	.714 (a)	**.510**	.389	1.88
2	.811 (b)	**.657**	.594	.90

(a) Predictors: (Constant), **DMT**;
(b) Predictors: (Constant), **DMT, MVS**
Source: SPSS 20 as a result of the research.

Using the Stepwise method SPSS produces an Analysis of Variance (**ANOVA**) for each model showed at **Table 7.**

Table 7
ANOVA (a)

Model	*Sum of Squares*	*Df*	*Mean Square*	*F*	*Sig.*
1 Regression	714.120	1	714.120	10.367	.001(b)
Residual	685.88	198	3.464		
Total	1400.000	199			
2 Regression	919.800	2	459.9	7.561	
Residual	480.200	197	2.437		.001(c)
Total	1400.000	199			

(a) Dependent Variable: **NCM**
(b) Predictors: (Constant),**DMT**
(c) Predictors: (Constant), **DMT, MVS**
Source: SPSS 20 as a result of the research.

The **Table 8** shows the results of Coefficients.

Table 8
Coefficients by stepwise method (a)

Model	*Unstandardized Coefficients*		*Standardized Coefficients*	*t.*	*Sig.*
	B	*Std. Error*	*Beta*		
(Constant)	5.237	.306		17.120	.000
dmt	.140	.043	.714	3.220	.001
2 (Constant)	1.250	.402		11.635	.000
DMT	.388	.044	.190	2.706	.007
MVS	.232	.055	.150	2.137	.034

Dependent Variable: **NCM**
Source: SPSS 20 as a result of the research.

Table 9 shows the Excluded Variables.

Table 9
Excluded Variables (a)

Model	*Beta in*	*t*	*Sig.*	*Partial Correlation*	*Collineartity Tolerance*
1 **MVS**	.150(b)	2.137	.034	.151	.953
VAL	.059(b	.548	.585	.039	.420
MKT	-.053(b)	-.687	.493	-.049	.820
GST	-.085(b)	-1.221	.223	-.087	.998
STG	-.012(b)	-.154	.878	-.011	.775
TAC	.059(b)	.548	.585	.039	.420
PLN	-.156(b)	-1.703	.090	-.120	.563
PER	-.019(b)	-.270	.787	-.019	.963
PRO	.059(b)	.548	.585	.039	.420
2 **VAL**	.022(c)	.206	.837	.015	.409
MKT	-.074(c)	-.972	.332	-.069	.807
GST	-.077(c)	-1.122	.263	-.080	.995
STG	-.028(c)	-.355	.723	-.025	.768
TAC	.022(c)	.206	.837	.015	.409
PLN	-.168(c)	-1.843	.067	-.131	.562
PER	-.012(c)	-.176	.860	-.013	.961
PRO	.022(c)	.206	.837	.015	.409

(a) Dependent Variable: **NCM**
(b) Predictors: (Constant),**DMT**
(c) Predictors: (Constant), **DMT,MVS**
Source: SPSS 20 as a result of the research.

7. Analyses and discussion

About **Table 6** and according by Hinton (et al. 2004), Cronbach's alpha corresponds : 0.90 and above shows excellent reliability; 0.70 to 0.90 shows high reliability; 0.50 to 0.70 shows moderate reliability; 0.50 and below shows low reliability. So, .804 corresponds to high reliability .

Regarding the **Table 7**, as a general rule, predictor variables can be correlated with each other as much as 0.8 before there is cause for concern about multicollinearity (Hinton, et al. 2004; Hair et al., 2010).

Regarding the **Table 8**, the Variables Entered/Removed table shows that the Stepwise method of regression has been used. Notice that **SPSS** has entered into the regression equation three variables: **DMT**, and **MVS** that are significantly correlated with **NCM**.

About **Table 9** shows the **Models**: 1 and 2 where the independent variables **DMT** and **MVS** accounts for **51 %,** and **65%** respectively of the variance in the scores of **NCM** dependent variable. The R value (**0.223**) in **Model 1** is the multiple correlation coefficients between the predictor variables and the dependent variable. As **DMT** is the only independent variable in this model we can see that the R value is the same value as the Pearson's correlation coefficient in our pairwise correlation matrix (See **Table 7**). In **Model 2** the independent variables **DMT** and **MVS** are entered, generating a multiple correlation coefficient, **R =.267**. The Adjusted R Square adjusts for a bias in R square and is usually used. The Std. Error of the Estimate is a measure of the variability of the multiple correlation.

Regarding the **Table 10**, indicates **Model 1**: $F(1,198) = 10.367$, $p<0.01$; **Model 2**: $F(2,197) = 7.561$, $p<0.01$; Dividing the Sums of Squares by the degrees of freedom (df) gives us the Mean Square or variance. **We can see that the Regression explains significantly more variance than the error or Residual**. We calculate R square (**Table 9**) by dividing the Regression Sum of Squares by the Total Sum of Squares. The values for **Model 1** have been used as an example: 714.120/1400.00= **0.510** (see **Table 10)**

In **Table 11** the Unstandardized Coefficients B column gives us the coefficients of the independent variables in the regression equation for each model:

-Model 1: NCM =5.237 + .140 **DMT**;

-Model 2: NCM = 1.250+ .388 **DMT**+ .232 **MVS**;

The Standardized Beta Coefficient column informs us of the contribution that an individual variable makes to the model. The beta weight is the average amount the dependent variable increases when the independent variable increases by one standard deviation (all other independent variables are held constant). As these are standardized we can compare them. t tests are performed to test the two-tailed hypothesis that the beta value is significantly higher or

lower than zero. This also enables us to see which predictors are significant. By observing the Sig. values in our research we can see that for **Model 1** the **NCM** scores are significant ($p < 0.05$) , and so on with **Model 2**. Hence, we suggest to use **Model 2** because it accounts for more of the variance (see **Table 11**). The Unstandardized Coefficients Std. Error column provides an estimate of the variability of the coefficient.

Regarding the **Table 12** The Beta In value gives an estimate of the beta weight if it was included in the model at this time. The results of t tests for each independent variable are detailed with their probability values. From **Model 1** we can see that the t value for **DMT** is significant ($p < 0.05$). However as we have used the Stepwise method this variable has been excluded from the model. As **MVS** has been included in **Model 2** it has been removed from this table. As the variable **NCM** scores is present in both models it is not mentioned in the Excluded Variables table. The Partial Correlation value indicates the contribution that the excluded predictor would make if we decided to include it in our model. Collinearity Statistics Tolerance values check for any collinearity in our data. As a general rule, a tolerance value below 0.1 indicates a serious problem (Hinton, et. al, 2004).

8. Conclusions

We concluded, the following issues:

1. Regarding the **SQ1:** *Which are the variables and the scheme involved?;*

   About the variables are discussed and described using the **Table 1** for **NCM** and **Tables 2, 3, 4 and 5** for **DMIM** involving for the two models: firstly, the use of the National Competitiveness Model (**NCM**) underlying factor based on 8 variables: Leadership Transformer (**LDT**); Customer Value Generation (**CVG**); Strategic Planning (**STP**); Guidance to change, innovation and continuous development (**CICD**); Social Commitment (**SCO**); Wellness and Inclusion (**W&I**); Knowledge (**KNW**); Agility (**AGY**) and secondly, our Digital Marketing Innovation (**DMIM**) underlying factor ba-

sed on 10 variables: Planning (**PLN**); Market (**MKT**); Goal settings (**GST**); Strategy (**STG**);Tactics (**TAC**); Mission-Vision (**MVS**); Value Proposition (**VAL**); Performance (**PER**); Profitability (**PRO**) and Digital Marketing Tools (**DMT**).

The construct between **NCM-DMIM** with 18 indicators (8 from **NCM** and 10 from **DMIM**).

2. About **SQ2**: *Regarding of these variables, are there differences between the academic vision vs. the expert vision?;*

   This issue is solved since **Table 4**. As a conceptual evidence, there are important issues to consider as a result of the comparison of academic vision vs. expert vision. For instance, the Strategy (**STG**) is cited as 19.6 % importance of academic vision vs, 9.7% of expert vision (9.9 as % difference amongst them). Revising the case of Profitability (**PRO**) with 16.1% importance of academic version vs. 4.9% importance of expert vision (11.2 as % difference amongst them). Other similar case is the variable Value Proposition (**VAL**) with 10.7% importance of academic version vs. 4.8% importance of expert vision (5.9 as % difference amongst them). These are the first insights about the three main variables with higher academic rates vs expert rates which mean a lack, to be developed as an opportunity to the expert vision in the final **DMIM**. In other words, it is necessary to make more practicable, the variables **STG-PRO-VAL** to be used by the expert vision.

   By other side, we obtained the higher expert differences (more than -2) with the academic vision as: Planning (**PLN**) with -6.3 and Goal Settings (**GST**) with -4.5. These are the first insights about the two main variables with higher expert rates vs. academic rates which mean a lack, to be developed as an opportunity to the academic vision in the final **DMIM**. In other words, it is necessary to make more definitions of the variables **PLN-GST** from the academic vision, to be more practicable to the expert vision.

   By other hand, it is important to consider the order of how is treated each one of the DMIM variables, suggested by the expert vision showed in **Table 4**. It is possible that it might be an issue of Project Management, and we recommend it for future studies.

3. Regarding the **SQ3:** *Which is the final questionnaire?*

   It was designed and concluded in detail. Please see the **Appendix**

4. Regarding the **SQ4**: *How are the main relationships between **NCM** and the variables of **DMIM**?*
   This issue is solved since **Table 7**, where we see the higher correlations (more than .3), as: **NCM-MVS** (.492) and **NCM-DMT** (.714). These variables are an empirical evidence, that only the mission and vision (MVS) and the digital marketing tools (DMT), are considered and used by the specialists in digital marketing campaign design, with main incidence on NCM; the rest (8) of the **DMIM** variables are remaining with scarce use and they are representing a great opportunity to be developed in any digital campaign design.
5. Our hypothesis: *The different **DMIM** variables are present in at least, on 50% of the variability of **NCM**.*
   This issue is solved using **Tables 8 and 9** where the partial variability was at least, of **51%** corresponding to **DMT** (Digital Marketing Tools) variable. So, we accepted the Hypothesis.
6. Finally , about the research question (**RQ**): *Which are the empirical effects of **DMIM** on **NCM**?*
   The main empirical effects are how the Digital Marketing Tools (**DMS**) and Mission-Vision (**MVS**) are impacting on National Competitiveness Model (**NCM**), representing both the 65.7% of the variability (according **Table 9**). These are a great opportunity for digital marketing sector to improve this Digital Marketing Innovation Model (**DMIM**) in order to develop the other 8/10 variables to rise their level of effects on **NCM**.
   The main conceptual effects are from point of view of both, academics and experts about:
   - How to make more practicable, the variables Strategy (**STG**) **–**Profitability (**Pro**)**-** Value Proposition (**VAL**) to be used by the expert vision.
   - How to make more definitions of the variables Planning (**PLN**) **–** Goal Settings (**GST**) from the academic vision, to be more practicable to the expert vision.
   - ow to consider an order to be affordable the **DMIM** variables.

The final questionnaire is a first insight to achieve a final model to relate the **DMIM-NCM.**

9. Limitations and Future Studies

The first limitation is that the final questionnaire was applied to professors (academic vision) and directors or CEOs (expert vision), and the results could be different with operative managers, customers and/or suppliers to analyze the results obtained.

The second limitation is the location of the survey which it involved only the Guadalajara city. For future studies, it is important to consider other regions of Mexico. Additionally, the sampled companies, for the **CEO** as specialist of digital marketing campaign designers were from 20 to 250 workers, excluding the companies from 1 to 10 workers, which represent an important quantity of the total manufacturing **SMEs**. For future studies it could be interesting to involve suppliers and customers into the **DMIM-NCM** construct.

The third limitation, is about the model of competitiveness. This could be designed with other variables involving other sources just like the Competitiveness Mexican Institute (IMCO, Instituto Mexicano de la Competitividad), or the SME Competitiveness Index (SMECO, 2017), or more sophisticated model based on the use of internet technologies.

About future studies, it would be interesting to do studies considering the **DMIM** as dependent variable to determine and analyze the variables more significant from the **NCM**.

It is very important to the sector of digital marketing practitioners to do strategic planning to develop the rest of the **DMI model**.

Finally, it would be interesting to do an exploratory factor analysis, to reduce the original variables into **NCM** and **DMIM** construct, and a confirmatory factor analysis to search underlying relationships among the **NCM** and **DMIM** variables through structural equations analysis, using techniques based on license software, such as: **EQS, LISREL, AMOS.**

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Appendix

Final questionnaire proposed

Multi-factor leadership questionnaire (MLQ5X as independent factor) (Bass & Avolio, 2006)			
Variable	*Dimension*	*Item*	*Indicator (Likert scale: 5)*
Transformational Leadership (TRFL)	Idealized Influence Idealized Attributes (IA)	1	Instills pride in me for being associated with him/her.
		2	Goes beyond self-interest for the good of the group.
		3	Acts in ways that builds my respect.
		4	Displays a sense of power and confidence.
	Idealized Influence Idealized Behaviors (IB)	5	Talks about their most important values and beliefs regarding education.
		6	Specifies the importance of having a strong sense of purpose.
		7	Considers the moral and ethical consequences of decisions.
		8	Emphasizes the importance of having a collective sense of mission.
	Inspirational Motivation (IM)	9	Talks optimistically about the future.
		10	Expresses confidence that goals will be achieved.
		11	Talks enthusiastically about what needs to be accomplished.
		12	Articulates a compelling vision for the future
	Intellectual Stimulation (IS)	13	Re-examines critical assumptions to question whether they are appropriate.
		14	Seeks differing perspectives when solving problems.
		15	Suggests new ways of looking at how to complete assigned tasks.
		16	Gets me to look at problems from many different angles

Multi-factor leadership questionnaire (MLQ5X as independent factor) (Bass & Avolio, 2006)

Variable	*Dimension*	*Item*	*Indicator (Likert scale: 5)*
Transformational Leadership (TRFL)	Individual Consideration (IC)	17	Treats me as an individual rather than just a member of the group.
		18	Helps me to develop my strengths
		19	Spends time teaching and coaching
		20	Considers me as having different needs, abilities and aspirations from others
Transactional Leadership (TRSL)	Contingent Reward (CR)	21	Makes clear what one can expect to receive when performance goals are achieved.
		22	Provides me with assistance in exchange for my efforts
		23	Discusses in specific terms who is responsible for achieving performance targets.
		24	Expresses satisfaction when I meet expectations
	Management by Exception: Active (MBE-A)	25	Focuses attention on irregularities, mistakes, exceptions, and deviations from standards.
		26	Concentrates his/her full attention on dealing with mistakes, complaints and failures..
		27	Keeps track of all mistakes.
		28	Directs my attention toward failures to meet standards
Passive / Avoidant Leadership (PSL)	Management by Exception: Passive (MBE-P)	29	Fails to interfere until problems become serious.
		30	Waits for things to go wrong before taking action.
		31	Demonstrates his firm belief that “what is not broke do not fix”.
		32	Demonstrates that problems must become chronic before taking action.

Multi-factor leadership questionnaire (MLQ5X as independent factor) (Bass & Avolio, 2006)

Variable	*Dimension*	*Item*	*Indicator (Likert scale: 5)*
Passive / Avoidant Leadership (PSL)	Laissez-Faire (LF)	33	Avoids getting involved when important issues arise.
		34	Is absent when needed.
		35	Avoids making decisions.
		36	Delays responding to urgent questions.
Outcomes of Leadership Style (OLS)	Extra Effort (EE)	37	Get others to do more than they expected to do
		38	Heighten others' desire to succeed
		39	Increase others' willingness to try harder
	Effectiveness (EFF)	40	Are effective in meeting others' job-related needs?
		41	Are effective in representing others to higher authority?
		42	Are effective in meeting organizational requirements?
		43	Leads a group that is effective
	Satisfaction (SAT)	44	Uses methods of leadership that are satisfying
		45	Work with others in a satisfactory way
Strategic Leadership (STL)	Not mentioned	46	As strategic leadership, your firm foster the forecasting needs for information
		47	As strategic leadership, your firm foster the understanding customer needs
		48	As strategic leadership, your firm foster the solution orientation
		49	As strategic leadership, your firm foster the communication
		50	As strategic leadership, your firm foster the creativity
		51	As strategic leadership, your firm foster the Independent learning
		52	As strategic leadership, your firm foster the team leading
		53	As strategic leadership, your firm foster the vision of different cultures and the internationalization

Multi-factor leadership questionnaire (MLQ5X as independent factor) (Bass & Avolio, 2006)			
Variable	*Dimension*	*Item*	*Indicator (Likert scale: 5)*
Digital Savvy (DSY)	Not mentioned by the authors	54	As digital savvy, your firm foster the Big data analytics & tools
		55	As digital savvy, your firm foster the cloud computing & virtualization
		56	As digital savvy, your firm foster the Mobile app design and Development
		57	As digital savvy, your firm foster complex business systems
		58	As digital savvy, your firm foster the web development & tools
		59	As digital savvy, your firm foster the IT architecture, platform Architecture
		60	As digital savvy, your firm foster the security skills
		61	As digital savvy, your firm foster the ERP systems
		62	As digital savvy, your firm foster the social media
Business Savvy (BSY)	Not mentioned by the authors	63	As business savvy, your firm foster the customer relations & sales
		64	As business savvy, your firm foster the partnership establishment
		65	As business savvy, your firm foster the business development
		66	As business savvy, your firm foster the organizational change
		67	As business savvy, your firm foster the project management
		68	As business savvy, your firm foster the process optimization
		69	As business savvy, your firm foster the strategic marketing
		70	As business savvy, your firm foster the agile methodology

Multi-factor leadership questionnaire (MLQ5X as independent factor) (Bass & Avolio, 2006)			
Variable	*Dimension*	*Item*	*Indicator (Likert scale: 5)*
Business Savvy (BSY)	Not mentioned by the authors	71	As business savvy, your firm foster the business analytics
		72	As business savvy, your firm foster the market analysis
		73	As business savvy, your firm foster the financial skills
Market (MAR)	Mission-Vision (MVS)	74	As a market, your firm considers the mission and vision in the digital campaign design
		75	As a market, your firm considers the trademark in the digital campaign design
	Value Proposition (VAL)	76	As a market, your firm identifies and applies the value proposition in the digital campaign design
	Market Segmentation (MKT)	77	As a market your firm, considers an specific market segmentation as a target to be attended in the digital campaign design
Strategic Planning (SPN)	Goal Settings (GST)	78	As strategic planning, your firm considers, as a goal to reach, the increasing of the branding positioning in the digital campaign design
		79	As strategic planning, your firm considers, as a goal to reach, the increasing of the number (real & potential) of customers database in the digital campaign design.
		80	As strategic planning, your firm considers, as a goal to reach, the increasing of sales in the digital campaign design
		81	As strategic planning, your firm considers, as a goal to reach, the increasing the product & services (current and new ones) information in the digital campaign design.
	Strategy Target (STG)	82	As strategic planning, your firm considers, as a strategy target, the foster of awareness in the digital campaign design.

Multi-factor leadership questionnaire (MLQ5X as independent factor) (Bass & Avolio, 2006)

Variable	*Dimension*	*Item*	*Indicator (Likert scale: 5)*
Strategic Planning (SPN)	Strategy Target (STG)	83	As strategic planning, your firm considers, as a strategy target, the foster of engagement & loyalty in the digital campaign design
		84	As strategic planning, your firm considers, as a strategy target, the foster of desire & experience in the digital campaign design
		85	As strategic planning, your firm considers, as a strategy target, the foster of effectiveness on call to action in the digital campaign design
	Tactics (TAC)	86	As strategic planning, your firm considers, as a tactics, the use of Digital Marketing Tools for each strategy such as Awareness, the following list: the SEO/SEM or Affiliate & Partner Marketing or On line Advertising or On line PR or Social Media in digital campaign design
		87	As strategic planning, your firm considers, as a tactics, the use of Digital Marketing Tools for each strategy such as Engagement & Loyalty, the following list: Content Marketing or Newsletters or eMail Marketing or e-Contact Strategy or Customer service & support or Mobile Marketing or Social CRM or Blogging in digital campaign design
		88	As strategic planning, your firm considers, as a tactics, the use of Digital Marketing Tools for each strategy such as Desire & Experience, the following list: Augmented Reality or Virtual Reality or Wearable Marketing in digital campaign design

Multi-factor leadership questionnaire (MLQ5X as independent factor) (Bass & Avolio, 2006)

Variable	*Dimension*	*Item*	*Indicator (Likert scale: 5)*
Strategic Planning (SPN)	Tactics (TAC)	89	As strategic planning, your firm considers, as a tactics, the use of Digital Marketing Tools for each strategy such as Effectiveness on Call to Action, the following list: Home & Site-Wide Page or Landing page design or Search and Browse Page or Basket and Checkout or Social Commerce in digital campaign design
	Digital Marketing Tools (DMT)	90	As strategic planning your firm considers, the constant surveillance to determine what kind of digital marketing tools are ready to use, in the digital campaign design,
Model Performance (MPE)	Planning (PLN)	91	As planning, your firm considers strong programs, with schedule and times to implement the digital marketing tools, in order to obtain remarkable results, in digital campaign design
	Performance (PER)	92	As performance, your firm considers the KPIs for performance monitoring to determine on real time, the current performance and is supported from the Web Analytics, in digital campaign design
	Profitability (PRO)	93	As profitability, your firm considers the current profitability analysis on real time in the digital campaign design

Source: Bass & Avolio, 2006; SMEsEC, 2015; Mejía-Trejo, 2017b with own adaptation

e-Business Innovation. Towards a Redefinition of a Concept

ABSTRACT. **Objective:** This study is aimed to determine a construct of electronic business (e-business) innovation (**eBIM**)
Methodology: This study is based on a documentary research to determine the main variables of the **eBIM** as academic vision and based on a focused group of e-Business experts using the Delphi Panel method and the Analytic Hierarchy Process we obtained the expert vision of the **eBIM**, as a general conceptual model.
Results. Based on both visions we obtained the 19 variables and 3 factors to be included in the final **eBIM** proposal, which: 9/19 variables are according to the both visions, 6/19 are suggested by expert vision and 4/19 are suggested by academic vision.
Conclusions: The conceptual **eBIM** obtained has the potential to be used. Further studies regarding the e**BIM,** are: an exploratory factor analysis to verify the grouping of such variables; a confirmatory factor analysis to disclose the underlying variables and factors relationships and a multiple linear regression to determine how is the correlation amongst these variables.
Keywords: e-Business; Innovation; Conceptual Model.

Introduction

According OECD (2005) par.146, innovation is: *"the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations"*. Innovation is an aspect of business strategy, or part of the set of investment decisions to create capacity for product development or to improve efficiency. It can create competitive advantages by repositioning production or output in the value chain (OECD, 2005, par. 80). e-Business is defined as the integral practice of planning actions to address the market with strategy and tactics to use e-Business tools for achieving goal

settings aligned with the mission & vision of the firm. All of them, to transfer a value proposition to the customer, with performance and profitability monitoring. This concept requires to involve tools, such as e-Media (e.g. Internet cloud, mobile), e-Marketing (promotion of products and/or services, capture and retention of the customer), and e-Commerce (transaction of a requirement of products and/or services with a payment) to be applied in different types of business: **C2C** (Consumer-to-Consumer), **C2B** (Consumer-to-Business); **C2G** (Consumer-to-Government9; **B2C** (Business-to-Consumer); **B2B** (Business-to-Business); **B2G** (Business-to Government); **G2C** (Government-to-Consumer); **G2B** (Government-to-Business); **G2G** (Government-to-Government) (Mejía-Trejo, 2017). The practice of e-Business offers to the firms a serial of tools to increase the competitiveness, in addition to the aforementioned, such as: e-customer relationship management (**e-CRM**), e-Enterprise Resource Planning (**e-ERP**); e-Sourcing Capability Model (**e-SCM**); e-Procurement; e-Supplier Relationship Management (**e-SRM**) and e-Security (**e-SEC**), amongst others. All of these items, increasing productivity, value added services, global competitiveness and sustainable development (Meier & Stormer 2009). Hence, what about the criteria of e-Business Innovation Model (**eBIM**) to be implemented as a design, aligned with the competitiveness of the small and media size enterprise **SMEs**? As you see, the e-Business is itself, an innovation (e-Business innovation) and a potential driver to improve the current place of any firm.

To achieve our proposal of conceptual **eBIM**, this work is divided into the explanation of: 1) Problem, hypotheses and rationale of the study; 2) Literature review 3) Methodology based on two visions: the academic and the experts to obtain a final **eBIM** conceptual model 4) Results; 5) Conclusions; 6) Limitations and Future Studies.

Problem, Hypotheses and Rationale of the Study

So, our problem is described in a research question: *Which is the conceptual model proposed for the e-Business Innovation Model (**eBIM**)?* To solve this, is necessary to propose a construct updated with all the

e-Business tools models as variables (academic vision) and the get the point of view of experts (expert vision) to characterize the model.

Hence, regarding the **eBIM** variables we proposed the following specific questions:

SQ1.*Which are the variables proposed for the general conceptual model?;*

SQ2: *What about the differences of both visions: academic and expert?*

SQ3.*Which are the groups or factors proposed for the variables in the final conceptual* ***eBIM****?*

Methodology

To determine the variables, factors as support of the theoretical framework, first we summarized all the activities and the features of the subject of study as technical data. See **Table 3.**

Table 3
Technical Research Data

Technical Research Data	
Features	*Survey*
-Literature Review	By own author through 20 meaningful papers about e-Business
-Academic and Expert vision for searching the variables as support of the Theoretical Framework	6 experts in e-Business located at the Guadalajara Metropolitan Zone, Mexico gathered in a Focus Group-**AHP** : 1 software designer of e-Business systems, 1 consultant of e-Business services, 1 professor of information and communications technologies (**ICT**), 1 **CEO** of **SME** of e-Business programming services, 1 programing manager of e-Business services (front office), 1 support manager of programming e-Business services.
Pilot survey for reliability and validity test. Scope	6 e-Business experts aforementioned tested during Oct-Nov-2016

Source: own.

Theoretical Framework

In this section, we established the importance of model and the e-Business, its definitions, and what is the e-Business Innovation Model.

The Importance of a business model

A business model is a model of a business. A generally accepted definition of the term *"business model"* has not emerged yet but we can say that it describes the logic of a *"business system"* for creating value that lies behind the actual processes. A model, on the other hand, is only an artificial representation of reality. It therefore has to detract focus from certain aspects while concentrating on others; it is impossible for all the variables that comprise reality to be adequately and consistently represented, particularly if the goal is to control for effect of certain factors over others. Due a model can be descriptive or predictive, you would not rely on the outcomes of the model only in your making decisions. This is because a model cannot (and should not) be a complete and precise representation of reality (even for very simple social systems). Moreover, what is considered to be important for the model depends on the position of the observer (Petrovic et al. 2001).

The mental model can be described as a network of facts and concepts, and its content and structure contain our understanding of social and physical phenomena (Morecroft, 1994). The business model must be evaluated against the current state of the business ecosystem (Korpela et al., 2013)

e-Business Model

Since IBM described about*"…e-commerce business model or electronic business mode is the transformation of key business processes through the use of internet technologies…"* (Li, 2007), many things have happened. For instance, the most fast and efficient e-Business integration can put up a close connection among the enterprise, manufacturers and customers. It can provide a simple communication method and

significant economic returns. The genesis of e-Business comes from e-commerce (Osterwalder & Pigneur, 2002), and the continuous development of e-Business, its focus has been is gradually moved from the initial **B2C** to more challenging type of business (**B2B**, **B2G**, etc.), achieving efficient business, increasing the income and reducing costs for getting greater business and competitive returns (Meier & Stormer, 2009). Today, the lot of operation modes of e-Business depends on disunity infrastructure, which results in the different contact information among the buyer, supplier, market and service providers. (Xueqiang, 2016). As e-Business evolution continues with emerging technologies and business models, a solid understanding of e-Business innovation, process, and strategy proves invaluable for the successful e-Business development and management (Lee, 2007). For Firms to adopt e-Business and e-Commerce strategies and tools, benefits must outweigh investment and maintenance costs (OECD, 2004).

e-Business Innovation Model definitions

We have to understand that business innovation: *"is an organization's process for introducing new ideas, workflows, methodologies, services or products"* (TechTarget, 2017). With the introduction of all e-media (internet, cloud, mobile) technology the e-Business innovation has in nowadays an extensive literature and as always, there are as many definitions as there are people defining them more or less complex. See **Table 1** OECD (2004) defines as: automated business processes (both intra-and inter-firm) over computer mediated networks. To determine the variables to explain basis of the theoretical model, we reviewed 20 meaningful papers and we gathered all the variables related with e-Business Innovation. See **Table 1**.

Table 1
Authors, definitions and variables related with of e-business innovation

No.	*Year*	*Authors (Year)*	*Definition of e-Business Innovation*	*Main e-Business variables approaching*
1	2017	Mejía-Trejo	*"…as the integral practice of planning actions to address the market with strategy (e-marketing, e-commerce, e-customer relationship, e-resourcing planning, e-supply chain management, e-procurement, e-supplier management and e-security) and tactics for achieving goal settings aligned with the mission & vision of the firm. All of them, to transfer a value proposition to the customer, with performance and profitability monitoring. This concept requires to involve tools, such as e-Media (e.g. Internet cloud, mobile), e-marketing (promotion of products and/ or services, capture and retention of the customer), and e-Commerce (transaction of a requirement of products and/or services with a payment) to be applied in different types of business: C2C; C2B; C2G; B2C;B2B;B2G; G2C; G2B; G2G"*	Planning (**PLN**); Market (**EMK**);Strategy (**STG**); Tactics (**TAC**); Goal Settings (**GST**); Mission & Vision (**MVS**); e-Business Tools (**EBT**);Value Proposition (**VPR**); Performance (**PER**); Profitability (**PRO**); e-Media (**EMD**); eMarketing (**EMK**); e-Commerce (**ECO**)
2	2017	Tech Target	*"is the conduct of business processes on the Internet. These electronic business processes include buying and selling products, supplies and services; servicing customers; processing payments; managing production control; collaborating with business partners; sharing information; running automated employee services; recruiting; and more.."*	Buying Processes (**BFN**);Selling Processes (**BFN**); e-Payment Processes (**EPY**); managing production control (**SCM**); collaborating with business partners (**SCM**); sharing information (**SCM**); Running automated employee services (**SCM**)

No.	*Year*	*Authors (Year)*	*Definition of e-Business Innovation*	*Main e-Business variables approaching*
3	2016	Pfisterer, Radonjic-Simic, & Reichwald	*"…e-Business is a conducting core business activities in a way that is enabled by the integrated use of information technology for processing and communication of information"*	Goal Settings (**GST**); Value Proposition (**VPR**); Revenue Model (**PRO**); Value Architecture (**INF**); Infrastructure (**INF**); Business functionalities (**BFN**); Electronic Market places (**EMK**); Smart Cities Architectures (**INF**)
4	2016	Xueqiang	"…(It is made)I n order to let enterprises to obtain highly efficient business, increase the income and reduce costs for getting greater business and competitive returns, the designers of E-Business solution scheme need consider crossing different network configuration from the various private internal network of enterprises to Extranet of sharing information data among them…!	Web Services (**BFN**); Web Page (**BFN**); the business to costumer (**TOB**) the enterprise to the enterprise (**TOB**); Electronic Data Interchange (**EDI**); Electronic Application Integration (**EAI**); Universal Description, Discovery and Integration (**UDDI**)
5	2015	Putra & Hasibuan	*"e-Business has been identified as a tool that could improve an enterprise's operational efficiency and competitiveness in the global market…"*	Factors that drive and hinder adoption of e-Business among SMEs (**O&T**); Profiling of SMEs based on their capacity or readiness to adopt e-Business (**CHM**); Implementation models that are inherently centered on specific technologies or e-Business applications (**BFN**)

No.	*Year*	*Authors (Year)*	*Definition of e-Business Innovation*	*Main e-Business variables approaching*
6	2015	Ciarniene & Stanke-viciute	*"…it can be described as a set of processes and tools that allows companies to use internet-based information technologies to conduct business internally and externally... that enhances organizational competencies, providing organizations new opportunities to deliver goods and services and adds value through improvements in supply chain efficiency and effectiveness"*	Type of Business (**TOB**); e-Commerce (**ECO**);e-marketing (**EMK**), supply chain management (**SCM**), Enterprise resource planning system (**ERP**), Customer Relationship Management (**CRM**)
7	2014	Gil-Pechuán,, Palacios-Marqués, Peris-Ortiz, Vendrell, Ferri-Ramírez	*"e-Business is composed by several strategies, such as: On line social networks; electronic Word of Mouth (eWom), Crowdsourcing; Websites; SEO; User Experience; Security"*	On line social networks (**OSN**); Electronic Word of Mouth (**EWM**); Crowdsourcing (**CRS**); Websites (**BFN**);Search Engine optimization (**SEO**); User Experience (**USE**); Security (**SEC**)
8	2014	Martínez-López	"E-Business (EB), or e-commerce, is the sharing of business information, maintaining of business relationships, and conducting of business transactions by means of digital telecommunications networks…"	Value Creation and Value Capture (**VPR**); Business Performance (**PER**); Strategy (**STG**); Market (**EMK**);Product Innovation Enhancement (**PIE**); Supply Chain Management (**SCM**); Enterprise Resource Planning (**ERP**); Online Consumer Behavior (**OCB**); e-Tailing (**ETL**);Multichannel Marketing (**EMK**); Pricing in Marketplaces (**EMK**); Consumer Avoidance Behaviors (**CAB**); e-Human Resources (**ORG**); Knowledge Management (**KMG**); Outsourcing (**OUT**); Customer Relationship (**CRM**); e-NNovation (**ENN**); Electronic Word of Mouth (**EWM**); Qualitative Analysis for Business Decisions (**OCB**); Ethics (**ETH**); e-Image (**IT&L**)

No.	*Year*	*Authors (Year)*	*Definition of e-Business Innovation*	*Main e-Business variables approaching*
9	2013	Korpela, Kuusiholma, Taipale, & Hallikas	*"e-Business is considered an e-Business ecosystem because it improves the traditional, thoroughly defined collaborative environments, such as centralized models (client-server), distributed models (such as peer-to-peer), and hybrid models (such as web services) and develops them further into its own model…."*	Customer Value (**VPR**); Data Model (**BFN**); Process Model (**BFN**); Network Collaboration (**CRM,ERP, SCM, SRM**); People Capabilities (**CHM**); Network Value Competitiveness (**CRM,ERP, SCM, SRM**); e-Commerce (**ECO**)
10	2012	Barnes	*"…(e-) Business model innovation refers to those reconfigurations in business strategies and operations that convert resources into business value… Firms will innovate different business models to suit their particular strategic business needs. Indeed, accommodating e-Business in business models is a continual process that is developed in cumulative stages…"*	Performance Monitoring (**PER**)
11	2011	Tawab, Kazemina, & Habib	*"It is considered as a ecosystem …a network that rapidly growing technology which caters online businesses in both sectors of Business to Consumer (B2C) and Business to Business (B2B)…."*	Technology Acceptance Model (**CHM**); Perceived Usefulness (**USE**); Perceived Ease of Use (**USE**)
12	2009	Meier & Stormer	*" It is a set of Support Processes involving: Strategic Planning, Organization and Human Resources, Security Management, Controlling, Cultural Administration and Value Chain. The Value Chain is composed with: e-Products & e-Services, e-Procurement, e-Marketing, e-Contracting, e-Distribution, e-Payment, e-Customer Relationship Management"*	Strategic Planning (**STG**); Organization & Human Resources (**ORG**); Security Management (**SEC**), Controlling (**BFN**); Cultural Administration (**CHM**); Value Chain (**VPR**); e-Products & e-Services (**PIE**), e-Procurement (**EPR**); e-Marketing (**EMK**); e-Contracting (**ECR**); e-Distribution (**EDS**), e-Payment (**EPY**), e-Customer Relationship Management (**CRM**)

No.	*Year*	*Authors (Year)*	*Definition of e-Business Innovation*	*Main e-Business variables approaching*
13	2009	Rappa	*"…defines the e-Business model in its most basic sense, as a method of doing business by which a company can sustain itself by generating revenue..".*	Type Model Business (**TOB**), we have: Brokerage Model (**BKM**); Advertising Model(**EMK**); Infomediary Model (**INF**); Merchant Model (**CRM**); Manufacturer Model (**SRM**); Affiliation Model (**EMK**); Community Model (**CMM**); Subscription Model (**EMK**); Utility Model (**PRO**)
14	2008	Desai & Currie	*"the value proposition in application service provision. The framework uses 6 constructs, namely, Market Positioning, customer Requirements, Products and Services, Value Proposition, Delivery and Pricing"*	Market Positioning (**EMK**); Customer Requirements (**CRQ**); Product & Services (**PIE**); Value Proposition (**VPR**); Delivery and Pricing (**EMK**)
15	2007	Chaffey	*"…It is a concept enhancing the competitiveness of an organization by deploying innovative information and communications technology throughout an organization and beyond, through links to partners and customers…"*	Infrastructure (**INF**); Environment (**O&T**); Strategy (**STG**); Supply Chain Management (**SCM**); e-Procurement (**EPR**); e-Marketing (**EMK**); Customer Relationship (**CRM**); Change Management (**CHM**); Analysis & Design (**BFN**); Implementation & Maintenance (**PLN**)
16	2002	Osterwalder & Pigneur	"it is based on an e-Business Model Ontology involving 4 elements: product innovation (with target customer segment; value proposition; capabilities), customer relationship (with information strategy, feel & serve, trust & loyalty), infrastructure management (resources, value configuration, partner network), financials (with revenue model, cost structure, profit & loss)"	Product Innovation (**PIE**); Customer Relationship (**CRM**); Infrastructure Management (**INF**); Financials (**PRO**); Target Customer Segment (**EMK**); Value Proposition (**VPR**); Capabilities (**CAP**); Information Strategy (**STG**); Feel & Serve (**EMK**); Trust & Loyalty (**IT&L**); Resources (**RSC**); Value Configuration (**VPR**); Partner Network (**CRM, SCM, ERP, SRM**); Revenue Model (**PRO**); Cost Structure (**CST**); Profit & Loss (**PRO**)

No.	*Year*	*Authors (Year)*	*Definition of e-Business Innovation*	*Main e-Business variables approaching*
17	2001	Gordijn, J. & Akkermans,	*"…model(s) that show how a network of actors (a value constellation) creates, exchanges and consumes objects of value by performing value adding activities…. is an important baseline for the development of e-commerce system applications"*	Actor (**VPR**); Value Object (**VPR**), Value Offering (**VPR**); Value Activity;(**VPR**), value port (**VPR**); Value interface (**VPR**); value exchange (**VPR**)
18	2001	Dubosson-Torbay, M., Osterwalder, A. & Pigneur, Y..	".. is nothing else than the architecture of a firm and its network of partners for creating, marketing and delivering value and relationship capital to one or several segments of customers in order to generate profitable and sustainable revenue streams…"	Product innovation (**PIE**); Customer Relationship (**CRM**), Infrastructure management (**INF**), Financials (**PRO**); Revenue (**PRO**)
19	2001	Amit & Zott	"…E-Business has the potential of generating tremendous new wealth, mostly through entrepreneurial start-ups and corporate ventures. It is also transforming the rules of competition for established businesses in unprecedented ways…"	Virtual Markets (**EMK**); Value Chain (**VPR**); Resource View of the Firm (**RSC**); Value Creation (**VPR**); Lock-in (**LCK**); Novelty (**NOV**); Efficiency (**EFF**)

No.	*Year*	*Authors (Year)*	*Definition of e-Business Innovation*	*Main e-Business variables approaching*
20	2001	Petrovic, Kittl & Teksten	"It is an improvement of the original business model of the firm…It includes de e-Commerce and the e-Market"	Value Model (**VPR**); Resource Model (**RSC**); Production Model (**SCM**); Customer Relationship Model(**CRM**); Revenue Model (**PRO**); Capital Model (**PRO**); Market Model (**EMK**); Mission (goals, vision & value proposition, **MVS**); structure or actors, governance and focus (**ORG**); Processes or customer orientation, coordination mechanisms (**USE**)

Notes: Brokerage Model (BKM); Business Functionalities(BFN); Crowdsourcing (CRS); Change Management (CHM); Community Model (CMM) ; Consumer Avoidance Behaviors (CAB); Cost Structure (CST); Customer Relationship Management (CRM); Customer Requirements (CRQ); e-Business Tools (EBT); e-Distribution (EDS); e-Contracting (ECR); e-Commerce (ECO); e-Human Resources (ORG); e-Marketing (EMK); e-Media (EMD); e-Procurement (EPR); e-Tailing (ETL); Efficiency (EFF);e-Image (IT&L); Electronic Application Integration (EAI); Electronic Data Interchange (EDI); Electronic Word of Mouth (EWM); Electronic Word of Mouth (EWM); e-NNovation (ENN); Enterprise resource planning system (ERP); e-Payment Processes (EPY); Ethics (ETH); Goal Settings (GST); Knowledge Management (KMG); Image, Trust & Loyalty (IT&L); Infrastructure Management (INF); Lock-in (LCK); Market (EMK); Mission & Vision (MVS); Novelty (NOV); On line social networks (OSN); Online Consumer Behavior (OCB); Opportunities & Threats (O&T); Outsourcing (OUT); Performance (PER); Planning (PLN); Product Innovation Enhancement (PIE) ; Profitability (PRO); Resources (RSC); Security (SEC); Search Engine optimization (SEO); Strategy (STG); Supply Chain Management (SCM);Tactics (TAC); Type of Business (TOB) ;Universal Description, Discovery and Integration (UDDI);User Experience (USE); User Experience (USE); Value Proposition (VPR)
Source: several authors with own adaptation.

Results

As a result of the literature review, we made a table to show the **eBIM** variables per author, a standardization and a summary of them, based on its total frequency as academic vision approach. The conceptualization of an **e-BIM** is still disperse and we need to determine the variables of the study. Therefore, we gathered a group of **6 e-Business experts**: 1 software designer of e-Business systems, 1 consultant of e-Business services, 1 professor of information and communications technologies (**ICT**), 1 **CEO** of **SME** of e-Business programming services, 1 programing manager of e-Business services (front office), 1 support manager of programming e-Business services. This group of experts was focused its experience and attention to determine the main variables and factors and a suggested order to be involved for the **eBIM.** To achieve it, we applied a qualitative analysis using a focus group with Delphi Panel and Analytic Hierarchy Process (**AHP**, Saaty, 1997). The results are showed in **Table 2**.

Table 2
Focus Group by Delphi Panel and AHP to Determine the Main Groups of Variables of eBIM Under Academic and Expert Visions

	Objective: e-Business Innovation Factor							
	Order Suggested for expert vision	*Variables*	*Factor as Academic Vision*		*Factor as Expert Vision*		*% Difference >|2.0| (Academic Vision-Expert vision)*	*Resulting Vision Issues*
			Frequency	*%*	*Factor suggested*	*AHP weighed as Expert Vision (%)*		
Alternatives	1	MVS	2	2.82	STR	2.5	0.32	ACD-EXP
	2	ETH	1	1.41		3.9	-4.49	EXP
	3	VPR	10	14.08		9.9	5.38	ACD
	4	EMK	11	15.49		9.56	6.69	ACD
	5	O&T	2	2.82		6.3	-3.48	EXP
	6	KMG	1	1.41		1.5	-2.19	EXP
	7	GST	2	2.82		2.7	0.12	ACD-EXP
	8	PLN	3	4.23		6.1	-1.87	ACD-EXP
	9	CST	1	1.41	IO&M	5.98	-3.83	EXP
	10	BFN	7	9.86		8.1	1.76	ACD-EXP
	11	CHM	5	7.04		1.9	5.14	ACD
	12	EBT	1	1.41		3.1	-1.69	ACD-EXP
	13	STG	5	7.04		3.2	3.84	ACD
	14	ORG	3	4.23		3.9	0.33	ACD-EXP
	15	INF	5	7.04		5.8	1.24	ACD-EXP
	16	TAC	1	1.41		6.89	-5.48	EXP
	17	SEC	2	2.82		5.97	-3.15	EXP
	18	PER	3	4.23	KPI	6.5	0.13	ACD-EXP
	19	PRO	6	8.45		6.2	1.25	ACD-EXP
Total			71	100		100		

Notes: ACD. Academic Vision; EXP. Expert Vision; STR. Strategy Factor; IO&M. Implementation, Operation & Maintenance ; KPI. Key Performance Indicators. Source: Own

According the methodology, the result for the test confidence Cronbach's Alpha is shown in **Table 3**.

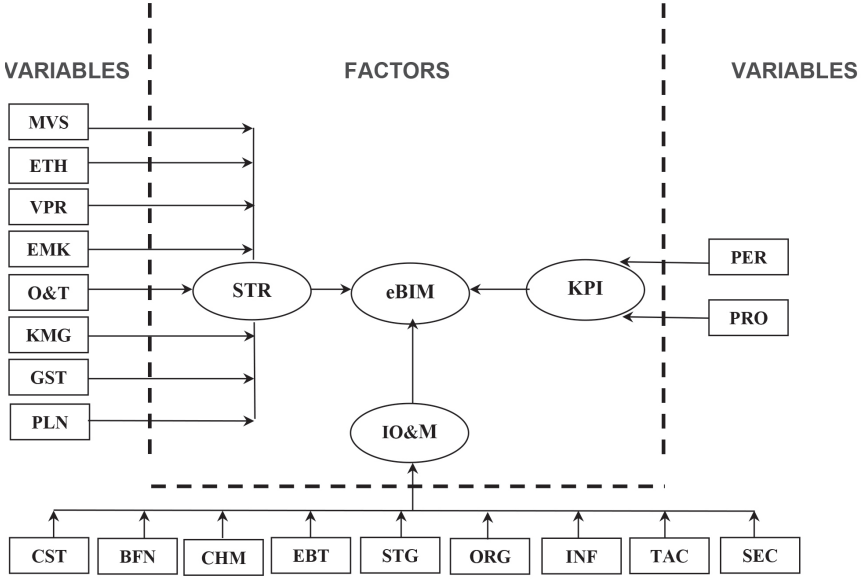
*Table 3*Cronbach's Alpha Test

Cronbach's Alpha	*N of Variables*	*Result*
.850	19	Good level of confidence

Source: SPSS 20 as a result of the research and adapted by the author.

The General Conceptual ex ante of **eBMI** is shown in **Scheme 1.**

Scheme 1
General Conceptual *Ex Ante* Of eBMI
Variables Factors Variables



Source: own.

Conclusions

6.1 For the 6 e-Business innovation (**eBIM**), located at the Guadalajara Metropolitan Zone, Mexico, the research question: *Which is the*

*conceptual model proposed for the e-Business Innovation Model (**eBIM**)?* is solved when are answered the specific questions as follows: At respect to **SQ1**: *Which are the variables proposed for the general conceptual model?* We showed the proposal of 19 variables and 3 factors in **Table 2.**

6.2 About **SQ2:** *What about the differences of both visions: academic and expert?*

According the **Table 2**, using the focus group technique and the **AHP** we obtained the visions: academic and expert. It is interesting to observe the common interest of both (ACD-EXP), in **9/19** the variables: **MVS, BFN, GST, EBT, ORG, INF, PLN, PER and PRO**. However, it still persist the lack of interest or lack of knowledge, to practice **4/19** variables in the sector of: **CHM, VPR, EMK, STG**. By other hand, the expert vision claims to incorporate in the academic vision concepts regarding **6/19** variables: **ETH, O&T, KMG, CST, TAC, SEC.**

6.3 Regarding **SQ3**: *Which are the groups or factors proposed for the variables in the final conceptual **eBIM**?*. The expert vision suggested **3** underlying Factors to group the variables: Strategy (**STR,**(8/19); Implementing Operation & Maintenance (**IO&M**, 9/19) and Key Performance Indicators (**KPI**, 2/19).

6.4 It is suggested to do additional studies such as an exploratory factor analysis to verify the grouping of such variables; a confirmatory factor analysis to disclose the underlying variables and factors relationships and a multiple linear regression to determine how is the correlation amongst these variables.

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Knowledge Management, Open Innovation and e-Marketing & e-Business as Key Factors of Development of the Information and Communication Technology Sector
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Knowledge Management, Open Innovation and e-Marketing & e-Business as Key Factors of Development of Information and Communication Technology Sector, is aimed to compile a selection of papers published during the period of 2015-2016 & 2017 by professors of the Phd Management Sciences, of the University of Guadalajara, to show how is proposed the design of their interaction and what were the first meaningful findings for the information and communication technologies sector located in Jalisco, Mexico.

This book represents an opportunity for demonstrating the relevance of how the management sciences identify problems from Knowledge Management, Open Innovation and e-Marketing & e-Business and design models for the development of such complex sectors like the information and communication technology.

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