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RONALD
MORA-ESQUIVEL

DANIEL
VARELA-JIMÉNEZ

JUAN CARLOS
LEIVA

JEL: O31, L30, M15.

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SME INNOVATION PROCESS: COMPARISON OF SERVICE AND MANUFACTURING FIRMS

PROCESO INNOVACIÓN EN PYMES: COMPARACIÓN DE EMPRESAS DE SERVICIOS Y MANUFACTURA

RONALD MORA-ESQUIVEL[1]

DANIEL VARELA-JIMÉNEZ[2]

JUAN CARLOS LEIVA[3]

JEL: O31, L30, M15.

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ABSTRACT

The article seeks to provide an understanding of process innovation, an area of innovation research where there is less contribution in the literature. The understanding of alternative ways in which companies innovate both their products and services, and organize and evaluate the results of their innovative activities is the focus of this study. To this end, a qualitative and explorative methodology was designed, focused on Small and Medium Enterprises (SME) from the information technology sector (ITS). It was then compared with a previous study of SME manufacturing in the food sector, both of which are in Costa Rica. Comprehensive, face to face interviews were implemented, with SME owners or managers who have recently launched an innovative service. The Nvivo version 10 software was used to process the information. The investigation results allowed the identification of a series of common phases and elements in the SME studied, for the development of innovations. Also, the existence of a series of differences and similarities in the innovation processes of these ITS SME with manufacturing SME was detected.

KEY WORDS

Innovation process, SME, Service innovation, Manufacturing innovation, Information Technology Sector

RESUMEN

Este artículo buscar aportar conocimiento en el proceso de innovación, un área de la investigación en innovación en la cual existe menor aporte en la literatura. La comprensión de formas alternativas que tienen, empresas que innovan en productos y aquellas que innovan en servicios, para organizar sus actividades innovadoras y evaluar sus resultados es el foco de atención del presente estudio. Para ello, se llevó cabo un estudio cualitativo y exploratorio en Pequeñas y Medianas Empresas (Pymes) pertenecientes al sector de tecnologías de información y comunicación, el cual se contrastó con otro estudio previo sobre Pymes del sector manufacturero de alimentos, ambos en Costa Rica. Se aplicaron entrevistas en profundidad con emprendedores quienes recientemente habían lanzado una innovación. Se utilizó el software Nvivo versión 10 para procesar la información. La investigación permitió determinar una serie de pasos comunes y elementos que caracterizan el proceso de la innovación. Asimismo, permitió evidenciar diferencias y similitudes en el proceso de innovación entre empresas manufactureras y del sector de tecnologías de información y comunicación.

1 Doctor in Business Administration from the University of Valencia, Spain. Professor at the School of Business Administration of the Technological Institute of Costa Rica.
rmora@itcr.ac.cr
ORCID: https://orcid.org/0000-0002-4315-0418
2 Bachelor in Business Administration from the Technological Institute of Costa Rica. General Manager. Independent Agent Insurance Office of the National Insurance Institute, Costa Rica.
danielvarelaj@gmail.com
ORCID https://orcid.org/0000-0002-6082-2087
3 Doctor in Business Administration from the University of Valencia, Spain. Professor at the School of Business Administration of the Technological Institute of Costa Rica.
jleiva@itcr.ac.cr
ORCID: https://orcid.org/0000-0001-9653-4629

PALABRAS CLAVE
Proceso de innovación, Pymes, Innovación en servicios, Innovación en manufactura, Tecnologías de información y Comunicación.

1. INTRODUCTION

Innovation is currently considered the keystone in the competitive capacity of countries. Consequently, the capacity to generate advances in science, technology and new knowledge has become fundamental (World Economic Forum, 2016; OECD, 2005).

In the study of innovation we find: a) a greater empiric contribution in the innovative result than in the process (Crossan & Apaydin, 2010), b) also, the explanation of the phenomena in developed countries and large companies (Matos, Aparecida, & Querido, 2016), and c) a greater contribution in the literature of technological innovations (Randhawa & Scerri, 2015).

In view of the aforementioned, the following research question is posed: are there differences in the characteristic elements of the innovation process of a product and service between Small and Medium Enterprises (SME) in the food sector and SME in the information technology sector (ITS). Therefore, the present study seeks to understand the phases in the innovation process in SME of the ITS and their characteristic elements.

Also, this study aims to determine similarities and differences in regards to the SME manufacturing innovative process for the food manufacturing industry. This information will be from the point of view of a small, developing country, such as Costa Rica. Additionally, this study will be focused on the understanding of process linearity from the study participants' perspective.

Costa Rica is the 53rd most innovative country, according to the Global Innovation Index (Cornell University, INSEAD and WIPO, 2017), second in Latin America, only behind Chile. Globally, Costa Rica is ranked 1st on ITS exports on the same index. Additionally, 93.4% of Costa Rican companies are SME; most of these companies are focused on service-rendering activities (43%) (Costa Rican Ministry of Economy, Industry and Commerce, 2015).

It is important to highlight the role of both sectors studied (Food and ITS) in the Costa Rican economy. The former, according to the Costa Rican Agency for Exports Promotion (PROCOMER) (2018) represented 14.65% of the country's exports of goods; which in their totality, according to Costa Rican Central Bank (2018), represented 19.3% of the Gross Domestic Product (GDP) in 2017.

In contrast, the ITS sector is made up, on average of 8.4% of exports in services from 2012 to 2014, and all service exports constituted 14.8% of GDP in 2017, according to the Costa Rican Central Bank (2017). Furthermore, according to the World Bank (2016), this sector stands out for employing 2.5% of the workforce as well as its importance for job creation in the country.

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To accomplish its research goal, the study adopted an exploratory qualitative approach. The innovation process´ elements identified by six ITS SMEs´ owners and managers interviewed were compared with those obtained in a recent study from Mora, Lafuente and Fonseca (2016) in six SME in the manufacturing sector. In the first cycle, descriptive coding and sub-coding were used to obtain and summarize citations whose contents referred to innovation process' elements; then, they were grouped into categories or related themes into second coding cycles (Miles, Huberman & Saldaña, 2014). Regarding the qualitative data processing, Nvivo 10 software was used.

As a result, a group of phases and their characteristic elements were identified, as well as tools and methodologies used to develop an innovation process within the companies. These processes are mainly focused on obtaining feedback from potential clients from the early stages of the process. Also, the study found similarities and differences between both sectors, and focused on its linearity.

2. LITERATURE REVIEW

Innovation, as a fundamental aspect of economic development, has been analyzed from different perspectives (Crossan & Apaydin, 2010; Ritala, & Almpanopoulou, 2017) that have generated different typologies and definitions (Oke, 2007). However, as Geldes and Felzensztein (2013) noted, there is an agreement in the proposed definition by OECD (2005), which states that an innovation implies the improvement and/or development in market introduction for products or services that are completely new.

Specifically, in the service sector, innovation is conceptualized as a merge between product and process innovation. Also, Agarwal and Selen (2011) define service innovation as a significant improvement in the way a service is provided, which may involve: a new interface for the client, new ways of delivery, improvements at the organizational level or in the marketing proposal, and/or changes that cause improvements in the productivity of the people providing such services.

Likewise, Den Hertog, Van de Aa and De Jong (2010) propose a conceptual model that identifies six main competencies that the service innovation process must involve. They include aspects such as: signaling user needs and technological options; conceptualizing; (un-)bundling; co-producing and orchestrating; scaling and stretching; and learning and adapting.

Along with the competence model previously presented, there is a new service generation process described by Johnson et al (2000), which proposes an activity cycle to develop a new service, which remarks the non-linearity of the process and the relevance of the process facilitators (team, design techniques, organizational culture, among others) that allow the design and provision of the service to the consumer.

The model proposed by Johnson et al (2000) consists of four stages: design, analysis, development and launch, which involve the formulation of strategies and objectives and the revision of the results obtained along with the formulation of new

ideas. Also, Randhawa and Scerri (2015) emphasize that the interaction between service consumers and suppliers, along with other parties, enables the education of the company and the development of strategies that allow for more efficient competition.

An effective methodology to manage these types of efforts is Design Thinking (Brown, 2008; Leavy, 2010; Dijksterhuis, & Silvius, 2017), which involves five main stages: understanding, empathize, defining the problem, coming up with ideas and trying them. They deliver a process that looks to solve users' problems in a creative, intuitive way which directly impacts the users' needs. Along with this methodology, the Lean Startup (Ries, 2011) method intends to lower the risks in these types of activities, with a main pillar which is customer feedback along the process.

2.1 Differences between the Manufacturing Sector and the Services Sector

First, it is important for services to demonstrate some characteristics such as: intangibility and heterogeneity, a durable character, greater interaction with users and simultaneity between production and consumption (Sampson & Spring, 2012).

In regard to the latter, it is relevant to point out that most of its performance is based on the user´s criteria (Bessant & Tidd, 2011). As a result of this, a service innovation tends to be tried in the market instead of in research and development labs (Tidd & Hull, 2003).

The innovation process in services involves a high degree of interaction between the supplier and the customer (Zeithmal & Bitner, 2003; Witell et al.,2017). Also, the interaction with the consumer during the process of service innovation results in the existence of a greater level of customization in the final result, which causes greater heterogeneity (Randhawa & Scerri, 2015; Leyer, Stumpf-Wollersheim, & Pisani, 2017).

There are areas where greater differences between the innovative process of products and services can be found (Ettlie & Rosenthal, 2011; Rosca, Arnold, & Bendul, 2017); for example, services select alternative ways to formalize their innovation processes, and there are peculiarities in the methodology used to try new concepts with customers. Managers have multiple roles at all levels, both in the generation of ideas and in the development of new production processes.

2.2 Evolution of Innovation Models

As Kotsemir and Meissner (2013) noted, since the 1950's the concept of innovation process has continuously evolved. The first of these generations, presented by Rothwell (1994), focused on the development of new technologies that would automatically generate a demand dominated by its supplier, where research was the main input in the process (Velasco, Zamanillo, & Gurutze, 2003). Also, a lineal trajectory was assumed from its discovery to its introduction into the market, which was later known as the Technology Push model.

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After that, and from the intensification of the competition from big corporations, it is important to understand the needs found in the market, which is the main aspect difference from the first generation (Matos et al., 2016); from that point on, the innovation process began its second generation, called Market Pull Model, which was focused on researching facts related to the demand as its keystone (Rothwell, 1994).

The third generation, known as the "coupling model", took place between the early 70's and mid 80's, as the result of the growth of inflation rates due to the increase in oil prices. This period was highlighted by the search of a balance between research, development and marketing needs (Matos et al., 2016). This implied the development of a model that allowed for better management of resources. The Stage Gate model, developed by Cooper (1994, 2017), came about as a key proposal to divide the innovation process into the following stages: idea, preliminary research, implementation of a business case, development, trials and validation. Each of such stages had quality controls known as doorways, where project development decisions were made.

The generation of the fourth innovation process is described by Kline y Rosenberg (1986), who propose a model that follows a logic sequence, but not as a linear, continuous step sequence (Matos et al., 2016). According to Kline and Rosenberg (1986), a commercial innovation is controlled by two main forces: the market and technology, which usually determine the opportunity to improve a product, its performance and/or the ability to reduce production costs. All of these relate to three areas in the technological innovation process: research, knowledge and the principal process chain (Velasco et al., 2003).

A fifth process generation area highlights the fact that companies do not innovate in isolation, so it is important to consider a structure in which the relationships of the company are related to others, both directly as indirectly when it comes to innovating (Rothwell, 1994).

Lastly, as both an alternative and as a part of the sixth generation of the innovation process, the Open Innovation model presented by Chesbrough (2003) is brought up as a solution to the innovation practice problem: concentrating only on information and the capacities of the innovation-interested company. Chesbrough (2003; 2017) proposes that before the dynamic conditions of the current environment, the innovation-interested companies must recognize valuable ideas which may come internally or externally from their management structure, and to highlight the value of their importance regardless of their origin.

2.3 Considerations on the process linearity

As noted by Escorsa and Valls (1998), a linear model is used which seeks to understand the different stages and activities carried out during the innovation process. However, these models vary far from reality, and be quite complex (Crossan & Apaydin, 2010; Escorsa & Valls, 1998).

Also, Velasco, Zamanillo and Gurutze (2003) state that process representation in a simple, rational way is very useful in its understanding. However, there are differences in this type of presentation: a) a sequential, organized character is not always necessary at some of the stages of the process, since they may exist in a different order; b) the existence of a different feedback processes; the exchange of information back and forth where unforeseen occurrences may appear which are not evidenced in this model; and c) these types of models must use some kind of activity as an initial process cause. However, naming a single element as a process activator may be a little extreme due to the existence of multiple innovation sources.

Lastly, it is important to state the innovation process in some companies does not follow stages or a systematic process, mainly because they do not have the resources to do so (Faherty & Stephens, 2016).

3. RESEARCH DESIGN

The research was qualitative and exploratory. It used the Case method (Yin, 2009). Six ITS service company innovation cases were studied. The manufacturing company part was analyzed using a study by Mora et al. (2016) who developed their study analyzing six Costa Rican manufacturing companies' innovation cases.

3.1 Case Selection

The theoretical sampling was used, not only by replicating and contrasting previous cases (Eisenhardt, 1989) in another sector, but also to understand a construct being studied and its variations (Patton, 2002), specifically, elements of the innovation process. The sampling was designed to include informants from: a) SME firms -company, smaller in size to 100 employees; b) firms which have developed and launched service innovations to the market during the last two years; c) firms that operate in ITS subsectors. With respect to these criteria, the collaboration of informants was used to select the cases; named by Patton (2002) as typical cases. Thus, The Technological Institute of Costa Rica alumni program and ITS professionals were contacted. Moreover, outstanding companies in the media and innovation award-winning companies were selected. These sampling criteria were similar to manufacturing firm cases selected by Mora et al. (2016).

Table 1 describes characteristics of the firms studied and the interviewees. In regards to the sampling unit, four small companies, a medium company and a micro company were taken into consideration. It is important to note that these companies belong to different sub-sectors within the ITS. There were three company manager-owners, one marketing manager, one operational manager and a software development representative.

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Table 1

Characteristics Of The Company Samples And Interviewees

Code	Sub-Sector [a]	Company Size [b]	Number of Interviewees	Interviewees Positions	Number of Visits
CT	6202 Hardware Innovation Consultancy	Micro	1	Owner-Manager	1
FP	6399 Video Game Consultancy and Development	Medium	1	Manager	2
GP	5320 Personal Messaging Service	Small	1	Manager	2
HH	6201 Health-related issues search platform	Small	2	Owner-Manager, Development Representative	2
SB	5820 Executive presentation development platform	Small	1	Owner-Manager	2
XY	6399 Hardware and Software Innovation Consultancy and Development	Small	1	Owner-Manager	2

Note. [a] According to the Costa Rican Economic Activities AECR-2011, based on Costa Rican Economic Activities Classification (INEC, 2011). [b] According to the micro-company traditional classification: less than 5 employees; small company: between 6 and 30 employees; medium company: between 31 and 100 employees (Costa Rican Ministry of Economy, Industry and Commerce, 2015).

3.2 Design of Data Collection Instrument

To compare the results of this study with previous ones obtained in the qualitative study of food sector SME firms, the conceptual framework of innovation process, stages and the questionnaire employed by Mora et al. (2016), were taken as a reference. The questionnaire used by Mora et al (2016) was analyzed and modifications were made to adapt it to the characteristics of the services sector, specifically, ITS, together, with the integration of new variables addressed in this study. These modifications were evaluated by means of a pre-test with a company from the ITS. Hence, an interview guide (Appendix 1) with open questions and polls was used, which looked for each participant to comment on the characteristics, phases and other elements related to the innovation process that took place within their organizations.

3.3 Data Collection Procedures

As shown in Table 1, in most of the firms the same interviewee was visited twice, during the second semester of 2016. Based on the interview guide, in the first visit each participant was asked to comment about the innovations in services their firms introduced to the market, and to describe each step and elements involved from

the idea gestation to its launch into the market. The interviewees were also asked to comment on their perception of the process linearity applied to their companies.

The second visit was devoted to present the manager with the main ideas, pieces of information, and aspects expressed by the interviewee, and that were captured in the first-round interview. This was submitted and depicted using figures and graphs, to explain in a narrative way the innovation process stages and elements of their company. Essentially, the interviewee was asked to complete any additional information not considered during the first visit, and most importantly, to confirm and validate the innovation process and the configuration of the elements. The latter, was used as a way to adjust and modify the construct validity (Pettigrew, 1997; Yin, 2009).

3.4 Data Analysis Procedures

The interviews were audio-recorded, with the authorization of the interviewee, and were transcribed *verbatim*. Every interview session lasted about 50 minutes. Subsequently, NVivo 10.0 was used to carry out the coding cycles of citations. In a first coding cycle, provisional coding enables the ability to have a beginning list of codes obtained from a previous review of literature; then relevant text or citations were identified using descriptive coding (Miles et al., 2014). Further, sub coding to detail the initial codes and structural coding related to elements of the innovation process were used, especially in the interest of identifying preliminary categories and subcategories into hierarchies or taxonomies. The aim of a second coding cycle was used to refine the grouping of themes and thematic categories and subcategories (Saldaña, 2013). Likewise, for large qualitative data sets, analytical techniques such as co-occurrences and frequencies of words or phrases were used for their reduction or synthesis, as suggested by Namey, Guest, Thairu and Johnson (2009).

The method allowed for the ability to identify and characterize elements that comprise the innovation process of the firms studied. It was important to structure the qualitative data into categories since it made it possible to identify differences and similarities between the processes and their elements. Finally, these results were later compared to those found by Mora et al (2016).

4.RESULTS ANALYSIS

4.1 Characterization and features of the innovation process stages

The qualitative data processed by Nvivo 10 generated 104 textual quotes expressed by the interviewees regarding the innovation process and its characteristic elements. These quotes were classified according to innovation process stages and worked as a guideline to establish which would be the most relevant aspects for each stage. These quotes were validated in the second round with interviewees. Also, it was possible to identify the elements in each one.

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As a key finding, regarding the characterization of the innovation process taken by the studied companies, the topics of theses citations tended to be grouped into three generic stages: a) idea gestation, b) development, and c) launch into the market. According to the methodology applied, citations were distributed in percentages as follows: idea gestation (30.77%), development (32.69%) and launch into the market (36.54%).

Furthermore, as it was distinguished by Kotsemir and Meissner (2013), three major steps (invention, development and commercialization) were identified in each innovation process studied. As such, there is the enforcement of all capabilities proposed by Den Hertog, et al., (2010), regarding the role of client participation in the learning process in the company, the generation of new strategies appointed by Randhawa and Scerri (2015), and the interactions and learning alongside the client as main points in the process (Brown, 2008; Johnson et al., 2000; Ries, 2011).

4.2 Contrast between the Service Sector and the Manufacture Sector

This section will contrast the generic stages in the innovation process of companies in the ITS with those in food sector analyzed by Mora et al (2016). To this end, the similarities and differences for each stage regarding the characteristic elements detected on both innovation processes will be presented, which will use the proposals from the theoretical point of view and the information collected along the study process.

Generic Stage 1: Idea gestation

The idea gestation stage detected four main sub-categories (Table 2): a) idea-generating sources, b) idea assessment flexibility, c) assessment criteria and d) external agent participation in the stage.

In connection with the idea-generating sources, in four ITS firms (SB, CT, XY, HH)

Table 2

Quote Distribution In Subcategories Of Idea Gestation Stage

Sub-category	Quote Number[a]	Percentage[b]
Idea-Gestation Sources	6	5.77%
Assessment Flexibility	6	5.77%
Idea Assessment Criteria	7	6.73%
External Agent Participation	13	12.50%

Note. [a]= Number of quotes related to the referenced stage in absolute frequency.
[b]= Relative quote frequency related to the stage regarding the total amount of quotes in the interviews.

the identification of a problem was considered as the main internal source while the monitoring of market and technology tendencies, and external sources were noticed

as fundamental in two firms (GP, FP). Although these two sources were present in the cases of manufacturing SME, there were differences in other information sources which were used in the manufacturing sector, for example, a) the use of scientific information sources and b) fair participation.

The use of both types of idea-generating sources coincides with the Cooper (2008) and Johnson et al. (2000) statement on the existence of several idea generating sources in the innovation process. The focus of problem identification as a main source in the ITS stage is linked to the Design Thinking methodology proposed by Brown (2008), where the main objective is to find a solution, oriented to the user's needs and their satisfaction. Den Hertog, et al., (2010) agree with this statement and propose finding unmet user's needs in order to provide service innovation.

With respect to the second subcategory as it relates to flexibility in idea assessment, four of the ITS companies (CT, GP, HH, SB) did not follow a specific assessment methodology. Conversely, two of the companies (FP, XY) use a series of specific criteria to define which ideas are the most attractive ones. The latter went in line with the same number of fewer cases in the manufacturing firms with a structured, standardized system to record and assess their ideas.

It is also important to mention five companies in the ITS (FP, GP, HH, SB, XY) used the Lean Startup method developed by Ries (2011), which is a non-structured idea assessment process. It uses the scientific method in business by enforcing tests, also known as hypothesis, which allow for the assessment of the proposal relevance according to the user criteria.

In terms of the third subcategory, some of the criteria used by the companies to assess innovative ideas are: a) scalability (GP, SB), b) organization culture (XY), c) process improvement (GP), d) marketing potential (FP), and e) novelty (CT, FP). It is evident there is no tendency regarding the criteria used to assess the innovative ideas in the ITS. The opposite happens in the manufacturing sector, where four companies noticed the availability of raw materials, both in quantity and in quality, as a relevant element. They also consider other factors, such as: potential demand, product shelf life and packaging (Mora et al, 2016).

In the ITS study none of the subsector firm cases presented a rigorous assessment process as established by Cooper (1994; 2017). One of the main principles in Lean Startup, proposed by Ries (2011) and used by five out of six companies in the ITS, is to choose to experiment with users above having a completely elaborated plan.

A final element in the idea gestation stage is the participation of external agents to the company during this stage. In this regard, three external agents were highlighted by interviewees: a) accelerators or incubators (SB), b) competitors (CT, XY) and c) distributors (FP). This subcategory was not the case concerning the SME manufacturing firms, in opposition to Chesbrough (2003) who has stated that companies may integrate external ideas and make their own available to others.

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Generic Stage 2: Development

The similarity and difference in analysis of the studied companies in the ITS and manufacture sector during the development stage identified the following subjects (Table 3): a) research, b) team building, c) an approval, d) acceptance test performance, e) "prototypes" and f) test documentation.

Table 3

Quote Distribution In Subcategories Of The Development Stage

Sub-Subject	Quote Number[a]	Percentage[b]
Preliminary Research	2	1.92%
Team Building	5	4.81%
Approval	4	3.85%
Acceptance Tests	6	5.77%
Prototypes	12	11.54%
External Agent Participation	5	4.81%

Note. [a] :Number of quotes related to the stage (absolute frequency). [b] :Relative quote frequency related to the stage regarding the total amount of quotes in the interviews.

In regards to the first characteristic element (Preliminary Research), two companies (HH, XY) emphasized the importance of conducting a preliminary research before the development stage. The aim is to learn about technological components and requirements needed to proceed with the development of their innovative idea. The study conducted in manufacturing SME found two companies had alternative ways to manage the requirements of the innovation process.

The capacity to analyze the requirements needed to proceed with the innovative service development implies two characteristics in the innovation process appointed by Den Hertog, et al., (2010). They contemplate the analysis of possible elements to be integrated in order to come up with a new solution in the market, and to have the capabilities needed to make smart combinations between them.

In regards to team building (second subcategory) and approval to manage the innovative service development (third subcategory), five companies (CT, GP, FP, HH, SB) think team work is valuable in this stage. Additionally, four companies (CT, FP, HH, SB) stated that it was important to designate specific people in the team in order to conduct approvals. One company (FP) highlighted the importance to accelerate the production process.

There were two cases in the manufacturing sector companies where an organizational mean facilitated coordination, planning and other aspects of the innovative process by implementing an innovation committee and a research and

development team. Also, the presence of approvals was a common subject in all companies of this sector.

Both elements are present in the Stage Gate model principles, where teams oversee the proposal development and the presentation of new advances to an assessment team, who decide if the project gets suspended, continues its course or needs to reassess certain aspects. The people in charge of approvals are known as "gatekeepers", and they are in charge of defining if the project may continue or not (Cooper, 2008).

Referring to the performance acceptance test, a fourth subcategory was studied in the development stage. All companies in the ITS performed them and kept the respective documentation. Additionally, four (FP, HH, SB, XY) out of six companies had a documentation instrument. These kinds of tests were not found in the manufacturing sector before the launch into the market.

Both the Cooper (1994) and the Johnson et al (2000) models contemplate the development of acceptance tests, with certain users who prove the product's acceptance before going into the market. Also, Lean Startup and Design Thinking methodologies, used by five companies in the ITS (FP, GO, HH, SB, XY) use experimentation and validation with users to guide their enforcement of innovative ideas. Moreover, that confirms the fact that service innovation may be proved directly into the market instead of research and development labs (Tidd & Hull, 2003).

The last subcategory in this stage considers the characteristics of a successful prototype. Of those, five out of six companies (CT, GP, FP, SB, XY) mentioned that a prototype was considered successful when it met the clients' requirements, and one company (GP) mentioned that the most important fact was process optimizing to access a bigger market.

In comparison, the manufacturing companies study showed prototype assessment in all cases. However, such assessment focused on the analysis of the following criteria: a) profitability and availability of raw materials, b) organoleptic and physical aspects, c) and market demand, among others.

The influence of methodologies, such as Lean Startup and Design Thinking, is demonstrated with the requirements that prototypes must comply with, which are focused on meeting the clients' needs and solving their problems. This shares the ideal proposed by Bessant and Tiid (2011) and Vargo and Lusch (2008), which emphasizes that value will be determined only or mostly for the benefit of the customer.

Cooper's Stage Gate model (1994) has spaces per stage to assess advances to consider qualitative and quantitative criteria. However, qualitative aspects are related to the market in general, such as: achieving a sustainable competitive advantage, commercial appeal or synergy with other products. The process does not revolve around solving a client's problem; rather it uses predictions and analysis to assess the project development in general.

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Generic Stage 3: Launch into the Market

During the launch stage (Table 4) these subcategories were identified: a) disclosure, b) client feedback, c) functionality or improvement introduction, d) critical facts in the stage and e) the existence of an augmented product.

Table 4

Quote Distribution In Subcategories Of The Launch Into The Market Stage

Sub-Subject	Quote Number[a]	Percentage[b]
Disclosure	14	13.46%
Client Feedback	6	5.77%
Improvements	5	4.81%
Launch Critical Facts	6	5.77%
Augmented Product	7	6.73%

Note. [a] :Number of quotes related to the stage (absolute frequency). [b] :Relative quote frequency related to the stage regarding the total amount of quotes in the interviews.

As it relates to the first subcategory, two companies (HH, XY) mentioned that they performed their disclosures internally in order to be prepared to answer all possible questions that clients may have. All companies in the ITS considered that the design and execution of a marketing plan played a determinant role in generating expectation for the client. This plan encourages the use of social media, content generation, publicity, and online search tools. In comparison, disclosure was not a characteristic subject to the cases studied in the manufacturing sector.

The model of Johnson et al (2000), contemplates the introduction of activities related to the designing of a marketing plan that the company will execute to the launch the innovative service. In addition, The Stage Gate system emphasizes the marketing department's involvement in the process and the presence of a post market introduction revision (Cooper, 2008).

As a second subcategory identified, client feedback, is considered by all companies in the ITS as an essential in the service assessment once they have been introduced into the market. Such an element is linked to the introduction of improvements and functionalities pointed out by four (GP, FP, HH, SB) of the studied companies, since users' criteria is the main input for idea generation. Additionally, focusing by all means in client satisfaction brings multiple benefits for companies because it allows for the building of long-term relationships with clients that can facilitate the introduction of new products or services in the future (Garcia, Quintero & Arias-Pérez, 2014).

In the manufacturing sector, companies were visiting the sales points as a system of internal feedback and were counted with an accompanying system for the distribution channel, where the information collected was considered as input to assess and manage change related to the previous stages executed.

On one hand, in the Stage-Gate model, there are three main elements to assess performance after the product introduction into the market: a) to meet the metrics proposed (sales, times), b) to analyze the role of each member of the team and their compliance of responsibilities and c) improvement points for future projects (Cooper, 2008).

On the other hand, this is contradicted by processes such as those proposed by Ries (2011) and Johnson et al (2000) which consider iterating and its learning process is fundamental to innovative product and service development. Therefore, there must be a possibility to retake previous stages or to revert the process by executing new ideas based on results obtained after the launch into the market.

Regarding the launch critical facts subcategory, one of the companies (CT) considered relevant to replicate the solution, two companies (HH, SB) highlighted the fact of having customers before the launch, another company (GP) to be able to have a balance between offer and supply in the platform, and two companies (SB, HH) considered as valuable not to take long in launching the product into the market.

Mora et al (2016) mention that companies in the manufacturing sector had monitoring systems to determine the acceptance of the product into the market and to have a volume control of the sales. The first of these aspects is mentioned before, and the second one is used by the companies in the ITS by using their platform and number of users.

The last subcategory studied in this stage was the presence of an augmented product. Two companies (HH, SB) have a system to advise clients, three companies (CT, FP, XY) provide maintenance services and one company (XY) provides support in solution installment.

This subject was considered by the companies in the manufacturing sector where use social media is used as well as complaint and claim systems to get feedback from users in order to solve their problems.

In the case of Johnson et al (2000), there are activities that involve preparing personnel to address issues customers may have, which are framed in the company context. Cooper (2008) proposes that companies assess each element involved in the development of each stage. However, these activities must be previewed from the initial stage of the project.

4.3 Perspectives regarding linearity of the innovation process

It is important to highlight the fact that all participants in the study identified the stages and elements of the process executed in their companies in order to bring innovative services into the market. They established a logic, stage-activity sequence in order to obtain certain results. Such an idea, according to Velasco, Zamanillo and

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Gurutze (2003) is useful to better understand the process by presenting it in a simple, rational way, as in this case.

Also, all interviewees stated thatthey could not adhere to one series of strict steps and the existence of spaces was necessary to reassess aspects and retake stages to formulate concepts previously established. It is relevant to mention that five of the companies in the ITS (FP, GP, HH, SB, XY) use the Lean Startup method, which seeks to use the minimum amount of time and resources needed in validating if the proposal really is valuable for users (Ries, 2011). Johnson et al (2000) agree with Ries (2011) and notes that the efforts in the service innovation process are very iterative and not so lineal.

Velasco, Zamanillo and Gurutze (2003) agree the innovation process involves many feedback process where information is exchanged, and in which eventualities may happen that are not evidenced in lineal methods. This is backed by five companies (FP, GP, HH, SB, XY) that stated that the process, and their three generic stages, may repeat themselves on multiple occasions in order to bring services into the market more quickly, and to assess their acceptance in it. So, it would be presented repeatedly by generating inputs for decision making regardsing improvements in the service or its withdrawal.

Not all innovation processes go through the same stages, and so the activity execution proposed for each stage is subjected to the circumstances of each specific development. Velasco, Zamanillo and Gurutze (2003), state that placing just one element as an activator in the process may be considered a little extreme due to the existence of multiple innovation sources.

Cooper's model (1994) on new product generation reflects on the existence of a series of similar stages. Kline and Rosenberg (1986) highlight the interaction between the stages in the process. However, the innovation process described in the service sector has a close relationship with the conceptual model proposed by Den Hertog, et al., (2010), since most competences described for the innovation process are enforced by companies that are a part of the study.

5. CONCLUSIONS

This study allowed for the identification of three generic stages in ITS SME analyzed in order to understand how they innovate. Sub-stages that were identified may help understand how an innovation is generated in the sector specifically for each stage as well as their characteristics. It was also possible to determine similarities and differences between the innovation process of companies which innovate in products and operate in a manufacture sector and those companies which innovate in services and operate in a service sector, like ITS.

Some similarities include a prototype acceptance test to reassess aspects and go back to the initial stages of the process while using similar channels to follow up their products and services into the market. Some differences include the client's participation from the idea gestation stage in the service sector

case and the criteria used to assess the innovative product or service proposals, which, in the manufacture sector, revolve around quantity and quality of raw materials and their availability, and in the service sector, around meeting the clients' requirements.

Although in both manufacturing SME and service SME, an essential point in the innovation process is the contact with clients in the generation of ideas, in the former, the qualitative reference study showed a tendency to formality in the registration and evaluation of ideas, in the latter this process is characterized by more flexible methods to request and to find client´s solutions.

In addition, the flexibility in terms of evaluative criteria of ideas is noted. As Nijssen et al. (2006) asserted these differences do not only have to do with the nature of services (intangibility, co-production with client and so forth) but also affect the process of services and advancement in order to make them, to a certain degree, unique.

The development stage, after idea generation, showed differences with manufacturing SME in terms of the significance in ITS´s services SME of task coordination, workers involvement (team working), planning and documentation for approval tests. These kinds of attributes are in line with the importance, in services companies, to fit customer needs with existing systems like enabling capabilities, a sound coordination and communication Nijssen et al. (2006).

Nevertheless, it is important to point out that the use of experimentation and validation with users to guide the enforcement of innovative ideas in service SME was another difference found. Specially, the study confirms that service innovation can be provided directly into the market instead of research and development labs (Tidd & Hull, 2003); being R&D, one of the key drivers of innovation in manufacturing firms (Brouwer & Kleinknecht, cited by Nijssen et al., 2006).

Finally, in the last stage -launch to market- ITS SME clearly engage with customers by designing and executing marketing strategies to generate expectation in clients, more actively than manufacturing SME did. A key factor in ITS SME studied was to improve and maintain client satisfaction in order to build long-term relationships with them, and as a means to facilitate the introduction of new products or services in the future (Garcia, Quintero & Arias-Pérez, 2014). Client feedback is a point that goes in line with one of the key drivers that differentiate service companies from manufacturing firms: a higher and stronger interaction between new service development and service delivery (Tatikonda & Zeithaml cited by Nijssen et al., 2006).

The research pointed out that the innovation process follows a series of stages with a logical sequence. However, it is not possible to adhere to a structured process where there are no spaces to go back to previous stages or to skip them. This is influenced by the methodologies used by the companies to manage their efforts in introducing innovative services into the market.

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This study is being conducted as an effort to explore and to comprehend different and similar actions undertaking by services and manufacturing SME to organize, accomplish and to evaluate their innovative activities. The latter, due to the lesser empirical evidence that exists related to innovation processes (Galende, 2008; Crossan y Apaydin, 2010). Therefore, the interest has not been to identify key drivers of service or product innovations, but rather to identify differentiating and complementary elements of the innovation process.

However, there are some limitations in the study, and due to their nature, it is not possible to generalize the results. Nonetheless, the ongoing exploration of this phenomenon will allow going from an exploratory/descriptive scope to other explanatory scopes. Regarding future research lines, it is possible to examine the impact of methodologies, such as Lean Startup and Design Thinking in the innovative process of other companies. Also, it allows the assessment of results that generate a greater interaction with external players in the product innovation process.

As well, it is possible to examine the role of the innovative culture in companies of the ITS compared to those in the manufacturing sector. Also, it allows for one to know about the participation dynamics of human talent within the process. It is valuable to have a greater knowledge that allows one to determine the main obstacles or inconveniences in the SME innovation process along with tools to be used by the companies which deal with them.

Finally, the research, focused on a little studied innovation type, allowing for knowledge and examination of the characteristics of how innovation is generated in a Latin-American country, and to identify the differences and similarities according to the sector. This in turn allows for better planning of support programs, both in state and in private companies.

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APPENDICES

Appendix 1: Questionnaire[4]

Introduction:

Good morning / afternoon. This research aims to identify the steps followed by ITS companies since the initial process to the launched to the market of innovative services.

Furthermore, it is intended to compare the results of the study with those obtained in a previous six case studies conducted in Costa Rica´s food industry sub-sectors.

It is the intention of this study in achieving knowledge to comprehend the process of service innovations,

At the end of this ITS case study we will be honored to present the global results and give you some feedback.

Part 1: Identifying Product/Service Innovation

According to Oslo Manual (OECD,2005), innovation is the conversion of technological knowledge into new products, services or processes for their market introduction and technologically significant changes in products, services and processes.

1.1 Considering the definition given above, could you, please, say whether the company developed service innovations, in the in last two years?

		Identifying Innovations	How many times?
Yes	NO	If yes, were they entirely new services?	
Yes	NO	Were they significant changes in services and processes?	
Yes	NO	Were they introduced to the market?	

4 Source: Mora et al. (2016), adapted for service innovations

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1.2 Could you describe, briefly, those new or improved services? (Interviewer: remember suggesting respondents to describe the process in their words).

Part 2: Idea Generation for that Innovative Service

2.1 Making a historic account of the developed service innovations, please let us know how ideas were originated.

2.1.1 What issues prompted / provoked the innovation that these ideas will originate? (Interviewer: delve into how the conception of the idea occurred, whether there was a market segment into which addressed or care of a need, specifically)

2.1.2 Who in the organization or externally participated in generating these ideas for innovation? (Remind the interviewee that what interests us is knowing who conceptualized what would those ideas of innovation and at what organizational level are those people. If they mention external actors, specify which actors were, what was their involvement and why they were involved).

2.1.3 Did any preliminary assessment of these innovative ideas were conducted formally or informally?

If the answer is YES:

a. Does the firm have a standardized assessment process?
b. What aspects were considered for the preliminary assessment? (Interviewer: identify if it is considered in the preliminary assessment aspects such as technical requirements for the development of the technology platform, access to resources, experience, etc.)
c. Who did participate in this preliminary assessment?
d. Was that assessment documented?

If the answer is NO:

a. What were the reasons that prompted not making any evaluation?

2.1.4 What was the course of action to pursue the development of those ideas? for example, a project team was formed? how members were chosen? do you a methodology to specify the idea?
2.1.5 Who was the responsible of giving approval to continue or not those ideas toward a next level of achievement? What is the role of these people in the company? Do they change according to the type of project? For example, allow for prototyping or more specific design of the service. (Interviewer: verify that these people have the knowledge and level of involvement needed to make the decision)

Part 3: Developing the idea into Possible Prototypes/Designs
3.1 You have already told us about the genesis of these innovative services, could you explain: what key issues were considered in the company, to transform that idea into preliminary samples of innovative services?
Additionally:
3.1.1 What information, in addition to the one considered in the generation of initial ideas, was added to develop samples or testing/designing of the new service?
3.1.2 Who in/or outside the organization, was involved in generating this information? (Remind the interviewee that the interest is knowing who or who contributed in this aggregation and what organizational level are these people. If they mention other external actors, specify which agents and because the firm gave participation in this stage)
3.1.3 Were feasibility studies conducted at this stage?
If the answer is YES:
What aspect of the study were considered for this assessment?
What were the sources of information used?
Who participated in this evaluation?
Who decided to continue with design?
If the answer is NO
What were the reasons that prompted this decision?
3.1.4 How many different versions or prototypes/designs were developed for each idea? (It refers to different formulations of the new service)
3.1.5 In case you have developed more than a prototype or preliminary version, how did you the firm choose between them? who participated? what were the criteria(s) to choose them?
3.1.6 Please, tell us about the process to move from prototype/design to production consumer testing? For example, service idea acceptance/rejections by customers opinions, computer technical requirements, evaluation regarding intellectual property, among others.
3.1.7 During the step for prototyping and design tests, did the firm consider/reconsider were taken or those elements that were addressed in the phase of idea generation to be changed or improved? Why?
3.1.8 Do you consider, at this point, that the company had to revisit and re-valuate additional elements of the of idea generation phase, why?

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Part 4: Testing to go from the prototype/design to its implementation

4.1 Once prototypes/designs were developed, could you explain us: what key issues were considered to start production its implementation? (Interviewer: write down the different aspects that the respondent refers to).

4.1.1 What aspects were considered to verify the feasibility of the implementation of the new service?

4.1.2 Who in/or outside the organization participated in the definition of the features and functionalities of the service? (Remind the interviewee that what we are interested is in knowing who contributed in the feasibility of the implementation and their organizational level. If they mention outsiders, specify who they were, what was the firm involvement and why was/were he/she/they considered)

4.1.3 Was some kind of service acceptance testing performed?

If the answer is YES:

to. What aspects were considered for acceptance testing?

b. Who designed and conducted these tests?

c. What was the scope of the test? (functionality, places, type of audience)

d. Who decided the continuity of the project?

If the answer is NO:

to. What were the reasons that caused these tests not implemented?

4.1.4 Do you consider that, at this point, the company has had to revisit and re-valuate additional elements of previous stages (idea, prototype/design)?

Part 5: Market Launch

5.1 Could you explain me, what key factors were considered in order to launch the service to the market? (Interviewer: write down the different aspects mentioned by the interviewee, consider the registration of patents and intellectual property, among others)

5.1.1 What aspects were considered to define the distribution channels? (Interviewer: delve into the different types of distribution channels for these types of services such as app stores, pay per installation, press, among others)

5.1.2 What aspects were considered to define the platform through which the user would get access to the service? (Interviewer: if there are several platforms through which costumer could access the new service, ask the interviewee, what factors were considered to make that decision)

5.1.3 What aspects were considered for communication strategies? (Regarding: advertising promotional campaigns, testing, etc.)

5.1.4 What aspects were considered to get customer feedback about the new service?

5.1.5 Who in/or outside the organization participated in these activities to launch the innovative service to market? (Remind the interviewee that what we are interested is in knowing who or who contributed at this stage to launch the service to the market and what organizational level these people. If they mention outsiders, specify who they were, what was your involvement and why was/were they considered)

5.1.6 Do you consider that, at this point, the company has had to revisit and re-evaluate additional elements of previous stages (idea, prototype, implementation)?

Part 6: Service Innovation Process Perception

6.1 Some specialists in the field of innovation consider the two following viewpoints of the innovation process:

(Interviewer: Show the card with the following statements

1. The innovation service process always goes from one stage to the next in a single sequence and, once a stage is exhausted, it does not go through it again.

2. b. the process followed to generate innovations do not necessarily follow a single sequence, and it can be passed from one stage to another, and even return to check what has been done and if it is the case, make adjustments.

Referencing the above:

6.1.1 Which of the above two statements (1 or 2) do you consider that your company is closer to?

6.1.2 What are some reasons that make you think that way?