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HOW DOES THE TECHNOLOGICAL INNOVATION COME FROM? A MULTILEVEL FRAMEWORK

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ABSTRACT

Technological Innovations pass through different passages or communities, hence are the multi-level phenomenon. The source of technological innovation is still an open question. The aim of this article is to contribute innovation literature by developing a multilevel conceptual framework for the process of technological innovations occurrence. The contemporary literature source of innovation is fragmented, and the dominant typology is based on the one side, supply or demand. The research focus on both demand and supply sides simultaneously are rarely observed. For successful innovations, simultaneous attention is needed on the supply and demand sides. The alternative typology is likely to be a minor step towards a theory on the innovations occurrence.

In this research, we discovered the basis of the innovations types proposed by Schumpeter a hundred years ago, and so far remained mysterious. This framework is likely to be a step towards to uncover and identify the areas of innovations occurrence which can support policymakers in the field.

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1. INTRODUCTION

Innovation is driven by the ability to see connections (Bessant & Tidd, 2007), a changing and "the turning of ideas into concrete realities" (Kingston, 2012), which "Is bringing something new into existence" (Sloane, 2000, 2003; Adams, 2005). Today, everywhere is talking about innovation and this proposition is a common sense that innovation is synonym for the development and survival, thus, "innovate or die" (Matson, 1996; Getz & Robinson, 2003; Chesbrough 2003; Jagersma, 2003; Terriff, 2006; Harper & Porter, 2011; Hengstenberg, 2017; Maynard-Atem, 2018). We are witnessing increasing attention to the importance of innovation in various areas of social life, especially in recent decades. Innovation has always stimulated progress and an important driver of economic productivity, social progress, and human achievement. Therefore, innovations are located

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at the heart of progress for all units of economic society like companies, industries, sectors, and entire nations (Haar & Ernst, 2016). Bazhal (2017) develops Schumpeter's theory to argue that genuine economic growth-especially in transitioning and developing countries-is only possible with innovation.

Despite this significant attention, innovation literature reports that many innovative activities fail, and failure rates in these activities are extremely high, ranging from 50% to 90% (Heidenreich & Spieth, 2013). Most enterprises still are struggling and experience great difficulties in their innovation efforts (Huber et al., 2017). So that “we are on the precipice of an epoch-a distinctive, exciting, and challenging time for organizations” (Hitt, 1998).

Some scholars believe that these high failure rates are due to the enormous complexity of many interrelated factors with product innovations (Attar et al., 2012).

In our view, another reason behind this high failure rate is the lack of adequate attention to "demand side" innovations. That is, insufficient attention to demand side has driven innovative activities towards the "Valley of Death."

“Schumpeter proved scientifically that innovations are emerging as key determinants of economic development that are isolated from the existing factors of K, L, and TFP” (Bazhal, 2017). Innovation from the perspective of Schumpeter, instead of being in the category of technology, is placed on the economic agenda. “It was Joseph Schumpeter the first who placed innovation at the center of economic analysis” (Carayannis, et al., 2015).

However, the first type of innovation defined by Schumpeter has been distorted over time and customers are deliberately or unwittingly excluded from the definition of innovation. For over half a century, discussions around the emergence of innovations have revolved around the “technology-push” and “demand-pull” innovation theories (Martin 1994; Mahroum & Al-Saleh, 2013). While, demand-side innovation policies need to be matched and combined with adequate supply-side policies and measures (OECD, 2011). Mowery and Rosenberg (1979) argue that both innovation supply and demand factors must exist simultaneously. Thus, innovation is the product of the creative interaction between the supply and demand sides (OECD, 2011).

Technological Innovations pass through different passages or communities, hence are the multi-level phenomena. In this paper, the emphasis is laid on the sources of technological innovations, in order to provide a new typology of innovations, where both the supply side and the demand are addressed simultaneously. In such a way that even the difference between supply and demand is not felt, which is often regarded as an important distinction in economic analysis (Ghasemi et al, 2014). In other words, with this new typology, with regard to the focus of human action and needs, the usual category of supply and demand sides becomes meaningless in such a way that humans attempt to innovate and create the goods they need, or others in the human community.

Hippel (2001) argues that new products and services must be accurately responsive to user needs if they are to succeed. He points out that an accurate understanding of user need has been shown near-essential to the development of commercially successful new products. According to Hippel (2005), the users’ roles are unique because they “expect to benefit from using a product or service, while manufacturers, by contrast, expect to benefit from selling it”. Hence, we require a new typology that simultaneously addresses both the "supply and demand side" of innovations. However, in the typical typologies of types of innovations, this issue cannot be seen, and one side of the supply and demand for innovation is neglected or deliberately or inadvertently - perhaps because of ease-has not been taken into

consideration (Matandare, 2018).

It seems that a major part of the proposed typology idea for categorizing innovations by Schumpeter (1911; 1934) has been derived from the General Theory of Goods, which was theorized in 1871 by Carl Menger (1871, 2007), but this general theory of the goods has not been used in any of the innovation studies. Our preliminary analysis suggests that this theory can be used to explain the formation of innovations (in particular, new process and product). Therefore, the objective of this study is to understand Menger's arguments, then try re-locate his theory in the analysis of innovations occurrence, new process, and products. This general theory of goods is used for drawing up a conceptual framework for new typology and classifying innovations types.

In this research, we have equipped to challenge the dominant typologies of innovations with extracting of the conceptual framework of Menger' general theory of goods. We have started with the origin of innovation itself and ended with our own typology of innovations.

2. RESEARCH BACKGROUND

Our initial review of 33 articles published in the Journal of Business Venturing containing "innovation" term over the period 1989-2018 shows that the three most important keywords in these articles were the innovation, performance, and entrepreneurship with the highest number of citations. Iurii Bazhal (2017) says in the language of metaphor that: "everybody sees and feels the Sun (innovations), but the dominant fundamental economic theory (mainstream) does not present it properly in the structure of its scientific categories". Nelson and Winter (1977) have used the term innovation as a "portmanteau to cover the wide range of variegated processes by which man's technologies evolve over time" (Nelson & Winter, 1977). They have proposed two major theoretical framework- "modeling innovation generation as the conditional probabilistic outcome of various R&D strategies, and modeling the fate of innovation in terms of the workings of a selection environment". They have rejected a profit-maximizing interpretation of research and development (R&D) activities, because, in many cases, the organizations doing R&D are not motivated by profits at all, but are governmental, or private not-for-profit institutions. They have emphasized that "a more process-oriented characterization of the innovation generation process seems essential" (Nelson & Winter, 1977; Jenaabadi & Issazadegan, 2014).

Since 2000, Kotsemir (2013) argues that the concept of innovation has become a buzzword and has been faced with ambiguity. The level of innovation analysis has reduced from a "macro level" to "micro level." Nevertheless, there is no common understanding as well as accepted from this concept at the present time (Kotsemir et al., 2013).

Hence, once again, the concept of innovation needs to be redefined; on the other hand, innovation is a multi-level phenomenon that nests and evolves in various societies. As a result, its analysis requires the use of "multilevel analysis".

Godin (2008) defines twelve concepts of innovation as imitation; invention; discovery; imagination; ingenuity; creativity; cultural change; social change; organizational change; political change; technological change; and commercialization of the new product. "Different people slice innovation up in different ways and so there is a cornucopia of typologies to choose from" (Levine, 1980). The plethora and diversity of current definitions of innovation create ambiguity, confusion and problematic (Garcia & Calantone, 2002; McAdam et al., 2004; Baregheh et al., 2009), especially in the new product development literature". Therefore, we need a classification and typology. Classification schemes

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demonstrate how entities are assigned to categories and how categories are differentiated from each another (Niknazar & Bourgault, 2017).

The classifications help us to organize and structure our knowledge in a way to obtain a simple list of more useful and comprehensible definitions (Coccia, 2006). Coccia (2006) refers that the classification provides models for ordering, labeling, and articulating the knowledge about innovations variety. However, scholars have applied the different ways for classifying innovations which it is possible to manage and predict sources and its impacts by distinguishing the different typologies (Prabhu, et al., 2005; Mardani et al., 2014). Coccia (2006) with focus on similarity and/or heterogeneity of taxonomies of innovation present in the economic fields has shown that the economic literature uses the same name for different types of innovations.

Kivimaa & Mickwitz (2004) from the environmental perspective have divided innovations into two categories: environmental technologies, where a specific environmental effect has been a key intention of the innovation, and other technologies, where the key intentions have not included environmental concerns but e.g. cost reduction (Kivimaa & Mickwitz, 2004). Despite the common typologies and classifications of various innovations, this question still requires an explicit and precise answer: How we can distinguish innovations?

This is still an open question, even among scholars deeply involved with the study of innovation. Scientists and scholars employ different approaches to define and recognize innovations. Drucker (2014) has defined innovation as an organized, systematic, rational work, which "is the specific tool of entrepreneurs".

Acs and Audtetsch (1988) has defined innovation as a process which begins with the invention, continues with inventions development, and is offered into the market as a new product, process, or service. Damanpour (1992) defined innovation as the adoption of an idea or behavior - either a system, policy, program, device, process, product, or service - which is new to the adopting organization. Fruhling and Siau (2007) regard innovation as an idea, act, or object which is understood as new by another adoptive person or unit. Also, Dibrell (2008) has defined innovation as minor changes in products, processes, services, or mutant changes in products, processes, or services which introduce exceptional features for the first time. Dosi et al. (1988) have classified different types of technical changes in the two groups of minor and radical innovations.

Review of literature shows different types of innovation which are referred to so far (as an instance, refer to Garcia and Calantone, 2002). However, prevalent typology of innovation in literature is quintuple statements presented by Schumpeter. Schumpeter (1934, p.66) sums up his conclusions as for the five species of innovations that here we have reported from the original text, as follows:

(1) the introduction of a new good-that is one with which consumers are not yet familiar- or of a new quality of a good;
(2) the introduction of a new method of production, that is, one not yet tested by experience in the branch of manufacture; concerned, which need by no means be founded upon a discovery scientifically new, and can also exist in a new way of handling a commodity commercially;
(3) the opening of a new market, which is a market into which the particular branch of manufacture of the country in question has not previously entered before, whether or not this market has existed before;
(4) the conquest of a new source of supply of raw materials or half-manufactured goods, again irrespective of whether this source already exists or whether it first has to be created; and

(5) the carrying out of the new organization of any industry, like the creation of a monopoly position (for example through justification) or breaking up a monopoly position.

Today, the aforementioned species, are referred by researchers in many fields of innovation studies (including Hennipman, 1954; Aghion and Tirole, 1994; Dreier, 2004; OECD, 2005; Becheikh et al., 2006; Windrum and Garcia-Goni, 2008; Peneder, 2010; Gunday et al., 2011; Damanpour and Aravind 2012; Yan and Yan, 2016; Machikita and Ueki, 2017; Salmelin & Curley, 2018; Anwar, 2018), with indirect reference to Schumpeter's work, as follows: (1). product innovation; (2). process innovation; (3). innovation in the market; (4). innovation in new materials; and (5). organizational innovation.

In the definitions provided on the basis of Schumpeter's typology, potential innovations (including new product or process) needs to be offered to the market in order to turn to actual innovation. It is noteworthy that the first type of innovation defined by Schumpeter has been distorted over time and customers have been excluded from the definition of innovation, conscious or unwanted. While Kingston (2012) confesses that Schumpeter taught us how market power is essential for innovation. In another word, in Schumpeter's initial version of the five categories of innovations, he was also somewhat concerned with the consumer, but, due to indirect referral mistakes by others, the Schumpeter's view was distorted and merely focused on the supply side of innovations. This distortion has been applied by the drafting and implementation of the Oslo manual and implementing it's at the firm level in various countries, in particular, the OECD members.

In fact, in this perspective, innovation in a product involves the commercial introduction of a product that is new to users (consumers and manufacturers). Therefore, demand is a key factor in innovation activities. As a result, the definition of technologic innovation (here) consists actually of offering a new product to a market for the first time. While in Schumpeter's distorted innovations typology, as the "Oslo manual", only the supply of the product is considered not demand side: "The Manual covers innovation in the business enterprise sector only; It deals with innovation at the level of the firm; It covers four types of innovations: product, process, organizational and marketing; and It covers diffusion up to 'new to the firm'" (OECD, 2005, p. 16).

Beginning in the 1960s, people from different fields began to look at innovation demand rather than a supply perspective and now, there exists no history for the demand-pull model (Godin & Lane, 2013). Over the past decade, in some countries, such as the OECD countries, innovation policies have shifted to "demand side" innovations. Despite this, dominant attitude in the operational definition of the innovation based on Schumpeter classification has mainly on the supply side. Also, the demand side and innovations origin and conditions are less attended generally. On the other hand, the indicators used for the recognition of innovations are mainly objective. Consequently, the most important questions raised here are:

What is the origin (source) of occurrence of a new "technological innovation"? What causes the occurrence of innovation in a product or process? In other words, what is the source or mother of a new product or process innovation? Is need the mother of innovations, as frequently pointed out in literature saying that need and necessity are the mother of invention? Is this true for all innovation and innovations too? Or there is another

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origin and source engaged for the occurrence of this phenomenon? On the other hand, how a need, especially need to an innovative product, is created? And finally, can the subjective indicators be defined for recognition and distinction of types of innovation especially product innovation? That is, is it possible to explain as subjectively how innovations occur? Here, it has been attempted to analyze these questions from the beginning of the need as a mother of innovations as follows.

3. METHOD

The research main objectives are to develop a multilevel conceptual framework to clarify and analysis of innovations occurrence and to investigate the role of human needs and entrepreneurial function on the occurrence of innovations. Frameworks identify the elements and general relationships among these elements and provide a meta-theoretical language that can be used to compare theories. They attempt to identify the universal elements that any theory relevant to the same kind of phenomena needs to include (Ostrom, 2011). The research questions, which we try to find their answers, including:

- How do the process and product innovations come from?
- What are the Characteristics of Goods?; and
- What are the roles of human needs and entrepreneurial function on the occurrence of innovations?

In this research, the first attempt was made to identify and analyze the related theories and typologies of innovations. Since the aim of the research is to contribute innovation literature by developing a conceptual framework for the process of the innovation occurrence, the documents with titles containing "Innovation Source" and topics containing "source of innovation" have explored based on the Web of Knowledge database (Web of Science Core Collection). The bibliographic data of extracted scientific documents for analysis are reported in (Table 1).

Table 1. The result of Search for: TITLE: ("source of innovation") AND TOPIC: ("source of innovation"): bibliographic data, WOS, 19 July 2018

Period	Total Publications	h-index	Average citations per item	Sum of Times Cited (Without self-citations)	Citing articles (Without self-citations)
1998- 2017	45	8	21.07	948	941

Search strategy: Allintitle: TITLE: ("source of innovation") AND TOPIC: ("source of innovation")

Timespan=All years. Indexes=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI.

The following documents have omitted because of their lack of close contact with the subject matter of the research. A total of 29 scientific documents remained for further analysis, *see* Table 2:

Van de vijver (2006), Dore (2017), HSU (2007), Junghans (2012), Maack (1999), Khajeheain (2016), Moack (1999), Dore (2017), Stoel zlen (2001), Steels (1998), Spafford (2010), Spafford (2012), Spafford (2012), Spafford (2013), Gritalis (2009), Gritalis (2009) and Gritalis (2000).

In the next step, pieces of information from the theories and typologies have been synthesized based on “explicating theory”.

According to Steiner (1988), criticism of theory consists of explication and evaluation of the theory. The way to explicate a theory is to unfold it, to set forth its content and form. The content of a theory is constituted by its elements or parts. The basic elements of a theory

are its concepts. The concepts of the theory are general ideas which describe properties of the object of the theorizing.

Here, we propound the idea that innovations occurs based on the source of innovations. Therefore, for the theorizing on the occurrence of innovations, it is necessary to identify its sources and analyze the conditions for its occurrence. In this regard, we have used the new integration of the concepts extracted from the two theories of Menger (1871) and Schumpeter (1954). In this research some of the definitions we have accepted are as follows:

- A theory is "a reasonably coherent intellectual framework which integrates existing knowledge, and enables predictions to go beyond the particulars of what actually has been observed" (Nelson & Winter, 1977).
- A concept is a mental image or a general notion of something. It summarizes observations and idea about all the characteristics of that image. Here it is a fundamental bulk of a theory.

A conceptual framework is a grouping of interrelated concepts used to explain a particular pattern or behavior.

4. SOURCE OF INNOVATION

Literature review shows that in analyzing the occurrence of innovations, analysts often ignore parents of innovation. Chidamber (1993) argues that scholars have frequently debated whether innovations are driven by market demand or by technological shifts. Human nature requires the utilization of so many goods in life. The question raised here is what these are goods; and how are they emerging? And where do innovations comprise product/process innovations come from? And how is the relationship between innovations and human needs? Since firms do not innovate in isolation, how are innovations affected by institutional arrangements?

If the need is "the mother of innovations", which one is the father? Therefore, how to explain the role of Entrepreneur as of father in the Occurrence of the process and product Innovations?

Genius, invention, talent, and of course creativity and its explanation (or the science of human innovation); these are the words which describe human performance at the highest level (Sawyer, 2011). Motavasseli (2015) argues that human beings are great treasures of the wisdom and genius codes which need to be decoded.

Kant gives three clearly characteristics to genius. They are (1) originality, (2) exemplariness, and (3) nature (Bruno, 2010). According to Bruno (2010), nature is the same the technical or technic is concerned with how things are fabricated. The scientific understanding of nature is concerned with "order and lawfulness". Kant argues that "Genius itself cannot describe or indicate scientifically how it brings about its products, and it is rather as nature that it gives the rule. That is why, if an author owes a product to his genius, he himself does not know how he came by the ideas for it" (Kant 1987, 175).

Eysenck (1995) provides experimental evidence to support the role of intelligence, social status, gender, and other factors that have been linked with genius and creativity.

From Motavasseli's point of view (2015), the current unresolved issue is the lack of complete recognition, guidance, cultivation, nurturing, and development of the most fitting ones in each individual in the human society. All human actions are of mind origin; which reasoning, accountability, and consciousness is merely a source of various sources of individual actions (Motavasseli, 2015).

From these discussions, we conclude that the human mind plays an important role in the

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process of human action that must be considered in the economic analysis, including the occurrence of innovations. In such a way that without the intervention and value of the mind, products derived from innovations will become ineligible objects.

According to the law of cause and effect, every single effect within our world, upon our earth has a cause, an original starting point. Schilling (2010) argues that “innovation” can arise from many different sources, like individuals, inventor, users, research efforts of universities, government laboratories, and incubators, or private nonprofit organizations (Schilling, 2010).

Table 2: Result of Search for: **TITLE:** ("source of innovation") AND **TOPIC:** ("source of innovation"): WOS, 19 July 2018

ID	Cluster	Authors	Source of innovation	Supply	Demand	Supply & Demand	citations
1	1	Bertschek (2017)	Outsourcing	1			1
3	1	Huergo (2006)	Technological management	1			48
2	1	Prusa (1991), Zylawski (1999)	New Firm, Firms	1			23, 41
5	2	Bengtsson (2013)	Online users		1		6
6	2	Fuller (2008)	Brand community members	1			166
7	2	Urbano (2008)	Concentration of supply	1			0
8	3	Gerryts (2008)	R&D	1			0
9	3	Laursen (2004)	Universities	1			385
10	3	Weigel (2011)	Medical technology	1			6
11	4	Cohen (2007)	Inter-organizational knowledge transfer			1	0
12	4	Fossas-olalla (2010)	Cooperation with suppliers			1	5
13	5	Bull (1992)	Biodiversity	1			145
14	6	Biggs (1990)	Multiple sources			1	90
15	7	Jaskyte (2006)	Inter-organizational relationships			1	7
16	8	De lorenzo (2017)	Do-it-yourself movement	1			2
17	9	Cebotari (2017)	Renewable energy project	1			2
18	10	Tiquia (2010)	Extremophiles	1			2
19	11	Copping (2000)	Natural Products	1			1
20	12	Farritor (2017)	University-based maker space	1			0
21	13	Kolouchova (2016)	Customer satisfaction		1		0
22	14	Spafford (2014)	International source	1			0
23	15	Baran (2014)	Social engagement			1	0
24	16	Zylawski (2014)	Relationships University-industry			1	0
25	17	Dumitrescu (2013)	Standardization	1			0
26	18	Greca (2011)	Employ participation	1			0
27	19	Knezevic (2008)	Knowledge	1			0
28	20	Davidson (1990)	Doubt	1			0
29	21	Vanhouten (1988)	Applied research	1			0
Sum				21	2	6	

Novelty is the extract of original innovations. Nevertheless, Schumpeter (2005) believes that the origin and nature of Novelty have remained unknown and very poorly understood until now (Schumpeter, 2005).

The dominant view in the literature of innovation is the over-emphasis on the important role of R&D activities in process and product innovations. However, the idea that an innovation like a new product straight away occurs from R&D—Just as chick comes out of the egg—is simply incorrect (Crawford, 2008).

Biggs (1990) has investigated multiple sources of innovation in agriculture activities, such as user and practitioner innovations; innovations from NGOs; innovations from private corporations; research centers; and innovations from extension agencies.

Chen et al. (2011) with the aim to explore the determinants that explain why firms choose a certain source of product innovation from among a variety of options have revolved that innovative ideas of other firms are the main sources of innovations. Eric von Hippel (1988) argues that it has long been assumed that product innovations are typically developed by product manufacturers, however, it now appears that this basic assumption is often wrong (Hippel, 1988). Drucker (2014) has searched for sources of innovations in a few situations like unexpected occurrences, incongruities, process needs, and industry/ market changes. Also, demographic changes and changes in perceptions are considered as the origin of innovations (Drucker, 2014). Shane (2000) quotes from Schumpeter, the sources of entrepreneurial opportunities as the changes in technological changes; political changes and laws and regulations (or institutional changes); and Social and demographic changes.

Schumpeter believed that new information is important to explain the existence of entrepreneurial opportunities. He said that changes in technology, political forces, laws, macroeconomic factors, and social trends create new information that entrepreneurs can use to figure out how to combine and use sources into more valuable forms (Shane & Venkataraman, 2000).

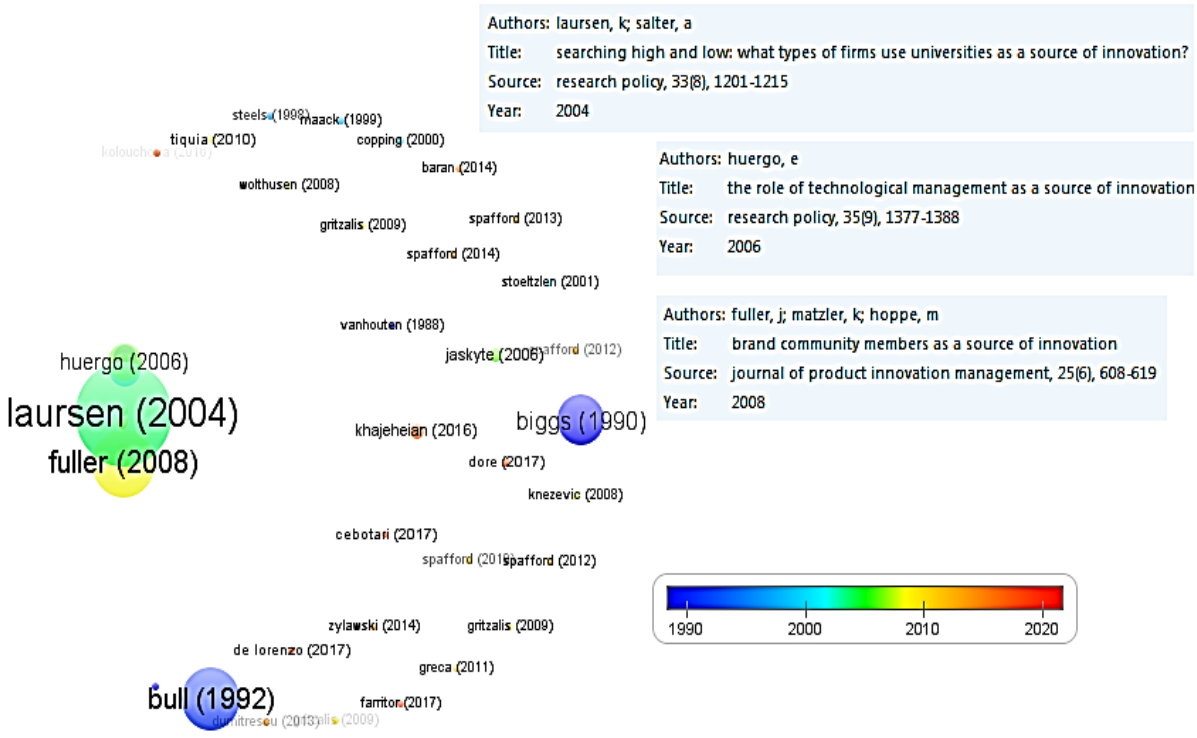

Figure 1. Network visualization of Authors of scientific documents related to the **"source of innovations"**

Table 2, a comprehensive summary of current research and theory on the sources of innovations from some researchers' viewpoints are reported, in 21 clusters. Table 2 shows that the contemporary literature on the source of innovation is fragmented, and researchers focus mainly on supply-side. Also, Figure 1 shows that the highest number of references to articles in which "supply side" has been identified as the source of innovation (Laursen, 2004: Universities as sources of innovation; Fuller, 2008: Brand community members; and

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Bull, 1992: Biodiversity). Laursen et al. (2004) have examined the factors that influence why firms draw from universities in their innovative activities. They have shown that firms who adopt "open" search strategies and invest in R&D are more likely than other firms to choose universities as a sources of innovation (Laursen et al., 2004). Fuller et al (2008) argue that brand communities can be a valuable source of innovation (Füller et al., 2008). Bull et al. (1992) have proposed biodiversity as a source of innovation in biotechnology.

The analysis of various sources suggested by the researchers in Table 2 shows that the root of these sources of innovation is human needs. At a very low level, innovation is considered as exploitation from a lucrative opportunity (Mansano and Pereira, 2016). Dosi (1988) holds that demand certainly plays a role in innovation, but it is technological opportunities or technological paradigms that determine the direction of innovation (Godin, 2017).

As obvious, the theory - at least since the publication of Schmookler (1966) research findings - is repeated that need is the mother of innovation. Contrary to prevailing emphasis on changes in scientific and technological science, Schmookler (1966) main argument was that demand has an important role on the determination of the trajectory and level of invention activities (Scherer, 1982). Schmookler logical theorems are as follows (Scherer, 1982): (A). Ability to make extensive inventions is flexible and is a reaction to profitable opportunities; and (B). As larger a potential or actual market is, more invention activities are directed toward that side; partly for the reason that, in case other conditions remain unchanged, the profitability of an invention is increased by the size of the market. And the other part of the reason is that the chance of confrontation between an invention talent and a problem requires a frequent solution. More manufacturing activity is dedicated to satisfaction of demand.

In the investigation of the relationship between scientific discoveries and invention, Schmookler (1966) found that scientific discoveries are essential but not sufficient for invention (Costello, 1967). Schmookler (1966) argues that invention occurs usually because people want to solve economic problems, or investment on economic opportunities have a decisive importance for an economic theory (Freeman, 2013). Major confirmation of Schmookler theory on the relative role of demand-pull and technological opportunities is obtained from analysis of patented inventions in different sectors of industry (Scherer, 1982).

If Schmookler view is right, the invention rate of demand for an industry finished product is gained then. It means that in response to dynamic factors, as the output (product) is increased, the rate of invention too will be increased (Freeman, 2013).

Based on Giddens Structuration Theory, constraints are considered as an enabler as well as restrictive (Giddens, 1976, 1981, 1984). In Giddens' view, constraints, or what he calls structures, are dual; because they are medium and outcome of the practices which form social systems (Giddens, 1981). In the same manner, structures form people's practices. On the other hand, people's practices form and re-produce social systems. In fact, Giddens (1984) defines the structure as rules and resources which are involved with social systems reproduction (Gibbert et. al, 2014).

It seems that basically, changes to social phenomena have consequences like a flipping motion; by the progression of societies, part of human needs are met and on the other side some new needs appear; and on the whole human needs are increased; such that underdeveloped societies or primary communities have little needs for new products.

Therefore, it can be said that innovations themselves may be considered as mother and origin of the need. It means that need results in the occurrence of innovations like new products, and the appearance of new innovations generate new needs, subsequently.

Also, some of the sources mentioned for innovations, although not explicitly referred to as "need" or "necessity," are also considered "necessary." Including: Crisis (Nam & Pardo, 2011); problem (Nam & Tatum, 1989); recession (Todd, 2010); conflict (Bunce, 1976); limitation (Christiansen et al. , 2014); and failure (Rosas et al, 2017).

In the present study, we base the "human needs" as the main constituent and a proxy of demand and the source of process and product innovations. In this way, we will benefit from the conceptual framework extracted from the Carl Menger' general theory of goods (Carl Menger, 1871) on one hand, as well as the special role of individual entrepreneurs in this process, based on Schumpeter's creative destruction theory (CDT), in another hand. Finally, a new typology is proposed for classifying and explaining the occurrence of innovations.

5. HOW DO THE GOODS COME FROM?

With asking and answering the question "why do we need to refer to early authors and readout their viewpoints", Joseph Schumpeter (1954) expresses three major reasons: "pedagogical advantages, new ideas, and insights into the ways of the human mind" (Schumpeter, 1954, p.2). Then, he argues that our minds are competent to get inspiration from studying history and fields of thoughts and "a man's mind must be indeed sluggish if, standing back from the work of his time and beholding the wide mountain ranges of past thought, he does not experience a widening of his own horizon" (Schumpeter, 1954, p. 4). Here, we have reconsidered one of an old theory: General Theory of Goods (GTG), invented by Carl Menger (1871). The main elements of Menger's theory of economics are the three concepts of goods, demands, and values, which he defines the relationships between them using a brief sentence as follows (Kiichiro and Ikeda, 2012): "Values are the significance that concrete goods or its quantity acquired for us through our recognition that the satisfaction of our desires depends on the disposal of concrete goods or their quantity".

The production of novel goods often is tied inextricably to wealth creation (Companys & McMullen, 2007). According to Harper (1979), "Economic goods are in limited supply, which results in the necessity of making choices; that is the reason why they are "economic goods" (Harper, 1979, p.317). William Smart (1891) argues that "the center of value is within us. It is only by association that we transfer to goods the value which we obtain through the consumption of them, therefore, we attach importance to them only as we find our life is incomplete or impossible without them" (Smart, 1891, p.16). Thus, "The wants of people constitute a demand for satisfaction. To meet this demand the working portion of the community is set producing. The whole end and aim of the industrial organization of society are to put the matter and forces of nature into shapes capable of satisfying this demand, and these shapes, now recognized as "good," society significantly calls "Goods." (Smart, 1891, pp.16-17).

According to the Austrian premise, the value is not intrinsic in the sense of being susceptible to objective measurement by any means whatever (Harper, 1979, p.43). Harper (1979) argues that "value determinations are subjective by nature", thus "economic decisions cannot be delegated by one person to another" (Harper, 1979, p.50).

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Before explaining the components and variables of the General Theory of Goods (GTG), we require to clarify its essential assumption. The most important assumption of the GTG theory is inclusivity of the law of causal, as stated by Menger "All things are subject to the law of cause and effect" (Menger, ([1871] 2007), p. 51).

GTG theory has been built on the basis of this fundamental hypothesis, and by applying specific concepts. Menger ([1871] 2007), with the aim to reduce the complex phenomena of human economic activity to the simplest elements that can still be subjected to accurate observation, has utilized the following concepts in his theory. As shown in (Figure 2), according to GTG theory a goods arises through the relations of following three components: Human need (HN); Things (Ti); and Satisfaction (S).

According to Menger ([1871] 2007), Needs arise from our drives and the drives are embedded in our nature. In Menger opinion, as value is originated from the mind of people, economic analysis should start its work by studying individuals. Although GTG has started with human need concept, Menger has not provided a specific definition for it. Other concepts utilized in the theory, including things, useful things, and satisfaction, have been defined, and characters for the distinction of a "goods" have been explained at the end.

According to Menger, the main goal of the said theory is to present a universal structure and framework from the relations between above-said concepts. The framework of this theory has an important application in the valuation of the goods too, which is to be surveyed later.

Carl Menger has put the basis of his theory on human need concept. According to this theory, in case of the presence of a causal connection between a thing, satisfaction, and human needs, the thing is turned to a useful thing. On the other hand, in case we attain the knowledge to a causal connection between a useful thing with a specific need, goods will appear. That is why, in order to recognize whether a thing is goods or not, that thing should have goods characters.

5.1 CHARACTERISTICS OF GOODS

Menger ([1871] 2007), has named the "things" that can be placed in a causal connection with the satisfaction of human needs as "useful things". If a thing is to acquire goods-character, all four of the following prerequisites must be simultaneously present. In another word, the "goods-character" consists of four groups of pre-requisites which should be present simultaneously altogether in order to turn a useful thing to goods, and consequently to attain characteristics of goods (Menger, [1871] 2007, p. 52):

(1). The existence of human need (HN);
(2). The existence of specific properties in the things to create a causal connection with the satisfaction of this need (CC);
(3). Human knowledge about this causal connection (HK); and
(4). Accessibility of the thing (AT)

When even one of them is absent, a thing cannot acquire the characteristics of goods. The first three characters are those referred above. The fourth character means to have a sufficient quantity of the intended things required to satisfy human needs.

Menger (1871) argues that in this generalized sense "A commodity or economic good is a dependent object" which cannot, of necessity, exist unless there exist also appropriately directed valuing acts which depend in their tum upon specific subjective beliefs and intentions of individual subjects".

Schumpeter (1934) with referred to Menger' general theory of goods ([1871] 2007) argues that "it is usual to classify goods in "orders", according to their distance from the

final act of consumption. Consumption goods are of the first order, goods from combinations of which consumption goods immediately originate are of the second order, and so on, in continually higher or more remote orders" (Schumpeter, 1934, p. 16).

Generally, businesses neglected their customers' dissatisfaction with focus on their daily problems. This kind of negligence leads to the habit of business executives losing customers and, ultimately, the slow death of their business. In the following cases, a product may lose its properties and become objects again:

a) Changes in human needs: With the occurrence of changes in human needs, certain human needs may disappear, as a result, the previous goods will not be able to satisfy new human needs; thus, becoming a thing again. In other words, if the human need for any reason is eliminated from a particular commodity, although we have enough of the thing in question, it will not have the necessary features of "goods";

b) Changing thing capacity: Occasionally with a change in the capacity of a material thing and its characters which is in causal connection with human needs satisfaction; that goods will lose their characters; that is, by changing the properties or usefulness of the thing, the capacity for causal connection and satisfaction of human needs are eliminated, and as a result, the goods property is destroyed and it becomes an unprofitable thing;

c) Knowledge obsolete: If knowledge of the causal connection (CC) between the thing and the satisfaction of the human needs is obsolete or disappears. In other words, human needs may still exist, and we have enough of the desired thing, there is a previous causal connection (CC) between the human needs (HN), satisfaction (S), and the thing (Ti), but the knowledge of the relationship is outdated and obsolete for any reason (including the advancement of knowledge and the occurrence of new innovations), the goods loses its properties and consequently becomes a worthless and unprofitable thing.

d) Lack of accessibility to things: If access to a useful thing is not possible, in a manner that is not directly applicable to satisfy the human needs, in this case, the previous goods loses its properties and shall not be deemed to be goods.

6. INNOVATION AND ENTREPRENEURSHIP

The philosophy of paying particular attention to the entrepreneurship in analyzing the occurrence of various innovations, in particular innovations, are that: (a). Innovations are a kind of genuine human action that is associated with uncertainty. (b). On the other hand, human action itself is basically associated with uncertainty; and 3) the future faces countless uncertainties.

Bonnet and Cussy (2010), by completing the idea of Stam (2008), have presented an interesting graphic display of the distinction between the boundaries of innovation, entrepreneurship and other productive activities. In entrepreneurship, we are looking to create value and value propositions. Often, in the studies of value creation, especially innovation studies, the value creator himself, the entrepreneur, is ignored. Danneels (2004) examined the theory behind disruptive innovations and identified a number of issues that require further and deeper exploration. The technologies have divided into two categories according to their effects on established products performance by Christensen (2013): (a). Sustaining technologies are those technologies that foster improved product performance, and (b). Disruptive technologies bring to a market a very different value proposition than had been available previously. Products based on disruptive technologies are typically

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cheaper, simpler, smaller, and, frequently, more user-friendly.

Markides (2006) argues that all disruptive innovations are not the same, and so they can be classified into three categories: technological, business-model, and new-to-the-world product innovations, which should be treated as distinct phenomena. It was Schumpeter (1934), who clearly articulated the active role of economic agents in innovations' occurrence. In Schumpeter's view, the innovative activities will be determined by the advances in the underlying scientific base (Chidamber, 1993). Merrifield (1986) decomposes innovations into three stages invention, translation, and commercialization and argues that Innovations are only achievable when an entrepreneur has existed. Ernst Friedrich Schumacher (1911-1977), the owner of the famous work "Small is Beautiful," argues that important innovations and changes normally start from tiny minorities of people who do use their creative freedom and the man of creative freedom is the entrepreneur (Schumacher, 1973, p.231). According to Schumacher (1973), the order requires intelligence and is conducive to efficiency; while freedom calls for and opens the door to, intuition and leads to innovation (Schumacher, 1973, p. 243).

Rosenbusch and colleagues (2011), by meta-analysis method, have investigated innovation and performance in SMEs, and are looking to find out if innovation is always beneficial. Khan and colleagues (1989) presented models for distinguishing innovative small companies from non-innovative ones. Anokhin and Schulze (2009) have analyzed the relationship between entrepreneurship, innovation, and corruption.

Freeman (1982) argues that necessity may be the mother of innovation, but procreation still requires a partner (Freeman, 1982). Before technological change leads to new processes, products, markets, or ways of organizing, entrepreneurs must discover opportunities in which to exploit the new technology (Shane, 2000).

Eric von Hippel (1988) argues that for a long time, it has been assumed that product innovations are developed by product manufacturers. However, it now seems that this basic assumption is often wrong (Hippel, 1988). Hippel (1988) has presented a series of studies showing that sources of innovation are very different. In some areas, users are primarily innovators. In others, suppliers of components and materials related to innovation are typically sources of innovations. In other contexts, common sense still perceives product makers as "innovators." He has explored why this diversity occurs in the functional resources of innovation and how it can be predicted (Hippel, 1988).

An entrepreneur is a vital part of the innovation and growth process. However, "the entrepreneur disappeared from economic theory" (Barreto 1989) and innovation studies. Hence, entrepreneurship needs to be considered in innovation studies. Because innovation is a special tool for an entrepreneur (Drucker, 2014). Schumpeter was probably the first scholar to theorize about entrepreneurship. In his view, without innovations, there will not be entrepreneurs (Schumpeter, 1934). Entrepreneurs are the main designers of the innovation strategy, the organizers of innovation activities, and even the creators of the innovation environment.

According to Schumpeter (1934), innovation can be defined as the launch of a new product, application of new methods, opening new markets, acquiring new resources, etc. All these types of innovations allow companies to realize a competitive advantage and economic benefits (Török, et al. 2018). Different kinds of innovations have different competitive effects and produce different kinds of markets (Markides, 2006).

Schumpeter (1939) argues that innovation in most cases acts on other prices as well as

on the prices of the innovating industry, and entrepreneurial activity shifts from one industry to another (Schumpeter, 1939, p. 479).

Technological change provides the basis for the creation of new processes, new products, new markets, and new ways of organizing; and entrepreneurship is central to this process (Schumpeter 1934, p. 66). However, before technological change results in this process of entrepreneurial exploitation, entrepreneurs must discover opportunities in which to use the new technologies (Shane, 2000). In brief, identifying and selecting innovative opportunities for new businesses are the most important abilities of a successful entrepreneurial function and for new businesses (Ardichvili, et al., 2003). In this paper, we identify and introduce the origin of innovations by entrepreneur exploitation. Here, the process of the introduction and exploitation of innovations by an individual entrepreneur has explained, as the following. This process has been extracted from Schumpeter's creative destruction theory (1934; 1954). This process, as seen, takes place in different rounds.

In the first round, the original entrepreneur (s) are looking for new sources of entrepreneurial profits based on the institutional and environmental conditions of the community. In this regard, (s) he seeks to use the new innovations. Opportunities exist in the form of product innovations, strategic factor innovations, and general advancements in technical information (Companys & McMullen, 2007).

Innovations include a product or service, or a new manufacturing process, or a new service delivery process. As a result of using these innovations, a strategic advantage has been obtained and exclusive entrepreneurial profits will be captured by the original entrepreneur (s).

In the second round, other entrepreneurs enter the market and try to imitate this process. Consequently, they see what the original entrepreneur has done and found out more information about the technology that s (he) use. With the technology being recognized, emerges a stream of new ideas. Hence, other innovations occur. As a result, the profits earned by the original entrepreneur (s) will be reduced. In such a way that the imbalance is eliminated and the equilibrium is established and the entrepreneurial profit disappears, gradually.

In the third run, the main entrepreneur or other entrepreneurs will change the rules and rewrite the rules and seek new sources of entrepreneurial profits. Looking for more insights to create something new, they will achieve further innovations. As a result, previous innovations are outdated and obsolete. The resultant process will be generating an exclusive entrepreneurial profit for entrepreneurs. This process will continue continuously.

7. NEW TYPOLOGY OF TECHNOLOGICAL INNOVATIONS

With the discovery of the "development" article written by Schumpeter, since 2005, the number of references to Schumpeter's works has increased sharply. Schumpeter had been the first to articulate explicitly the dependence of innovation on monopoly since nothing else can offer the prospect of high profit from the high-risk investment. Innovation, in turn, is the 'powerful lever that expands output and brings down prices' (Kingston, 2012).

Theories for classification distinguish between significant and trivial features of given phenomena (Niknazar & Bourgault, 2017). Establishing an analytical framework of occurrence of innovations is no easy task. In this section, we frame our typology on innovations as our unit of analysis in terms of its conceptual framework and classification.

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This alternative framework, strongly influenced by Carl Menger's scholarly work, takes the form of a set of concepts designed to synthesize a wide range of academic literature on the source of innovations and role of an individual entrepreneur and institutional environment in the occurrence of innovations.

The meeting point of four seemingly incongruous Menger's GTG theory, praxeology, and innovations theory here are human needs and human actions.

Shackle (1952; 2013) argues that "value can only be added to things by a change in people's desire for the things or by some change in the condition of the things themselves" (Shackle, 2013, p. 15). "The importance or usefulness or enjoyability of a thing does not depend on that thing only but on the relation between the character of that thing and the desires and circumstances of a human being" (Shackle, 2013, p. 13). Culture affects human action through values that direct it to some ends rather than others (Swidler, 1986).

For Weber, human beings are motivated by ideal and material interests. Interests are the engine of action, pushing it along, but ideas define the destinations human beings seek to reach and the means for getting there (Swidler, 1986). Therefore, in Weber' view, human action is important for analyzing social problems. The action is to include other people in the mind in the decision-making process. Human action is intrinsically associated with uncertainty and requires the imposed institutional constraints by human itself. Mises (2012) in the explanation of the praxeology argues that human action is purposeful. Therefore, it can be analyzed from the relationship of the Means and the Ends (1949). Also, Schumpeter's creative destruction theory (1950) is used to explain the likelihood of innovations.

In Menger's theory ([1871] 2007), the need is considered as an essential basis for defining and identifying the characteristics of goods. We examine how to use Menger's GTG theory as one's point of departure for the construction of a new theory of innovations. In doing so, at least two things are crucial. First, we need a considerably better knowledge of Menger's General theory of Goods (GTG). Second, we need to start suggesting ways for how to complement and add to his general theory of goods as a platform for investigation of innovations occurrence.

Menger ([1871] 2007) did not explain more about how to penetrate into the structure of things or in contemporary literature, as an understanding of the process and product innovations. Here, the purpose is to fill this void. According to our argument, this aim can be attained by developing and expand the general theory of goods (GTG) to the innovations studies territory to explain the occurrence and exploration of a new category for innovations with taking into consideration both demand side and supply side simultaneously.

Schumpeter has been called the Prophet of Innovation for his theoretical and extensive studies and influences in the field of innovation and entrepreneurship. Hence, his creative destruction theory, as well as the five pillars of innovation proposed by Schumpeter, has been the starting point for developing a conceptual framework for analyzing the occurrence of innovations.

Therefore, in this section, the conceptual framework of GTG and Schumpeter's Creative Destruction Theory (CDT) is have used to derive an alternative typology for recognition of the innovations types and source of its occurrence which is in conformity with the demand side. By this typology, explanation of the conditions for innovation occurrence is feasible. On the other hand, GTG theory does not address a variety of different needs. It is assumed that we are facing specific needs.

The locus of innovation often lies with the users because they cannot easily articulate

their needs for undeveloped solutions to problems (Hippel 1988). Most new products fail as they are rejected by consumers, indicating that innovations remain a critical challenge for managers (Heidenreich & Spieth, 2013). Therefore, an accurate understanding of user needs has been shown to be essential to successful new products (Shane, 2000).

(Figure 2) depicts a new conceptual framework of the alternative typology of innovations. We hypothesize that based on the causal connection between human needs, things and users' satisfactions, there are two major sources of demand for innovations: (1) the community potential needs and (2) the needs raised by innovations.

"Schumpeter's Innovation Theory" is based on Novelty and Change (Schumpeter, 1911-2005). The innovation in a very brief way is to make changes in established order by introducing something new and novelties (Webster, 1983, p. 945). In another word, "Innovation combines the elements of reform and change; reform implying new and change implying different" (Levine, 1980). Therefore, possible changes in any of the characters of goods or in general processes can be considered as innovations, of course, if human needs are met and satisfaction is achieved.

Based on the new conceptual framework, the process of process and product innovations begin first by identifying the source of innovations. Possible changes in the components of a product or process can be a source of innovations.

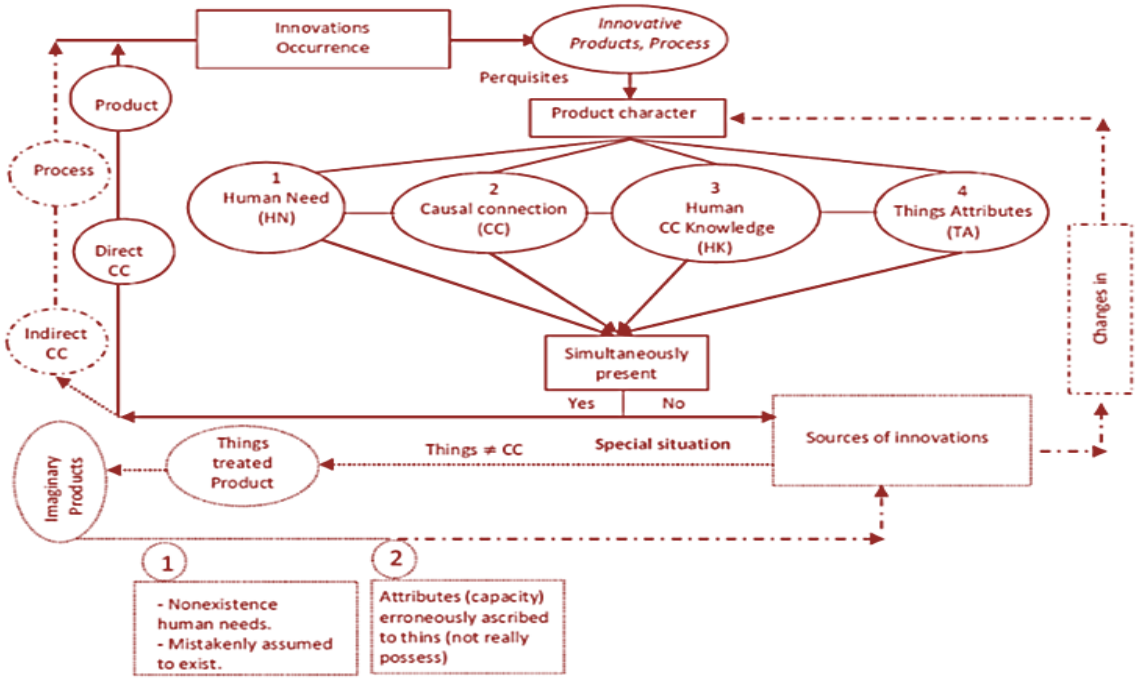

Figure 2: Conceptual framework of the source of process and product innovations occurrence

Here, we propound the idea that innovations occurs based on the source of innovations. Therefore, for the theorizing on the occurrence of process and product innovations, it is necessary to identify its sources and analyze the conditions for its occurrence. From Menger's (1871) theory, the four components of a product or process are human needs, objects, the causal relationship between needs and objects (or new technologies) as well as proven and documented technical knowledge of the causal relationship. In the next step, the nature of the source of potential innovations identified in the components of a product or process is analyzed. Then changes are made to the components of the product or process. If, after applying the changes, the four components of the product or process reappear

simultaneously, the achievements resulting from the changes are evaluated as positively. If the causal relationship is direct to human needs, product innovation has taken place. If the causal relationship is indirect, process innovations have occurred. Thus, seventh new types of innovations, at least, are recognizable based on the Alternative typology of innovations as follows See in (Figure 2):

- Providing a new product/process to meet existing users' needs;
- Provide new product/process to meet new users' needs;
- Creation of new needs by previous or new innovation;
- Establishing a new causal relationship (new means-ends relationship or new technology) between things and the needs of users (whether existing or new);
- Development of knowledge of the causal relationship between things and human needs;
- Change things attributes and create useful things; and
- Changes in the features of existing products/process.

Shackle (1952; 2013) argues that "modern business depends on the exploitation of the unknown. It is by a successful technological or commercial gamble that one firm gains an advantage over its rivals, and this advantage lasts only so long as it takes those rivals to imitate the product, method or market" (Shackle,1952; 2013, p. 155).

"Business success today springs largely from successful innovation. The very concept of novelty implies essential and deep-rooted uncertainty, for the novel is the hitherto unknown, even the unimagined. If there can be new knowledge, there must have been either wrong knowledge or a gap in knowledge" (Shackle, 1952; 2013, p. 76).

Accordingly, the level of different innovations in terms of satisfying the needs, the novelty of things, technologies and needs also sources of innovations for unsatisfied and unknown needs are presented in the table below (Table 3).

Table 3. Classification of process and product innovations

Needs satisfaction		Fully satisfied	Relatively satisfied	Unsatisfied
Needs	Old	Traditional innovation	Source of incremental innovation	Source of radical innovation
	New	Medium innovation	Source of medium innovation	Source of radical innovation
	Unknown or Nonexistence	Radical innovation	Source of radical innovation	Source of radical innovation
Things	Old	Traditional innovation	Source of incremental innovation	Source of radical innovation
	New	incremental innovation	Source of medium innovation	Source of radical innovation
	Unknown or Nonexistence	Radical innovation	Source of radical innovation	Source of radical innovation
causal connection (technology) (Direct/Indirect)	Old	Traditional innovation	Source of incremental innovation	Source of radical innovation
	New	Medium innovation	Source of medium innovation	Source of radical innovation
	Unknown or Nonexistence	Radical innovation	Source of radical innovation	Source of radical innovation

In this classification, each of three factors of needs, things, and the causal relationship between these two are classified from the perspective of users (consumers-manufacturers)

in terms of the three levels of old, new, unknown or non-existent. On the other hand, the level of satisfaction resulting from the use of the desired innovations (product or process) is evaluated in terms of three fully-satisfied, relatively satisfied or unsatisfied levels. As a result, a 3 * 9 matrix is created to classify innovations (product or process).

According to Bozeman and Link (1983, p. 4), when the innovation is the final marketable result, it is called a product innovation; when the innovation is applied in subsequent production processes, it is called a process innovation. In other words, when there is a direct causal connection between needs and things, innovation will be related to product innovations. If the causal relationship is not direct, then the related innovations will be the kind of process innovations.

It should be noted that if the satisfaction is relatively satisfied or unsatisfied, or in each of the three components of the needs, things, and the causal relationship between them were new or unknown, then the sources of new innovations can be found in these situations or areas. Accordingly, the sources of innovations can be categorized into four groups of traditional, partial, moderate, and radical innovation in terms of their degree of uncertainty or unknown rate.

8. CONCLUSIONS AND FUTURE RESEARCH

Literature review shows that in analyzing the occurrence of innovations, analysts often ignore parents of innovation. "Schumpeter's Innovation Theory" is based on novelty and change, with focused on human needs (consumers or producers). While our review shows that Schumpeter's innovation indicators have gone a long way over the past 100 years. And some of them have lost their original meaning. Part of this deviation has occurred as a result of the mistakes of referrals by different authors to second-hand references, other than Schumpeter's original works. So that the demand side in these indicators is neglected. We discovered the basis of the innovations types proposed by Schumpeter about 100 years ago, and so far remained mysterious, with reference to Menger's general theory of goods ([1871] 2007).

The paper presents the multilevel conceptual framework for describing how the phenomenon of process and product innovations (or technological innovations) can occurrence. Following Menger's general theory of goods ([1871] 2007), the 'innovations' are conceptualized as a process of occurrence of innovative products, here. The seventh major dimensions, at the least, are included in this conceptual framework. In doing so, we first read Menger’s General theory of Goods (GTG), carefully. Then, we have extracted the conceptual structure of this theory (Ahmadi et al, 2014).

The reason for choosing this theory as the basic theory for further development was that the literature review showed that the need to be the origin (mother) of the occurrence of innovations. In Menger's theory, the needs are considered as an essential basis for defining and identifying the characteristics of goods. An accurate understanding of user needs has been shown to be essential to successful new products (Shine, 2000).

Since human needs are motivators of human behavior and value generated by the fulfillment of these needs, understanding of human needs provides the foundation for effective innovation management (Oliver Yu, 2016).

The existing categories of innovations are either focused on the supply side or just on the demand side. The "market pull" projects represent the majority of industrial new product

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projects. But "technology push" projects where the product idea comes from basic research or a technological discovery-also play a role, particularly in the case of radical innovations or breakthrough products, which are important to long term success (Cooper, 1983). On the supply side, it is argued that Research and development (R&D) leads to innovation, and innovation leads to technological change. Technological change, in turn, is the primary driver of economic growth (Link, 2006).

While in the newly proposed typology, here both sides of supply and demand are simultaneously addressed. According to the multilevel conceptual framework of the innovations occurrence, we have introduced the seventh new types of innovations as follows:

- To provide a new product/process to meet existing users' needs;
- To provide new product/process to meet new users' needs;
- Creation of new needs by previous or new innovation;
- To establish a new causal relationship (new means-ends relationship or new technology) between things and the human needs (whether existing or new);
- To develop the knowledge of the causal relationship between things and human needs;
- To convert the things attributes and create useful things; and
- To changes the features of existing products/process.

Also, different innovations can be classified based on the level of satisfaction, as well as the newness degree of human needs, things, and the causal relationship between them (technologies).

In conclusion, we argue that by considering both the supply and demand sides in the types of innovations, the occurrence of innovations can be better explained. Furthermore, in order to foster innovations' occurrence, it is necessary to create favorable environmental and institutional conditions. In this case, as a result of reducing uncertainties and transaction costs and increasing trust and compliance with obligations and contracts, the likelihood of failure in innovative activities decreases. With the experimental and field research, this typology can be tested. As well as, the proposed typology can be used to revise innovations scanning and surveys schemes and questionnaire-based measures of innovations (e.g. the CIS). Finally, it's worth noting that the human mind plays an important role in the process of human action that must be considered in the economic analysis, including the occurrence of innovations. In such a way that without the intervention and value of the mind, products derived from innovations will become ineligible objects. The proposed typology is a simple one which explains only a given, and specified, range of innovations. Therefore, it requires future theoretical and empirical research. In the direction of future research, we ask the reader to keep in mind two limitations of the study: (1) the proposed typology is a simple one which explains only a given, and specified, range of innovations; (2) further research in the theory of innovations are occurring which might modify or improve upon our conceptual framework and extracted classification.

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