

RESEARCH ON RELEVANT VARIABLES RELATED TO ENTERPRISE CO-CREATION AND INNOVATION FOR BETTER PRODUCT OUTPUT

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ABSTRACT: Co-creation is a business strategy to excel in product and service creation and improvement through collaborative innovation involving stakeholders, especially customers. The aim is to produce outcomes that are more valuable to the target market, through customer aligned and enriched needs and knowledge, skills, and creativity base. Present AI times show an accelerated evolution in most business key areas. Proactivity to change is paramount for any organization to survive. What measurable organization traits better relate to co-creation and innovation? Can these relationships allow to identify businesses better posed for success and allow to prioritize certain activities for a better performance? Study deepens on different enterprise variables related to innovation and co-creation, as causes or effects. Software and technological business as well as those present in short cycle physical product markets relate to co-creation. Business in service-related activities also show this relationship. Multisector entities may perform better than unique sector of activity ones. Public activities are less result driven and less prone to co-creation and clear improvement opportunities. Budgets seem to affect co-creation, therefore so should do economic cycles. For future research: faster time to market, cost-savings, internal process improvement, customer loyalty and engagement, eco-sustainability concerns and preferences of stakeholders, incorporated into products and services. Internal knowledge and innovation management culture and processes are key to innovation success and relate directly to operational performances.

KEY WORDS: *Innovation; co-creation; product creation; value chain improvement; customer needs; variables.*

1. INTRODUCTION

Currently the framework in which companies operate changes rapidly due to various driving factors: the environmental situation, Artificial General Intelligence (AGI) and the

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data it is fed with for training, and the globalized strong fluctuation of markets including that of energy and materials as well and related to present geopolitical turmoil. These accelerated changes, after years of free, stable trade conditions, exacerbate competition and the need for rapid evolution of all entities. This evolution of companies must logically be adaptation: in accordance with changes needed. This is where innovation is more than ever paradigm for improved organizational changes as well as related product and service improvement. As always, the guiding backbone for innovation must be the stakeholders value chain growth. Meeting customer's needs is the fundamental aim in the stakeholders value chain. And they can't be better met than with co-creation and customer centered collaborative innovation processes.

2. METHODOLOGY

Hypothesis and objectives

Any tools to predict any enterprise expected innovation performance is a great asset. The aim of the study is the identification of input and output characteristics that relate to innovation and co-creation as a fundamental first step. Studying the nature of relationships between these output and input variables is another step in the way to a predictive model.

Stages and methodology

First trough innovation concepts and second, enriched and corroborated through a basic review of scientific literature, entities characteristics or variables that are related to innovation and co-creation are proposed.

3. RESULTS

Characteristics of enterprises that could be related to innovation and co-creation from innovation and present common knowledge

Enterprises articulate innovation systems based on concepts between which three could be considered main pillars: knowledge, technology, and interactions, being the first two, the basic components of innovation. Internal knowledge level affects the performance both of inventions and development. Knowledge management is increasingly important, also considering powerful established AI algorithms and new AGI algorithm analysis technology using big data for training.

Funding is not indispensable, but innovation requires risk taking because resources are used sometimes without a guaranteed output. Therefore, firms without capital resources have greater difficulties innovating. Since innovation is a complex activity, requiring resources and management, enterprise size plays also a role, except for emerging markets or technologies, where small, pioneers and first to arrive enterprises have a naturally

innovative uprise. Similarly, budget size or relative size to income in certain areas like design and research and development show effort and compromise by companies. Sustained effort should yield innovation and co-creation results. Economic cycles affect budgets so they should also affect innovation and co-creation.

Even though globalization and online working technologies have decreased its influence, localization of the enterprise still plays a significant role. External knowledge and innovation dynamics are heavily influenced by local government policies, public institutions, educational institutions, existing technological infrastructures and legal frame. All these may boost or ballast innovation efforts. Universities and other educational entities feed the entities workforce initial knowledge. Also, innovation organizations tend to cluster. When this happens, innovation and cooperation benefit from the clustering dynamics such as high knowledge companies and high skilled personnel density and availability. Strong economic and industrial areas where corporations strongly drive suppliers into co-creation, not only at a component level, are frequently sectorial hotbeds of innovation. Automotive industry is a classic example of this. Economic, activity and social diversity favor innovation, since besides similar interests, also different interests concur in a same spot. knowledge mixing and crosspollination of ideas, learning and applying positives from other activities is more likely to occur in these areas than in homogeneous environments. The result is a richer innovation seedbed and later easier translation of different ideas into new products and services. These conditions happen in or close to urban areas.

Also due to diversity in knowledge, multisector entities may perform better than unique sector of activity ones.

Rapid changing markets or those where product changes rapidly due to fast technology advancement are populated by innovation centered companies. Otherwise, they would have disappeared by market nature. Software and technological business as well as short cycle product markets are an example.

Product nature will affect innovation outcome. Service-related business show a closer relationship to co-creation activity. Service is by nature easily tailored to customer needs more than physical products, which have a wider pool of design constraints. Product wise, strategies based on mass scale production or cost reduction may yield different innovation outputs than strategies based on custom, new or high-quality premium products.

Public activities are less improvement proactive since their existence is less or not tied to performance. There may not be other entity for customers to choose, no competence can take over its activity. Consequently, they are less prone to co-creation and innovation, but in the other hand can show clear and easy improvement opportunities through them.

As outputs that could measure co-creation and innovation return, are gains in market share as well as in new markets. New products successfully launched into market could also be gross indicators to which they would most probably contribute. Ideally, they should be pinpointed to projects. Internal efficiency gains and sustainability indicators in

areas where innovation related projects had taken place, as well as shortened process and development cycles are also possible indicators. Some of this information is internal to companies and hard to obtain for academic purposes.

Characteristics of enterprises that could be related to innovation and co-creation from basic review of scientific literature

A simple systematic approach is adopted, identifying 9 relevant articles, 7 sought in Web of Science database and 2 additional ones that were judged to be relevant. We limited the search strings to the following in Web of Science database: TI=(((innova* AND (factor* OR variable*))) OR ((co-creat* OR cocreat*) AND (factor* OR variable*)))) AND TS=(innova* OR co-creat* OR cocreat* OR sustainab*), with the use of asterisks at the end of words enabling the search for different endings. Additionally, no restrictions to date or country of publications were placed.

Market, law and regulation knowledge, inter functional collaboration, innovation-oriented learning and R&D investments are the four main success factors for environmentally sustainable product innovation (Cortimiglia et al., 2014).

A study of product innovation, the influence of organizational process factors and capabilities on development performance (Tatikonda et al., 2001) show that development organizational process factors studied are associated with achievement of operational outcome targets for product quality, unit cost, and time-to-market. This achievement of mentioned operational outcomes aids the achievement of market outcomes, so development capabilities are a valuable resource. Also, these relationships are robust under conditions of technological, market, and environmental uncertainty, where innovation is more than ever needed.

Another article (Cooper, 1999) states that factors for success fall into two categories. The first is the right selection of new product projects. This indicates the importance of market knowledge, thus marketing department. The second category contains factors referring to doing right the projects. This includes complete and early product initial definition, strong customer voice following, well resourced and planned projects, capable cross-functional teams with strong leaders and global and multimarket research. Interestingly, the lack of efforts in these factors operate as “blockers” of the innovation and development process.

A meta-analytical investigation over new product success (Evanschitzky et al., 2012) indicates that local cultures affect with success factors weakened for individualistic countries and strengthened in risk-averse countries. Also, that working in varied cultural contexts will result in different backgrounds of successful new product companies.

Internal factors are analyzed in an article (Galende et al., 2003) and the following relevant are mentioned: size, debt, human resources, organizational and commercial resources, diversification, and internationalization.

A study with a sample of over 6000 manufacturing firms from the Spanish Survey of Technological Innovation 2000 (Vega-Jurado et al., 2008) states that internal research and development technological competences have a principal role in product innovation and that with such strong competences, non-industry agents derived from technological opportunities affect less to innovation.

Although another study (Donate et al., 2011) has a scope limited to high-rate innovation industries, the analysis of organizational factors influencing knowledge practices and innovation, show that the following factors: human resources, leadership and culture, when are knowledge-centered will elevate the exploitation of innovation capacity of the firm.

A study over data from Spanish automotive firms (Segarra-Ona, 2011) showed that those that innovate rely greater in information. Also, that companies which consider market information sources -such as customers, suppliers, competitors, and other external sources- as important in the process of innovation and development of new products and markets are also more environmentally oriented.

A study with the PITEC Innovation in Companies Survey (Segarra-Ona, 2011), Spanish companies show that company and market size, formal innovative activity (reflected by registered numbers of patents) as well as total expenditure on technology acquisition influence the eco-innovative orientation of firms.

4. CONCLUSIONS

From results we propose the search for variables related to the following concepts in a valid data set. They are classified as internal and external inputs and outputs for a later study of their relationship with innovation and/or co-creation.

Internal inputs

Knowledge excellence culture and management effort variables: registered patents, internal formation budgets, educational level of staff, R&D and Innovation budgets and personnel (staff quantity internal and external), also related to innovation internal processes management, software and hardware licensing budgets or acquisitions.

Innovation internal processes management: assigned budget, staff and number of innovation and development projects for products or internal processes (also related to internal interaction). Diversification: other departments staff dedication to R&D and innovation projects (personnel, hours, budget...). Average R&D and Innovation staff age.

Technology effort: software and hardware licensing budgets or acquisitions, machinery renovation budgets or expenditure, IT budgets or expenditure, process engineering budget and personnel, quality improvement budget and personnel.

Stakeholders and customer interaction (co-creation): local entities and customer involvement in projects (number of projects and staff involved).

Collaboration with other entities: joint ventures with other companies (number or dedicated budget and staff involved), collaborative projects with local educational and technological entities (number or dedicated budget and staff involved).

Marketing function: Marketing budget, especially for market study (not selling strategies). Personnel assigned to market analysis.

Funding and size: public or private funding, income, personnel number, company growth (income and quantity).

External inputs

Localization: distance to urban area, urban area size, urban area number of superior and vocational educational institutions, public local educational expenditure, local median gross income, average gross income of first local 100 firms, average gross income of first local 100 firms in same business activity, average gross income of first local 100 firms in IT, number of foreign working permits working locally, immigration data, English language local knowledge data.

Outputs

Quality data (scrap losses, customer satisfaction indexes...), time to market data, diversity of markets product and geographically wise, new product growth data (number of products, income...), new market share gain data (number of new markets or countries with sizeable income, total income growth in markets with innovation projects), eco efficiency data (when projects with eco-innovation aims concur): data of carbon print evolution, recycling of materials data evolution, renewable energy data evolution, waste and hazardous waste production evolution and management data.

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