

Knowledge Integration in Open Innovation: A Conceptual Comparison

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ABSTRACT: This article is based on a PhD thesis that examined open innovation and its relationship with knowledge integration, comparing less open and more open firms. The ability to integrate knowledge is related to competitive advantage, and this study sheds light onto OI at each different firm. The main findings show that, different levels of openness in innovation, demand firm-specific mechanism for KI. Also, openness increases complexity in management. The understanding of how firms select their knowledge for appropriation and differentiation is also considered. The Brazilian cosmetics market was chosen for the empirical work because it occupies the 3rd position in the world's ranking and this industry is under researched. A cross-case comparison is used.

KEYWORDS: open innovation; knowledge integration; cosmetics; cross-case; Brazilian market

I. INTRODUCTION

Making use of external and internal ideas to advance knowledge is claimed to bring more competitiveness for companies in general [1]. The inflow and outflow of knowledge, which are part of this process, involve practices that should encourage participants to explore a wide range of innovation opportunities through multiple channels [2]. Several authors [3-9] affirm that innovation processes can no longer be limited to local or internal know-how, but needs to focus more on professionals that can maximize the effectiveness of innovation, as well as finding alternate sources such as markets or spillovers. An example of that in the cosmetics sector is the search for special and unique knowledge (i.e. fragrance experts) that sometimes is available in another country. Also, emerging markets can be explored (nationally and internationally) according to changes in socio-economic conjectures (i.e. end of crisis and a more democratic regime or economic empowerment in the case of Brazil). This implies interaction and integration of knowledge, suggesting a relationship with another concept, that is, Knowledge Integration, which has been explained as a learning process within organizations and, therefore, has been seen as a critical process for understanding firm's competitiveness. It depends on people's attitudes towards learning, it varies in scope (the greater the harder for competitor to replicate) and it can be more or less flexible in relation to the capacity an organization has to build one innovation initiative on the top of another [10, 11]. Both Open Innovation and Knowledge Integration have complementarities, as well as overlapping dimensions, and have not been compared in previous studies (so far and to the best of my knowledge).

Also, they were developed mainly with a focus on high-tech industries, which might reveal characteristics that pertain to these fields only, but might not reflect the situation in medium or low technology industries for example. In reality, firms might find it difficult to balance the differentiation [12] results from more open innovation practices (i.e. behaviour and attitudes of people involved), and the integration of knowledge for competitiveness (i.e. achieving unity of effort among people that is transformed in value for the firm). So, these concepts can be also antagonistic, and an investigation is necessary to study this relationship, taking into consideration that strategic shaping might influence organizational forms and practices [13], as well as the important dimensions of innovation such as offerings, presence, customers and processes [14], preferably in low-medium technology industries which are under researched to present. The economic context suggests firms are encouraged to implement open innovation mechanisms and knowledge integration to be successful. So, this research aims to study how firms deal with these concepts in practice.

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II. RELATED WORK

Both Open Innovation and Knowledge Integration have complementarities, as well as overlapping dimensions, and have not been compared in previous studies (so far and to the best of my knowledge). Also, they were developed mainly with a focus on high-tech industries, which might reveal characteristics that pertain to these fields only, but might not reflect the situation in medium or low technology industries for example. In reality, firms might find it difficult to balance the differentiation [12] results from more open innovation practices (i.e. behaviour and attitudes of people involved), and the integration of knowledge for competitiveness (i.e. achieving unity of effort among people that is transformed in value for the firm). So, these concepts can be also antagonistic, and an investigation is necessary to study this relationship, taking into consideration that strategic shaping might influence organizational forms and practices [13], as well as the important dimensions of innovation such as offerings, presence, customers and processes [14], preferably in low-medium technology industries which are under researched to present. The economic context suggests firms are encouraged to implement open innovation mechanisms and knowledge integration to be successful. So, this research aims to study how firms deal with these concepts in practice.

III. METHODOLOGY

This research aims to make an analysis that will be carried out within an industrial environment, the cosmetics sector in Brazil. The focus of the research is on the firms' ability to integrate knowledge under the influence of different degrees of innovation openness, exploring the interaction of the main actors in this process. So, a qualitative research is employed, as the context is very important and should therefore be analysed. Multiple case studies will allow replication of responses to the research, or will allow the description of circumstances where responses are not replicated [15]. One of the participating organisations will be used as a pilot case [15] enabling the refinement of aspects of the research such as interview schedules, interview questions and interview techniques. This pilot was carried out in Brazil as an attempt to refine the instrument of collection of data within the socio-cultural environment of this study. Choosing one specific sector such as the cosmetics sector, facilitates the validation of the research in its final stages, as the design of this study uses a replication approach, that is, each individual case study consists of a "whole" study, in which convergent evidence is sought regarding the facts and conclusions for the case; each case's conclusion are then considered to be the information needing replication by other individual cases [16]. The choice of cosmetics industry is also relevant as research in this industry is still incipient which is confirmed by the small number of results when searching for articles using the main academic search engines. The articles encountered were only few as referred as follows [17-21]. Research data was collected from multiple sources in each case. This allows for triangulation of data sources [15] in order to confirm, or disconfirm, answers to the research questions. Data was collected by observing activities in loco, interviewing professionals, and analysing secondary data.

Semi-structured interviews were selected as the primary data collection method for this study. These consisted of:

- 1) Interviews with, in each case study, people involved with innovative processes/products including multidisciplinary teams.
- 2) Interviews with, in each case study, the heads of departments, as a management team.
- 3) Interview with, in each case study, the senior operational manager, depending on availability.

Observations were also used to obtain information from events such as Seminars and Congresses, aiming to explain data available at these encounters by means of listening, questioning people, and exchanging ideas. Direct observations served also to prepare for further observations and interviews at later stage. Data preliminary collection was done by using a Likert questionnaire, which was applied in every company before the interviews.

Innovation is a hot topic in Brazilian government due to the country current economic growth. In spite of that, managers are sceptical about new trends in management, even if they are considered of high importance as it is the case of innovation. Therefore, open innovation being a newer concept, most managers preferred to keep their governance models in a more traditional way, with few exceptions. The integration of knowledge occurs mostly at administrative level, particularly because the firm has been created in an incubator and sponsored by government agencies. Finally, BN is a manufacturer of hair colouring products that compete 'head to head' with multinationals such as L'Oreal. The firm is clearly driven by strong marketing campaigns and publicity in the media.

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IV. EXPERIMENTAL RESULTS

This cross-case analysis has been carried out to compare different conditions of openness and the implication of these on knowledge integration, as well as its influence in innovation. Firm size appeared as an important factor because of the high costs and increased complexity involved in the OI practices. Large case firms demonstrated an advantage in building processes that enable OI. Also, these firms have the ability to launch new products faster than SMEs due to their advantageous financial status that allow for large investments in marketing and publicity. Apart from that, large firms normally have their own laboratories and can compete with multinational in category 2 products, a higher regulated category of cosmetics that SMEs have difficulties to produce.

The preliminary questionnaire applied in the phase 1 of data collection resulted in two 'more open' firms, four 'hybrid' and three 'more traditional' in the nine case firms. This was the first step to determine different levels of openness that was then developed in the phase 2 (semi-structured interviews, observation and documental analysis). Phase 1 results showed a certain degree of proportionality in the type of open practice in the sixteen dimensions. This suggested that all firms, more open, hybrid and more traditional carried out open practices to a certain degree.

During phase 2 of the data collection, thirty three interviews were carried out among the nine case firms. Results corroborated to a certain degree with the preliminary questionnaire (phase 1). So, having divided firms into these categories, a comparison between knowledge integration mechanisms was made by analysing data collected from interviews, paying particular attention to the dynamics used by each firm in relation to interdisciplinary teams of collaborators, regular meetings, opportunities for sharing knowledge, enablers of knowledge integration, as well as Grant's four categories division [22, p114-115]: i) rules and directives, ii) sequencing, iii) organizational routines, and iv) group problem-solving and decision-making. The results reveal that more open firms were also more intensively practicing knowledge integration, and that a degree of proportionality is also present between the two categories, that is, openness and knowledge integration, with the exception of the firm BU, a hybrid firm, whose practices are much more traditional comparatively.

Also, a semantic analysis revealed six common topics that are related to leadership, personnel (i.e. human resources), culture, planning, information and processes. Having found this commonality, I decided to compare these six topics according to the pre-established division into more open and more traditional, and concluded that significant differences in mind-sets of these two groups also influence knowledge integration.

Finally, all firms demonstrated a considerably high level of intensity in knowledge integration practices. Knowledge acquired externally is normally 'ordered' by internal needs and strategic direction.

V. CONCLUSIONS

This study contributed to the expansion of the two concepts chosen as the theoretical basis of this study, Open Innovation and Knowledge Integration, exploring the relationship between these two concepts. It can be summarized that, based on these findings, the theory of innovation management that focuses on open innovation and the theory that focuses on knowledge integration could be extended and further compared in future studies.

The analysis and interpretation of results confirmed the existence of a relationship between these concepts, and a variation of intensity of related practices that suggests some sort of direct proportionality between them. Also, more open firms demonstrated higher levels of intensity in knowledge integration practices. Knowledge acquired externally is normally 'ordered' by internal needs and strategic direction, and it is a practice that is present in every case firm.

After careful observation of the nine case firms, it can be affirmed that none of them is practicing open innovation in the strict sense proposed by Chesbrough[1], as it would imply either outside-in and inside-out movement of knowledge (or a coupled process). What has actually been seen in this sector are enormous efforts to bring valuable knowledge from outside to the inside, and the inside-out movement is almost non-existent. In spite of that, knowledge integration practices were always present in both types of firms, more open and more closed, as a necessity to integrate whichever knowledge was present for the creation of value.

The proposition that was formed from the rationale behind this research was confirmed in the sense that more open firms required higher intensity of knowledge integration practices. The study also suggests that absorptive capacity is a

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crucial pillar of more open practices because it requires more preparation from internal workers before bringing external knowledge internally, and points to future research within the Resource (Knowledge) Based View that should be developed in order to further consolidate both concepts of open innovation and knowledge integration.

Further research made about Brazilian innovation system demonstrates that Brazil has become competitive in the international export market for medium and high technology goods, showing signals that the country is moving from predominantly agricultural and commodity-based sectors towards high-tech ones, supported by the important role of innovation and entrepreneurship. Innovative firms in Brazil tend to be large in size in comparison to US, EU and Japan [23]. This study confirms the conclusion reached in this study about higher levels of innovativeness in large cosmetics firms, and propensity to establish OI practices in comparison to SMEs in the sector. In spite of that, the case firm CA shows an example of innovation in SMEs that is on business model rather than technological, demonstrating a good opportunity for smaller sized firms in this sector. CA, as mentioned earlier, is concentrating its efforts on a market niche of organic cosmetics.

A huge technological gap has been seen in the study between large (medium) and small firms, corresponding to the categories of cosmetics 1 and 2. These differences also caused a 'knowledge gap' between these firms, because those working with high-tech materials or category 2 products also utilize high calibre workers that deal with higher complexity. Small firms, normally making category 1 products, tend to contract ad-hoc specialists in specific situations and occasions, and this can present difficulties in terms of competitiveness. As technology is not the only differentiator in this sector, small firms make use of niche marketing tools (i.e. organic products) that do not depend on high technology but still cause an impact to a certain group of consumers. Brazil's socio-economic situation has arguably played an important role in the growth of cosmetics consumption in recent years, and it is to be considered and further observed in similar research.

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