

# Predictors of Commercialization Success in Product Innovation: A Systematic Research

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**Abstract**—This review paper illustrates the routes within the area of innovation commercialization. The routes are extracted from the total of 245 past studies that had been published from year 2007 to year 2015 from numerous established databases. The results from systematic literature review shows that eight main predictors of commercialization has been identified. All eight factors are organizational support, knowledge management, strategic orientation, contextual factors, innovation characteristics, team composition, individual factors and collaboration.

**Keywords:** Commercialization, Success, Product, Innovation,

## I. INTRODUCTION

Innovation commercialization is possibly one of the main important challenges being faced by all kinds of innovation companies. Across the century, new technologies have mushroomed rapidly according to an increase in the number of research universities, research institute and competition in the market. The world has seen market demand for new innovations also increasing considerably as vital sources for the generation of national incomes. Innovations play a major role in the economic development of our country because innovations have become one of the vital elements in the business model of a firm. Today, innovation is seen as a requirement for staying competitive in a modest environment, and it is significant for organizations to uphold it in the face of the rapidly changing needs of customers [4].

As [26] pointed out, innovation, can be defined as something that is able to create value, is beyond science or technology. This can be seen, for example, in the competitiveness of mobile phones, such as Samsung, Apple, Sony, Blackberry and others, nowadays. These companies keep revolutionizing their output by introducing innovative technologies or features in order to maintain their sustainability in the market and to survive in the global battle for a share in the market. Another good example is online shopping, which has practically changed the retail market by offering online purchasing. For this reason, firms have to be more innovative to ensure that they are in a comfortable zone in the global market. In short, innovation

is necessary in order for companies to remain relevant in the market.

The failure of new innovation in commercialization stage is rising at an alarming rate even though large amount of previous studies mentioned the success story of innovation. In fact, greater part of previous findings affirm that most of the innovations are affluent at the stage of research and development (R&D) and in the initial phase of product development, but it will not definitely lead to triumph when it enter the market during commercialization phase [35]. This was why [23] stated that the success of commercialization is one of the crucial agendas that need more research and further investigation. Thus, many researchers have attempted to identify the barriers and challenges in the commercialization of new technologies and to investigate the factors that lead to the successful commercialization of new innovations. As the result of a systematic literature review, some of the positive significant factors were identified, and all these factors are discussed in the subsection as below.

## II. MATERIALS AND METHODS& METHODOLOGY

This section discusses previous studies by reviewing approximately 245 relevant articles. Only studies that actually measured commercialization were included in this systematic literature review. The purpose of a systematic literature review (SLR) is to outline areas of uncertainty in a research in order to identify gaps in the research area and to recommend opportunities for future research [67]. In addition, a SLR involves explicit and rigorous methods to critically assess and synthesize relevant research studies [9]. The purpose of the systematic literature review was to discover the factors and variables that impel commercialization success of innovation.

The following procedure has been conducted to discover and retrieve primary empirical studies pertinent to the research question. It follows the methodological instructions has been designed. The procedure starts with the determination of the dependent variable which is commercialization performance. With the intention of search for related searching for related papers, a few databases were used such as EBSCOhost and Web of Science. The majority of the literature belongs to cited and high ranked journals. The articles being reviewed were browsed from different disciplines. For the next step, selection of the studies, a search was conducted within the 7

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# PREDICTORS OF COMMERCIALIZATION SUCCESS IN PRODUCT INNOVATION: A SYSTEMATIC RESEARCH

years starting from 2007 until 2015. The screening was made based on the keyword (i.e commercialization, innovation, innova, market, success).

Referring to the discussion above, commercialization is one of the components in innovation process. Therefore, researcher seems have to limit only on articles that indicate commercialization performance as innovation success. The findings of analysis from the selected articles, innovation success has been measured by number of publication, product speed to market, product novelty, and patent data. However, referring to the commercialization definition, it signifies the conversion of R&D innovation or project into marketable or profitable products. As a result, all papers that used these types of indicators have been excluded from the list. For example like patenting measure, according to [12], patent protection negatively influences the company's profit growth directly but partially mediated by commercialization. This result showed that patenting protection is only helps the commercialization process [12]. This result concluded that the patenting is not the best indicators for innovation success; it is just as a protection for commercialization process.

Therefore, for the purpose of this study, the researcher has chosen to focus on articles that indicate commercialization performance as an innovation success. From the literature review, it was apparent that many studies have been carried out by scholars to identify the factors of innovation commercialization that affect commercialization performance. Based on a frequency analysis, 245 articles

related to commercialization performance from the year 2007 to 2015 were shortlisted from the database. An analysis of the number of articles based on the year is shown below in Table 1.

**Table 1: Number of Reviewed Studies with respect to Publication Year**

Year	Number of Articles	Years	Number of Articles
2007	13	2012	30
2008	26	2013	30
2009	16	2014	33
2010	27	2015	30
2011	40	<b>Total</b>	123
<b>Total</b>	122	<b>Total (2007-2015)</b>	<b>245</b>

The reviewed articles were browsed from different disciplines. 245 number articles were selected as sample studies; consist of 80 journals and 10 conference proceedings. The vast number of the literature classified as cited and highly ranked journals. Most of selected paper came from the Technovation, Research Policy, Industrial Marketing Management, Journal of Product Innovation Management, and Journal of Technology Transfer. Table 2 shows the total of articles comes from all 80 journals while Table 3 shows 19 articles on ISI proceedings from 10 different conferences.

**Table 2: Number of Reviewed Journals with respect to Publication Source**

Number of reviewed journals with respect to publication source			
Name of journal	No of articles	Name of journal	No of articles
A Journal of the Decision Science Institutes	1	Journal of Business Marketing Management	1
Academy of Management Journal	1	Journal of Business Research	6
Academy of Entrepreneurship Journal	1	Journal of Business and Industrial Marketing	1
Annals of Regional Science	4	Journal of Business and Venturing	3
Asia Pacific Journal of Management	1	Journal of Commercial Biotechnology	2
Asian Journal of Technology Innovation	1	Journal of Innovation Management	1
Asian Business & Management	1	Journal of Innovation and Entrepreneurship	1
Asian Social Science	1	Journal of Operations Management	1
African Journal of Business Management	2	Journal of Product and Brand Management	2
Baltic Journal of Management	1	Journal of Management Studies	4
British Journal of Management	1	Journal of Management & Organization	1
Table 2 (Cont'd)			
Creativity and Innovation Management	1	Journal of Communication	1
Creativity Research Journal	1	Journal of Engineering and Technology Management	3
European Journal of Innovation Management	2	Journal of Small and Business Management	1
European Journal of Marketing	1	Journal of Technology Transfer	12
Expert Systems with Application	2	Long Range Planning	2
IEEE Computer Strategy	1	Management Research Review	1

IEEE Transaction on Engineering Management	4	Management Decision	1
Industrial Management and Data System	2	Management Science	3
Industrial Marketing Management	14	MIT Sloan Management	1
Innovation-Management Policy & Practice	3	Operation Management of Resources	1
International Journal of Organizational Innovation	2	Organizational Studies	2
International Business Journal	1	Organizational Dynamics	1
International Business Review	2	Production Planning & Control	1
International Journal of Business and Management	1	PLOS One	1
International Journal of Business Innovation and Research	1	R&D Management	6
International Journal of Innovation Management	1	Research Policy	27
International Journal of Electronic Business Management	1	Sciencetometrics	1
International Journal of Engineering Innovation & Management	2	Science and Public Policy	5
International Journal of Research and Marketing	1	Science Technology and Society	1
International Journal of Technology Management	1	Strategic Management Journal	5
International Small Business Journal	2	Strategic Change	1
Industrial and Corporate Change	3	Technovation	24
Journal of Marketing	2	Technological and Economic development of Economy	1
Journal of Economics & Management Strategy	1	Technology Analysis & Strategic Management	2
Journal of International Marketing	1	Technology and Investment	1
Journal of International Management	1	Technology Forecasting & Social Change	6
Journal of Product Innovation Management	17	The International Journal of Human Resource Management	2
Journal of Business Ethics	1	The Evolution of Economic and Innovation System	1
Journal of Purchasing and Supply Chain	1	World Journal of Entrepreneurship, Management & Sustainable Development	1
<b>Total</b>	<b>88</b>		<b>138</b>

### III. RESULTS

#### 3.1 Factors that affect the success of innovation commercialization

Previous literature review revealed eight factors that affect innovation commercialization performance. The first factor was organizational support. It believes that; firm's performance enhancement might need effective and appropriate assistance to speed up their innovation to enter the market. Organizational support or perceived organizational supports indicate on how an organization concerns of its employee with expectation that at the end their organizational goal will fulfilled [20]. All organizational support mentioned above include information technology tools and technology ([18]; [27]; [70]), systematic patenting system ([22]; [30]), top management support ([36]; [61]), manufacturing [40], organizational capabilities such as marketing ([40]; [83]), learning or training [40], research and development [40], rewards [45], organizational innovativeness ([32]; [36]; [41]; [79]; [85]), and lastly new product development capabilities [49]. Furthermore, from the results, it has been proven that organizational resources have a positive effect on innovation commercialization performances. These are the studies that shows the positive effect of financial resources ([21]; [31]; [80]), technological resources ([34];[58]), and lastly human

resources ([51]; [60]; [75]; [77]; [81]) towards commercialization performance.

Second factor that identified beside the organizational support was knowledge management. This component is essential in accelerating commercialization [37]. The knowledge management can be defined as a process of discovering, capturing and leveraging on the collective knowledge in an organization to facilitate its competitiveness/competitive edge [80]. A few findings have recommended that knowledge management could support firms to increase their commercialization performance ([14]; [17]; [21]; [31]; [33]; [42]; [50]; [61]; [63]; [72]; [78]; [82]; [87]; [88]). Knowledge management here was referring to knowledge exploration, knowledge integration, knowledge exploitation, knowledge on market, and lastly explicit and tacit knowledge. Undeniable, a firm who intends to speed up their commercialization of innovative products need all these kind of knowledge.

Based on the SLR analysis, it has been identified that firm's orientation plays an important role on the success of innovation commercialization and strategic orientation is the most widely type of firms' orientation studied by researchers. Strategic orientation was categorized as market

# PREDICTORS OF COMMERCIALIZATION SUCCESS IN PRODUCT INNOVATION: A SYSTEMATIC RESEARCH

orientation [66], entrepreneurial orientation ([10]; [25]; [52]; [57]; [64]), network orientation [64], technological orientation [64], industrial orientation ([6]; [33]), and research orientation [6].

The systematic literature review results also indicate that contextual factor is one of the variables tested for successful commercialization. Contextual factor are external influences that affect the innovation commercialization, such as, political and legal, economic, social and cultural factors. This shows that external factor plays an important role in ensuring the marketability of an innovation. There are few studies apply this variable as moderator [58]; while there were another studies employed it as independent variable meaning that, it has a direct relationship with commercialization performance ([16]; [53]; [55]; [63]; [90]). According to [37] and [45], the external environment example, capital situation and labor, shaped from government may also influence the innovation market ([6]; [39]; [56]; [76]).

The next factor discussed in previous literature was innovation characteristics. Innovation characteristics according to [19], refers to the innovation scope, tacitness, newness and relatedness. Meanwhile, according to [69], the characteristics of innovation are patent, commercial uncertainty, technology dynamism, and complementary assets. In addition there are several authors that also discussed the details on the other elements of innovation characteristics (e.g., [2]; [3]; [7]; [15]; [18]; [19]; [28]; [32]; [34]; [38]; [41]; [46]; [47]; [48]; [62]; [66]; [68]; [69]; [70]; [72]; [71]; [73]; [74]; [76]; [81]; [82]; [87]; [90]; [91])

Team composition has been identified as the sixth factor which has a significant effect on innovation commercialization performance ([8]; [13]; [24]; [29]; [32]; [47]; [77]). A team is defined as the collection of individuals who share responsibilities for an outcome [8]. Teamwork factor is one of the factors widely discussed in innovation commercialization context.

The eighth factors on top of team composition, is individual factor such as individual experience [45], encouragement and emotional ([2]; [11]; [13]; [32]; [38]; [55]; [61]; N. [88]) which also contribute to the innovation commercialization performance.

Apart from these factors, the least discussed notion is the effect of collaboration towards innovation commercialization performance. According to [1], previous studies seldom referred explicitly to commercialization networks. The majority of the researches on innovation discussed innovation and the research and development (R&D) network. After analysing all the 245 journals, only 64 articles (26%) or less than 50% discussed collaboration in the context of commercialization. A summary of the articles is given in Figure 1:

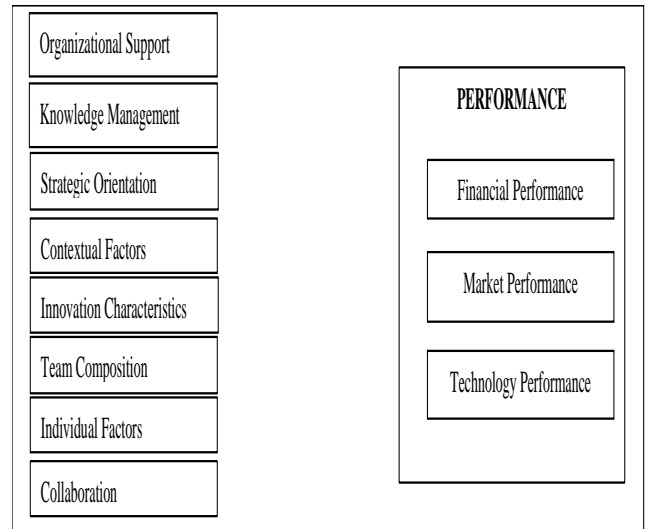


Figure. 1: Summary of SLR Findings

## IV. CONCLUSION

This paper presents a result of a systematic literature review from previous studies. Based on the results, there are eight predictors identified that effect commercialization performance; organizational support, knowledge management, strategic orientation, contextual factors, innovation characteristics, team composition, individual factors and collaboration. However, based on the analysis of reviewed paper, least scholars discussed on the collaboration factors. Therefore, it was suggested that future research should focused on the effect of collaboration towards commercialization performance.

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## PREDICTORS OF COMMERCIALIZATION SUCCESS IN PRODUCT INNOVATION: A SYSTEMATIC RESEARCH

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