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Understanding the Open Innovation Pathways Used in Malaysian Biotechnology Companies

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ABSTRACT

Due to its significant role in the generation of new ideas, open innovation is growing rapidly in academia. Every country opened its economy to free trade, which had an influence on the earlier focused technological trend of technology transfer within an enterprise. As a result, most companies are moving their latest technology to free innovation, which is constant with the open market philosophy. The current study adds to the existing literature by addressing the extent of open innovation practices in Malaysia's biotechnology industry. This project aims to understand current open innovation in the sense of Malaysia's biotechnology sector and to identify appropriate pathways to the success of the biotechnology industry. The focus was limited to biotechnology companies that were actively engaged in research and development. Identifying the positivist worldview, understanding the theoretical lens of open innovation, data collection, and data analysis using correlation, factor analysis, and multiple regression, the best fit for the scope of this study, are the methodological steps. The findings contribute to a comprehensive study of how biotechnology firms use open innovation to benefit their business models. The study's model includes open innovation as a dependent variable and various open innovation pathways as an independent variable. According to the findings of this study, both inbound and outbound open innovation encouraged parties to acquire technology in both directions. While significant financial investment is required for innovation, biotechnology firms can benefit from government assistance in ensuring the smooth progression of their research and development efforts. Companies can acquire technology and form inbound and outbound relationships with external parties. The path also enables technology that is not currently being used by a company to be distributed to the market via licensing without compromising the cost of innovation. The framework can be used to outline a company's strategy for dealing with situations, such as not only selecting the best innovation practices for innovation activities, but also addressing the best open innovation pathway companies can take when dealing with company growth and performance.

Keywords: Open innovation: Malaysian biotechnology: pathways: firm performance

INTRODUCTION

Most businesses throughout the world practiced innovation in some form or another. The concept of creativity was later adopted in tandem with the globalization movement. Most of the world's industries have been impacted in some way as a result of this. Chesbrough (2003) proposed the notion of open innovation in the early 2000s and suggested that it be applied to the high-technology sector. The concept of innovation has thus, shifted from closed to open innovation. Closed innovation was the thought that all innovation ideas and products were within the control of the company that generated them, whereas open innovation is the concept of spreading technology or information among companies (Chesbrough, 2006b).

In the field of biotechnology, open innovation is currently being used in a big way. It is a developing industry that contributes to Malaysia's economic growth. Biotechnology is biology-based technology that is the world's fastest growing science-based industry, and is widely recognized as the new engine of global economic growth. When a company implements open innovation into its roadmap, it directly provides opportunities for new markets, it is at the cutting edge of biotechnology research and development.

Most academics support the open innovation model as a response to the present economic trend of the open market being increasingly relevant and used across countries. Despite the widespread agreement among experts on this topic, the application of this approach is still absent. Studies by Ili et al. (2010), Lee et al. (2010), Chiaroni et al. (2008), and Laursen and Salter support this claim (2006). The progression cycle of open innovation was defined as using the inside, outside, or both of the innovation to create something that can be sold (Chesbrough, 2003, 2006a; Chesbrough, 2006b). Traditionally, the concept of advancement was developed within an organization, and the organization was responsible for innovation. However, this concept was transformed into open innovation, where anyone from all over the world might use the innovation for the benefit of their own business, particularly in their innovative work (R&D) activities before commercializing them (Chesbrough, 2003).

Open innovation's potential to deliver a wide range of benefits to the implementing organization (e.g., addressing the problem of staying competitive over time and responding to changing trends) has been proved time and time again. In contrast, as Di Minin et al. (2010) phrased it, open innovation is not a "firefighting approach." A build-up phase is required to migrate to open innovation due to the massive consequences and changes that the paradigm implies for a firm, such as transformations in customer and partner networks. The change has an impact on human resources, project planning, and the layout and structure of the company (Di Minin et al., 2010). As a result, any company intending to innovate its products or services must develop a strategic approach to managing the resulting changes by building an effective planning process that spans all stages of innovation, from concept to finished creation (Kenneth et al., 2013). Salameh and Hmeidiyeen (2015) classified innovation as an "organized activity" that invariably precedes change, highlighting the significance of recognizing the need for change as soon as possible and acting accordingly (Salameh and Hmeidiyeen, 2015).

To manage change in fast-paced situations, some authors in the innovation literature advise the well-studied approaches and processes of the organizational change paradigm (Bucciarelli, 2015; Gregu et al., 2012; Kenneth et al., 2013; Salameh and Hmeidiyeen, 2015). The ability to adapt to change fast and efficiently is typically associated with successful entrepreneurs and organizations (Paton and McCalman, 2008). Because innovations are high-risk activities with a high failure rate, O'Connor (2009) predicts that using change management methodologies for innovation practices will lead to higher innovation outcomes. Chesbrough, 2003a, an organization's failure to generate effective innovations can be attributed to both the invention and the execution technique of the referenced innovation.

"Unfreezing" refers to the first stage of the transformation process. The organization, particularly top management, must identify the need for change, communicate it to all affected stakeholders, and obtain support for the transition throughout this phase. Complete commitment to the intended change is necessary to build a sense of urgency and create an environment of enthusiasm. Re-designing organizational structures to allow for new ideas and the establishment of external relationships is often required to unfreeze the corporation. The purpose is to increase public awareness of open innovation and its expected benefits, as well as to prepare for any unforeseen repercussions (Chiaroni et al., 2010).

The "moving" part of the transition comprises building new procedures, including behavior patterns, to successfully enforce open innovation in accordance with the organization's new vision. Chiaroni et al. (2010) define moving as an experimental process in which the best

solution for the organization is found through trial and error (e.g., pilot projects (Boscherini et al., 2010)). Phase one's relationship-building initiatives should result in a larger network of external partners who can help with open innovation (for example, by bringing new ideas or capabilities) (Chiaroni et al., 2010).

The company rigidifies the adopted modifications and procedures during the "institutionalizing" phase of the transformation. Continuous performance reviews of the open innovation program, as well as the establishment of key performance indicators, are common actions in this phase. Phase two relationships are cultivated even further with the goal of long-term collaboration. The purpose of this phase is to prevent the organization from reverting to its previous structures and practices (Chiaroni et al., 2010).

Openness can be categorized into five pathways. The first is an open innovation technique that involves allowing individuals from outside the research and development domains to participate in the innovation process. Employee involvement, on the other hand, is thought to be similar to other types of open innovation in that it engages operational and frontline employees. Secondly, as a result of technology advancements and digitalization, employee skills have also improved. As the baby-boomer generation retires and millennials and Gen-Z take over as the dominant workforce, businesses must adapt to new ways of recruiting and retaining people through employer branding and talent acquisition (Morton, 2021).

Customers' involvement is likely the most well-known type of open innovation, but it is also one of the most challenging to accomplish, in our experience. There are several dangers, but when done appropriately, it can provide vital information and considerably boost brand value. Fourthly, collaborating with start-ups is a great way to gain access to skills that would be difficult to develop on your own. The start-up mindset encourages collaboration and places a premium on learning over future profits. The fifth pathway is that the mindset of a start-up encourages value chain collaboration and prioritizes learning over future revenues. Many businesses like experimenting with the start-up mindset, but they lack the dedication to function like a venture capital firm. Intentions that are clear and unambiguous pave the basis for successful partnership (Morton, 2021).

METHODS

The goal of this research is to learn about different types of open innovation and how biotechnology companies use them. Further research will be conducted to determine the type of openness that a corporation can adopt in order to succeed in open innovation. The term "open innovation" was coined to describe the scope of open innovation's application and impact on a biotechnology firm. This study's quantitative portion is based on a positive paradigm. However, because researchers can employ both qualitative and quantitative data, the study's procedure was not limited to quantitative data. This paper's quantitative method was shown to be more viable than a positivist one.

The companies chosen for this study suited the study's generalization, which was biotechnology companies that used open innovation. These businesses were chosen because they are operational biotechnology businesses with a functioning research and development department that are still operating in Malaysia.

To represent the entire number, 30 well-established companies with a fully operational research and development department were chosen. The sample size was chosen because the exact number of biotechnology businesses in Malaysia is uncertain, and the utilization of open innovation is debatable. Because the goal of the article is to determine the extent to which open innovation can be used and to develop a dependable path, well-known organizations were picked to focus on the research goal.

The questionnaire was created utilizing dependable questions that were suitable with the study's focus group, such as if the organization engages in innovative activities for the company's growth and performance. Each respondent received an introduction phone call to obtain their consent and valid email address. Companies that expressed interest were then given an email with a cover letter that included an introduction to the research topic, the research's objective, and a consent to participate in the study. This document is connected to the online survey questionnaire. Following up on the poor response rate, phone calls were made and the survey was performed over the phone.

Because organizations use diverse methods to gauge growth, firm performance is considered subjective. Wang and Wang (2012) and Wang et al. (2012) research were used to assess company performance and growth (2015). Seven items (Table 1) were found and rated on a 5-point Likert scale ranging from very bad (=1) to very good (=2).

TABLE 1. Seven Item related to survival of a company

No	Items
1	Sales growth rate
2	Market share growth
3	Return on investment
4	Growth rate of profit
5	Responsiveness to meet customer’s demand
6	Productivity and quality development of the product or process
7	Cost and asset management

The quantitative data analysis used in this study focused on the influence of open innovation and its openness on the company's growth and performance.

RESULTS AND DISCUSSION

The data collection procedure was statistically assessed. When contacted by phone, companies that were willing to participate in the survey were provided it. The survey was distributed through email, and for organizations that did not respond within the two-month time frame, a phone poll was done. The total number of data obtained was 30, with the majority of the data coming from Malaysia's central area in the agriculture sector, from small businesses that have been in operation for 5 to 10 years.

Employee engagement, employer branding and talent acquisition, consumer involvement, start-up collaboration, and value chain collaboration are the condensed five routes that open innovation is represented by. Inbound and outbound open innovation practices were largely tracked for the company's growth and performance (Table 2). Based on the graph, it appears that Malaysian biotechnology companies engage in open innovation.

According to the survey, 30 organizations regularly conduct internal research and development at their facilities. Inbound open innovation is actively practiced by 90% of the sample size. Table 2 shows how corporations have taken the effort to put open innovation into reality within their organizations. Relationship links and reliance on partners' innovation, as well as reaching out to external parties, appear to be highly sought after by these biotechnology enterprises.

The results demonstrate that organizations' outward open innovation practices have slightly lower percentages than their inbound open innovation practices. Outbound open innovation was mentioned by nearly 83.3 percent of the participants, indicating that they are eager to share their intellectual property with other businesses. When it comes to the focused selection of

enterprises, there is no difference between inbound and outward open innovation. It's possible that the project was successful because of successful negotiation or because either party was able to establish an agreeable contract. According to the findings, both inbound and outward open innovation are beneficial in allowing parties to obtain technology in both directions.

TABLE 2. Companies with R&D Department practicing Open Innovation

Related Questionnaire	Identified Pathway	Never Practise	Rarely Practise	SometimePractice	Frequently Practice	Always Practice
We often acquire technology from outside for our use	Start-up Collaboration	0%	13.3%	30%	36.7%	20%
We regularly search for external ideas that may create value for us	Value Chain Collaboration	3.3%	13.3%	30%	40%	20%
We constantly search for and acquire external technology and intellectual property	Value Chain Collaboration	0%	13.3%	30%	30%	20%
We proactively reach out to external parties (e.g: research groups, universities, suppliers, customers, competitors etc) for better technological knowledge or products.	Employer Branding and Talent Acquisition	0%	0%	50%	43.3%	6.7%
We tend to build greater ties with external parties and rely on their innovation	Start-up Collaboration	0%	13.3%	16.7%	46.7%	23.3%
We are proactive in managing outward knowledge flow	Employee Engagement	0%	30%	20%	23.3%	26.7%
The technology which is not used within the firm will be distributed to the market, for example; through licensing.	Start-up Collaboration	10%	20%	26.7%	30%	16.7%
We welcome others to purchase and use our technological knowledge or intellectual property.	Customer Involvement	6.7%	10%	6.7%	43.3%	33.3%
We seldom collaborate our technology with the technology of external organization or our competitors	Employee Engagement	13.3%	10%	46.7%	20%	10%

Overall, the company's growth and performance were rated as neutral to excellent (Table 3). When organizations engage in open innovation, the data showed an incline of neutral results toward positive outcomes. When used in Malaysia's biotechnology sector, they produce better results.

The determinants for inbound and outbound open innovation demonstrated a positive relationship with the growth and performance of biotechnology companies. The correlation coefficients were 0.23 and 0.488, indicating a substantial relationship between variables. Factors were examined using a qualitative questionnaire, and quantitative percentages were calculated to examine the path to effective open innovation adoption using percentages

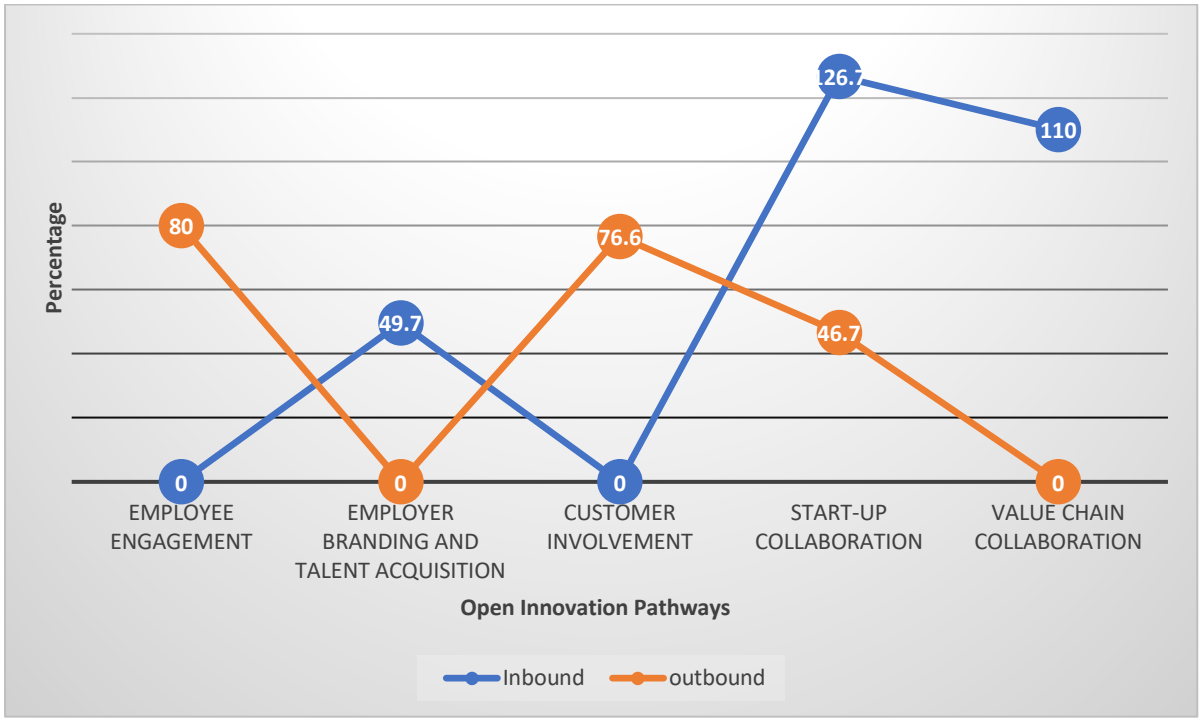
received from people who practice it regularly and always (Table 2). Employee engagement, employer branding and talent acquisition, customer involvement, start-up collaboration, and value chain collaboration were identified as factors or paths in this study.

TABLE 3. Growth and Performance of Biotechnology Companies

Items	Worst	Worse	Neutral	Better	Best
Sales Growth Rate	0	1	7	14	8
Market Share Growth	0	2	9	10	9
Return on Investment	0	1	7	14	8
Growth Rate Profit	0	1	8	10	11
Responsive to Meet Customer Demand	0	4	5	10	11
Productivity Development	0	2	7	14	7
Quality of Product	0	0	4	17	9
Cost Management	0	3	11	8	8
Asset Management	0	3	11	7	9

According to the findings, start-up collaboration (Figure 1) was mostly picked as a good strategy to adopt the open innovation concept for biotechnology company growth and performance. Companies can acquire technology and develop relationships with external parties, both inbound and outbound, using this route. The approach also allows for the licensing of technology that is not already in use by a corporation to be delivered to the market without reducing the cost of innovation.

FIGURE 1. Graph showing Open Innovation Pathways and percentage of usage for inbound or outbound open innovation



CONCLUSION

The results of this study reveal that inbound and outbound open innovation have a substantial impact on a company's growth and success. The findings show that Malaysian biotechnology companies, particularly those with Bionexus status, are accustomed with open innovation and may prosper in it. Although issues that may develop from the usage of open innovation are deemed inescapable, the option of picking from the five simplified pathways of both inbound and outbound open innovation in each of the firms can offer an efficient pathway.

Open innovation pathways should be investigated further, not just in theory, but also in terms of suitability for adaption in Malaysian industry. This study looked at the extent to which open innovation is used, firm performance, and issues that may develop while employing open innovation in the biotechnology industry. While this study may be applicable to some Malaysian businesses, it cannot be applied to all Malaysian sectors due to the method's application and implications, which vary depending on environmental conditions.

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