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Location Efficiencies of Host Countries for Strategic Offshoring Decisions Amid Wealth Creation Opportunities and Supply Chain Risks*

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Abstract

Purpose – Offshoring has emerged as one of the major trends in international trade and has become one of the strategies for achieving competitiveness in the global market. In spite of this, the expected gains of offshoring can be offset by hidden costs and risks, such as those associated with the COVID-19 pandemic, the trade war between the USA and China, and the ongoing trade dispute between Korea and Japan. To obviate such business failure and prevent critical business blunders, offshoring strategies that efficiently consider both risk elements and potential wealth creation are urgently need. The first purpose of this study is to contribute to the development of more advanced offshoring strategies to help host countries select the best locations to manage supply chain risks and create unique value. The second purpose is to specifically analyze the current status of Korea and provide Korean companies with implications to be considered when deciding whether to offshore or re-shore.

Design/methodology – A Network DEA model was applied to measure the comparative location efficiency of national competencies for offshoring strategy from perspectives of wealth creation opportunities (profitability and marketability) and supply chain risk management. The location efficiencies are compared among a total 70 countries selected from the Global Competitiveness Index (GCI) and globally attractive locations outlined by Kearney (2017). For the secondary analysis of efficiency, a t-test examining the nature of competitive advantage and the level of sophistication in production processes was implemented in three divisions. We then analyzed differences in offshoring performance in terms of the identified national traits. Moreover, Tobit regression analysis is conducted to investigate the correlation between value-added business activities and each divisional efficiency, seeking to determine how each degree of value-added business activity influences the increase in offshoring productivity.

Findings – Regarding overall location efficiency for offshoring performance, only the USA and Italy were identified as being efficient as host countries for offshoring, under circumstances of advanced development, such as productivity and risk management. Korea ranks 13th among 70 countries. The determinants of national competitiveness depend on national traits (the nature of competitive advantage and business sophistication). Countries with labor/resource advantages and labor-intensive industries are more competitive in terms of marketability than others. In contrast, countries with strong technology-intensive industries benefit offshoring companies, particularly in the technology sector, with the added advantage of supply chain risk management. As the perception of a value chain is broader in a country, it can achieve both production sophistication and competitive advantages such as marketability and SCRM.

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Originality/value – Existing studies focus on offshoring effectiveness from a company perspective. This paper contributes to comparing country efficiency in producing core competencies related to an offshoring strategy and also segments countries into three performance-based considerations associated with the global offshoring market. It also details Korea's position as an offshoring location according to national efficiency and competency.

Keywords: Location Choice, Network DEA, Offshoring Strategy, Supply Chain Risk Management, Wealth Creation Opportunity

JEL Classifications: F18, F23, F50, F60

1. Introduction

Offshore outsourcing (offshoring) has emerged as one of the major trends in international trade and has become one of the strategies for achieving competitiveness in the global market (Kraiwinee, Eugene and Jonathan, 2007). Offshoring contributes to a greater dynamism and intensity in commerce as a new feature of the global economy, representing opportunities and challenges not only for multinational companies (MNCs), but also for host countries (Ahmad, 2007). First, offshoring increases the performance of exports (Lagunes, Danvila and Sastre, 2016). Second, it compels firms to develop networks of external contacts (Weerakkody and Zahir, 2010). Third, it can increase the transfer of resources that companies use to export (Salomon and Shaver, 2005). In summary, offshoring is regarded as an important channel of diffusion for globalization in terms of international trade. There are, however, numerous repercussions being experienced by MNCs due to unexpected risks in offshoring activities. The COVID-19 pandemic revealed the uncomfortable truth regarding the length of production and supply chains directly correlating to increased vulnerability to unexpected shocks. Offshoring companies are now recognizing that in the obsessive pursuit of lower production costs, they underestimated the complexity and fragility of globalization and the systemic risks it implies. It is opportune to analyze the true advantages of offshoring alongside considerations of hidden risks and wealth creation opportunities.

In particular, pressured by limited cashflow as a result of the ongoing worldwide financial crisis, a growing number of multinational firms (MNFs) seek ways to outsource operations, especially in low-cost countries (LCCs) such as China, Vietnam, and India. As such, offshoring has often been characterized predominantly by the movement of non-core business activities from a developed economy (high-cost countries) to a developing economy (i.e., LCCs). A major driving force behind this pattern has been the price competitiveness of the sources of supplies in LCCs vis-a-vis those in developed countries. For instance, suppliers in LCCs such as China have been able to offer a 25%–40% lower price than those available from domestic U.S. suppliers–the typical threshold for moving off-shore (Ferreira and Prokopets, 2009).

However, expected gains can be offset by hidden costs and risks involved in LCC offshoring (Min and Kim Il-Suck, 2011), due to offshoring strategy encompassing even unpredictable conditions of international trade and logistics (Jensen and Pederson, 2012). Moreover, as a supply chains are stretched more geographically with the globalization of business activities, offshoring firms become more vulnerable to potential risks. There are several contemporary cases in point that illuminate the types of risks to which global supply chains are exposed, including the worldwide COVID-19 pandemic; political risks, such as Japan's restrictions on the export of key industrial materials to South Korea and nuclear threats from North Korea; various natural disasters, such as earthquakes in Japan and Ecuador and floods in Bulgaria,

Italy, and the U.K.; terrorist attacks in France and Belgium; and sea piracy in the Gulf of Aden and off the east coast of Somalia. As illustrated by these examples, it is imperative for MNFs to identify and measure such risks before deciding on an offshore location and formulating offshoring strategies. The failure to deal with various exposed and potentially hidden risks of offshoring can result in total business failure.

With this in mind, it is indispensable to take a broad view of offshoring strategy at the country-level. Offshoring is the sourcing of activities outside a firm's home country to acquire access to another country's advantages and ultimately to fulfil domestic or global operational needs. Furthermore, there are relevant factors of national governance for such processes of offshoring strategy, which involve tariffs, tax, government regulations, logistics, cultural distances, and the quality of infrastructure (Ilan, Julia and Lesle, 2009). Hence, offshoring as a source of international competitiveness for MNFs is chosen for various purposes when considering different location advantages. This study regards offshoring as an inextricable strategy that can clearly help MNFs to expand markets abroad and to achieve quality standards and productivity improvement at a lower cost (not in reference to labor cost) (Christ et al., 2015; Gray et al., 2013).

In order to mitigate such business failure and prevent critical business blunders, offshoring strategies that efficiently consider both potential risk elements and wealth creation are urgently need. Thus, given the need to develop more advanced offshoring strategy, it is crucial to select a host location that can manage supply chain risks and create a unique value that exceeds the costs of all resources used to produce the overall value. Considering both the potential risks and wealth creation opportunities from an offshoring strategy, we evaluate three-step location efficiency for an offshoring decision to formulate successful offshoring by using a Network DEA (Data Envelopment Analysis) model, along the dimensions of:

(1) Profitability: Location efficiency of production performance from a wealth creation perspective, such as the improvement of productivity.
(2) Marketability: Location's attractiveness for creating the value of exports depending on the outcomes of profitability.
(3) Supply chain risk management: Management efficiency of offshoring governance modes related to supply chain activities in the presence of wealth creation opportunities.

This research suggests three major considerations in the choice of an offshoring location from an international business perspective. These include profitability, marketability and supply chain risk management, ultimately estimating the relative location efficiencies through each step and identifying the relevant factors that affect location efficiency for offshoring. Finally, this research is expected to reveal the implications for both researchers and practitioners relevant to corporate strategy. It contributes to identifying country-efficiency for producing core competencies related to an offshoring strategy and also segments countries applying three performance-based partitions associated with the global offshoring market. In addition, this study reviews Korea's position as an offshoring location in detail, according to national efficiency and its competency. Moreover, the practical implications of each step are suggested in chapter 6.1.

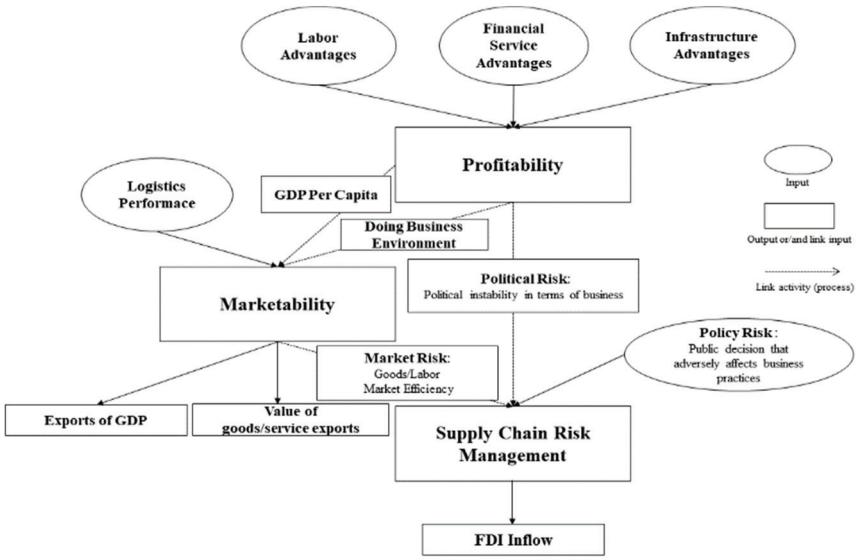
For this study, a Network DEA model is applied to measure the country performance efficiencies of offshoring strategy from the perspectives of 1) wealth creation: profitability and marketability and 2) supply chain risk management by means of DEA-Solver-PRO version 7.0, which includes Network DEA models to treat interrelated divisions. Ultimately, the results of this study will be open to application as the standards to aid decision making with

regard to offshoring through stages that involve profitability, marketability, and supply chain risk management. It enables MNEs and scholars to assess and identify appropriate offshoring locations to efficiently add value and manage potential supply chain risks.

2. Empirical Framework

Offshoring trends have accelerated in the last decade, first in terms of manufacturing activities, then extending to administrative and technical services as well as high-value services (Doh, 2005). The relevant studies on offshoring have emphasized the motivation of cost savings, while some discussions have highlighted more articulated motivations driving firms' offshoring decisions, including access to skilled human resources, knowledge, new technologies, and new markets (Acemoglu, Gancia and Zilibotti, 2015; Agrawal, Taylor and Seshadri, 2019; Farrell, 2005; Gurtu, Saxena and Sah, 2019; Hummlers, Levina and Su, 2008; Munch and Xiang, 2018; Musteen and Ahsan, 2013). This development is part of a trend towards a globalized sourcing strategy in which offshoring is not only considered as a cost-saving exercise, but is in fact at the very heart of firms' core value creation and enhancement activities (Clampit et al., 2015). Across such a diverse research topic as offshoring motivations, benefits, and strategic considerations for offshoring, researchers have particularly focused on profitable and marketable outcomes of offshoring at a firm level (Cohle, 2019; Mukherjee et al., 2019; Haleem et al., 2018). Some research about offshoring location decisions has given weight to supply chain issues (e.g., rising costs of transportation, requiring fast response from global customers, and increasing theft of intellectual property) and factors that affect location decisions (e.g., labor cost, logistics, supply chain interruption risks, country risks, and trade policies) (Lisa et al., 2013). To date, there has been no research into whether current state of host countries around the world is appropriate for advanced offshoring strategies. Grounded

Fig. 1. The Linking Efficiency Model of Country Performance as an Offshoring Strategy



in relevant contemporary research on offshoring, this study evaluates the suitability for improving offshoring performance with internal link efficiency at the national level, assessing 70 countries. Actually, firms that decide to invest in or relocate activities in a foreign country always encounter potential risks of a foreign legal environment, political instability, and market inefficiency (Lamper and Bhalla, 2008). As risk factors are associated with potential costs, they strictly interact with the governance mode of an offshore location adopted in determining the performance of the offshoring (e.g., profitability and marketability). This study suggests how the strategic choice of offshore location results in efficient outcomes to hedge against offshoring risks and creates additional wealth opportunities.

Fig. 1 suggests three divisions that can affect offshoring performance from wealth creation opportunities and risk management perspectives. It evaluates the relative efficiency of an offshoring location in consideration of internally linked activities.

2.1. Data Collection and DMU Selection

The efficiency of offshoring performance for countries worldwide is examined to identify strategic offshoring alternatives where offshoring firms ultimately mitigate failure. In this study, the efficiency of the offshoring outcomes is compared among a total of 70 countries, selected from the Global Competitiveness Index (GCI) and globally attractive locations outlined by Kearney (2017). Some deliberate tax havens, including Hong-Kong and Singapore, are not selected as Decision Making Units (DMUs).

One systematic way to analyze national efficiency for an offshoring strategy and measure competitive factors between overall countries is to use data of the Global Competitiveness Index (GCI), which is published annually by the World Economic Forum (WEF) and generally reflects country-level competitiveness, such as the set of institutions, policies, and factors that determine the level of productivity of a country, such as the condition of public institutions and technical circumstances. As such, the CGI presents multiple structural dimensions of global national economies that can affect countries' economic performance. The GCI is composed of 113 variables, of which, 79 come from the Executive Opinion Survey carried out annually by the WEF. It includes statistical data from internationally recognized organizations, notably the International Monetary Fund (IMF), the World Bank, and various specialized United Nations' agencies (World Economic Forum, 2018). It integrates the macroeconomic and the micro/business aspects of competitiveness into a single index (1-7). The GCI is a composite index calculated through averaging scores for survey data within 12 additional pillars of economic competitiveness. There is no single method of measuring competitiveness; hence, the GCI can be measured in a number of ways, including, among others, 1) a country's terms of trade, which is an index of the ratio of a country's export and import prices; 2) labor productivity, which is usually expressed as GDP per worker; 3) price competitiveness, which considers relative inflation and real exchange rate (RER, the nominal exchange rate deflated by an index of prices). These indexes consider national competitive performance that represents drivers of long-term growth and governance. They can also explain the factors that influence the creation of a favorable trade/business climate in the country and imply the strengths and weaknesses of a country in terms of international business and trade.

In this paper, the business index is leveraged as a systematic resource for comparing identified competitive factors between countries. The Doing Business (DB) report is an annual publication of the World Bank (2018). It aims to measure the costs of business regulations to firms in 190 countries. The WB's "ease of doing business index" measures regulations that directly affect businesses and consists of 10 sub-indices, such as starting a

business, dealing with construction permits, getting electricity, registering property, getting credit, protecting investors, paying taxes, trading across borders, enforcing contracts, and resolving insolvency.

2.2. Profitability (Division 1)

As an increase in corporate revenue is of primary importance to all kinds of firms, it follows that improving worker productivity and business efficiency are critical considerations. Accordingly, the main driver for offshoring is cost savings (Carmel, 1999). In addition, another salient purpose of offshoring is to access resources or increase entrepreneurial opportunities as well as save costs (Roza, Van Den Bosch, and Volberda, 2011). It does not mean that cost saving is just a result of cutting labor cost. Firms' profitability from offshoring tends to be demonstrated by productivity (Jabbour, 2010). In cooperation with workers and employees, firms' goals are positively linked, and they help each other to reach their goals (Tjosvold and Tsao, 1989). Furthermore, the level of cooperation in an organization influences the strength of its effect on productivity and profitability. In other words, organizations with high-level cooperation are found to have a stronger and more positive impact on both productivity and profitability than those with low-level cooperation (Oum et al., 2004). Some researchers define offshoring as the process of value or wealth creation; thus, environmental factors, such as advanced management systems and a highly skilled workforce are imperative for creating wealth through technological and organizational innovation (Lewin, Massini, and Peeters, 2009). Accordingly, this paper selects two inputs: 1) the effect of the cooperation in labor-employer relations on productivity and 2) the relationship between wage-level and productivity. Two selected inputs represent labor market flexibility. Advanced openness and economic integration are accompanied by increased labor market flexibility; this greater labor market flexibility coexists with protecting workers' rights and reducing inequality (World Economic Forum, 2018). Therefore, labor advantages increase both improved work productivity and profitability.

Furthermore, a range of factors can broaden the quality of infrastructure at offshore locations. That is, the appropriate offshoring decision is influenced by location advantages, such as the quality of infrastructure and availability of advantageous financial services (Lewin, Massini, and Peeters, 2009). Advanced financial services are essential not only to firm-level productivity, but also investments in innovation. In addition, high-quality infrastructure is used as inputs; country-level production advantages which increase profitability supported by innovation capacity.

GDP (Gross Domestic Product) is the authoritative economic statistic, including productivity, such as the output of the manufacturing sector (Mandel, 2007). An increase in average worker productivity affects the improvement of GDP (Jaffee, 2005). An environment that supports the ease of doing business is closely related to competitive production advantages (Sethi and Guisinger, 2002). Some of the bonds of trust between enterprises and host countries are established under competitive advantages, and such trust can contribute to economic growth (Humphrey and Schmitz, 1998). To increase productivity caused by the adoption of an advanced offshoring strategy can affect economic growth.

Consequently, offshoring to an innovative business environment can result in increasing value-added opportunities from an economic perspective (Farrell and Agrawal, 2003a, 2003b). Economic growth is not only generated by both aggregate levels of labor and finance but also by higher productivity in exports (Feder, 1983). This implies that there are various activities that link the profitability and export-side marketability of a country. Therefore,

GDP and the business environment are used as outputs of profitability and link inputs between first division (profitability) and second division (export marketability).

The meaning of the first division (profitability) includes 1) how efficiently country-level value is created, 2) how efficiently advanced production improves firms' profitability and marketability, as shown below in Table 1.

Table 1. Inputs and Outputs of Profitability

Category		Subcategories	Contents
Profitability (Division 1)	Input	Labor advantages (Labor Market Flexibility)	Cooperation in labor-employer relations In your country, how do you characterize labor-employer relations? [1=generally confrontational; 7=generally cooperative] Pay and productivity In your country, to what extent is pay related to employee productivity? [1=not at all; 7= to a great extent]
		Financial Advantages (Maintaining Stability of Financial Sector)	Availability of financial service In your country, to what extent does the financial sector provide the products and services that meet the needs of businesses? [1=not at all; 7=to a great extent] Affordability of financial services In your country, to what extent does the cost of financial services (e.g., insurance, loans, trade finance) impede business activity? [1=not at all; 7=to a great extent]
		High Quality Infrastructure (Availability of Land & Electricity)	State of cluster development In your country, how widespread are well-developed and deep clusters (geographic concentrations of firms, suppliers, producers of related products and services, and specialized institutions in a particular field)? [1=non-existent; 7=widespread in many fields] Quality of electricity supply In your county, how reliable is the electricity supply (lack of interruptions and lack of voltage fluctuations)? [1=extremely unreliable; 7= extremely reliable]
	Output (Link Input)	GDP per Capita	Size of a country's economy total value of final products.
		Business Environment	Quantitative indicators on business regulation affecting 11 areas of a business and the protection of property rights that can be compared across 190 economies—from Afghanistan to Zimbabwe—and over time.

Sources: World Economic Forum (2018), World Bank (2018).

2.3. Marketability (Division 2)

The export market is expected to grow as a result of the profitability of the country. This is due to the close internal link between profitability and marketability in a country. Export performance tends to be a result of host country market size (Kravis and Lipsey, 1982). In other words, countries with large markets can enjoy economies of scale in production. Productivity also makes the market more economical in addition to performance driven by export. Another linked factor between performance of production and export is the tendency of a host country to pursue international trade (Kravis and Lipsey, 1982).

Lewin et al. (2009) argued that the dynamics offshoring as a part of an innovative business strategy helps firms enter the global race for talent. Therefore, the efficiency of marketability exhibits how profitable offshoring efficiency enables an increase in the export performance of each country in terms of both quality and quantity:

1) GDP, which equates to the production statistics of each country.
2) Doing Business index, which has cause-relation with business (production) activities.
3) Logistics performance, which activates international trade beyond countries.

In this study, the 'export volume' in each economy is considered to be an output of marketability, which represents the quantitative export performance. Other outputs such as foreign market size and market efficiency (labor/goods) are described as values of exports. In detail, foreign market size equates to the value-creation of goods or services for export. It is made possible through the production circumstance of each country. Also labor market efficiency refers to the condition of the labor market and goods market efficiency refers to the effectiveness of trade conditions. Both can maximize export performance. Table 2 presents the subcategories of the Marketability division in our considerations.

Table 2. Inputs and Outputs of Marketability

Category	Subcategories		Contents
Marketability (Division 2)	Input	Logistics Performance	The availability of customs, infrastructure, international shipments, logistics competence, tracking & tracing, and timeliness.
		GDP	Size of a country's economy: total value of the final product.
		Business environment	Ease of doing business index.
	Output	Export volume	Total Export in billions of dollars.
		Foreign market size	Value of exports of goods and services.
	Output (Link)	Labor market efficiency	Market condition under government that increases labor productivity.
		Goods market efficiency	Market condition that produces and sells the right mix of goods and services in the given marketplace and effectively trades them in the economy, not limited by the government (e.g., tax incentives, no limited non-tariff barrier, prevalence of foreign ownership).

Sources: World Economic Forum (2018), World Bank (2018).

2.4. Supply Chain Risk Management (Division 3)

Lambert et al. (1998) defined Supply Chain Management (SCM) as the integration of key business processes from end-user through original suppliers that provides products, services, and information that add value for customers and other stakeholders. SCM is a major component of competitive strategy to enhance organizational productivity and profitability (Gunasekaran, Patel, and McGaughey, 2004). As a supply chain is stretched more geographically with the globalization of business activities, global companies are increasingly vulnerable to export risks. Concerns emphasize the management of potential risks in a supply chain (Zhu and Sarkis, 2004). Thus, supply chain risk management (SCRM) is applied to strategic, tactical, and operational planning (Gunasekaran, Patel, and McGaughey, 2004). Within the development of offshoring strategy as business activities are globalized, it is imperative to prepare for heightened supply chain risks. As supply networks become more complex, offshoring strategy is exposed by exponential supply chain risks and uncertainties that make businesses more vulnerable to supply chain disruptions (Hallikas et al., 2005; Wagner and Bode, 2006). The heightened effect of supply chain risks on business activities and offshoring has been demonstrated. When entering a particular host market, foreign companies typically confront such risks as well as the social costs of doing business abroad (Eden and Miller, 2004), which is referred to as the liability of foreignness (LOF). Offshoring companies can present price competitiveness and exploit the advantages of a host country. Conversely, companies face environmental uncertainties, including political, cultural, social factors that determine economic efficiency (Dunning and Rugman, 1985). Hence, successful offshoring strategy can only be achieved if the host country provides resources and advantages that offset environmental uncertainty.

In this study, the SCRM division encompasses the efficiency of preventive actions against environmental uncertainty in a host country; referring to probable or even possible threats to offshoring firms. In division 3, three risks are employed as inputs, and include policy, political, and market risks. Market conditions are based on expedience and ease in the acquisition of production inputs, such as labor and material. Thus, they are subdivided into the labor market and goods market. Market risks usually occur from the uncertainty in the acquisition of those production inputs (Rao and Goldsby, 2009). Market risk management refers to the process of seeking sufficient market conditions to improve the productivity of production.

Political risk refers to the level of political instability that can be caused by major changes in political regimes, a weak government, potential or actual changes in the political system, or other political disturbances (Rao and Goldsby, 2009). Thus, political risk management ensures a favorable business climate for foreign investors.

Policy risk refers to policy uncertainties, including government policies such as regulations that can adversely affect business practices. Policy risk management has positive influence on business practices with respect to government regulation and enforcement. It is associated with the modes of governance that are associated with inbound supply.

Thus, the national efficiency of SCRM is considered as the last factor in determining offshoring options, as outlined below in Table 3.

The above division identifies national policies and regulations and legal/political environments as key determinants of offshoring decisions with respect to Foreign Direct Investment (Acharyya, 2009; Alfaro et al., 2004; Graham, 2004). The SCRM division involves the governance traits for offshoring firms efficiently addressing supply chain risks as they are recognized as attractive for an offshoring location. Whether to offshore products and/or services, and if so, for determining to what extent, in what location, and the degree of control available to address potential risks are important decision-making factors.

Table 3. Inputs and outputs of Supply Chain Risk Management (SCRM)

Category	Subcategories		Contents
Supply Chain Risk Management (Division 3)	Input	Policy risks	Policy decisions that adversely affect business practices; over-regulation of business
			Burden of government regulation
			In your country, how burdensome is it for companies to comply with public administrations' requirements (e.g., permits, regulations, reporting)? [1=extremely burdensome; 7=not burdensome at all]
			Efficiency of legal framework in settling disputes
			In your country, how efficient is the legal and judicial system for companies in settling disputes [1=extremely inefficient; 7= extremely efficient]
			Protection of minority shareholders' interests Strength of investor protection 0–10 (best) scale Prevalence of foreign ownership
			Regulation of securities exchanges
			In your country, to what extent do regulators ensure the stability of the financial market [1=not at all; 7= to a great extent]
	Input (Link)	Political risks	Political instability
			political disturbances in terms of business Doing Business index
		Market risks	Uncertainty in the acquisition of production inputs (e.g., labor and materials)
	Output	FDI net inflow($)	Results of offshoring investment

Sources: World Economic Forum (2018), World Bank (2018).

3. Research Methodology

3.1. Network DEA[1]

Black-box models, such as aggregation or separation, only consider those inputs that are consumed by and outputs that are produced from the system. The limitations of these two efficiency models led to the consideration of applying a DEA model to account for efficiency in the absence of the connectivity and continuity of link factors. Applying the DEA technique to measure the efficiency of DMUs with a network structure is called Network DEA (NDEA) (Fare and Grosskopf, 2000). In this study, the NDEA model evaluates the efficiency of national offshoring performance along with internally linked activities.

This section introduces Network DEA referring to its efficiency. Suppose a system is composed of p divisions (k=1, ..., p) dealing with n DMUs (j=1, ..., n). Let m_k and r_k be the numbers of inputs and outputs to division k, respectively. It is denoted as the link leading from division k to division h by (k, h) and the set of links by L. The observed data are $\{ X_j^k INR_+^{m_k} \}$(j =1,...,n; k=1,...,K)(input resources to DMU j) $\{ Y^{k_j} \in R^{r_{k+}} \}$(j =1,...,n;

[1] Adapted from Kaoru and Miki (2009).

k=1,...,K)(output product is from DMU j at division k) and $\{Z_j^{(k,h)} \in R_+^{t_{(k,h)}}\}$ (j=1,...,n; (k, h)∈L) (linking intermediate products from division k to division h) where $t_{(k,h)}$ is the number of items in Link(k, h).

The production possibility set $\{(X^k, Y^k, Z^{k,h})\}$ is defined by

$$\begin{aligned} & x^k \geq \sum_{j=1}^n X_j^k \lambda_j^k \text{ (k=1, …, p)}, \\ & y^k \leq \sum_{j=1}^n Y_j^k \lambda_j^k \text{ (k=1, …, p)}, \\ & z^{(k,h)} = \sum_{j=1}^n Y_j^{(k,h)} \lambda_j^k (\forall (k,h)) \text{ (as outputs from k)}, \\ & z^{(k,h)} = \sum_{j=1}^n Z_j^{(k,h)} \lambda_j^k (\forall (k,h)) \text{ (as inputs to h)}, \\ & \sum_{j=1}^n \lambda^{k_j} = 1(\forall k), \lambda^{k_j} \geq 0(\forall j,k), \end{aligned} \tag{1}$$

where $\searrow^k \in R^{n_+}$ is the intensity vector corresponding to division k (k=1,...,p).

For each DMU_o, several efficiency scores are defined depending on the selected orientation classified as input, output, or non-oriented. This study generally suggests input-oriented efficiency. And input-oriented efficiency of DMU_o is formulated in the following linear program:

$$\theta_o^* = min_{\lambda^k, s^{k-}} \sum_{k=1}^k w^k \left[1 - \frac{1}{m^k}\left(\sum_{j=1}^{m_k} \frac{s_i^{k-}}{x_{io}^k}\right)\right] \tag{2}$$

where $\sum_{k=1}^k w^k = 1, w^k \geq o(\forall k)$ and w^k is the relative weight of division k, which is determined corresponding to its importance. θ_o^* is denoted as overall input-efficiency of DMU_o. If θ_o^* has the score 1, DMU_o is called overall input-efficient.

Using the optimal input slacks s^{k-*} of (2), the input-oriented divisional efficiency score is defined by

$$\theta_k = 1 - \frac{1}{m^k}\left(\sum_{m_k}^{t=1} \frac{s^{k-*}}{x_{i0}^k}\right) \text{ (k=1,..., p)} \tag{3}$$

where θ_k is the divisional efficiency index that optimizes overall efficiency θ_o^*. If $\theta_k = 1$, then the DMU_o is called input-efficient for the division k.

That the above divisional efficiency score is not always uniquely determined has been recognized, although overall efficiency is uniquely obtained as the linear program optimum. The overall input-oriented efficiency score is the weighted arithmetic mean of the divisional scores.

$$\theta^{*o} = \sum_{k=1}^k w^k \theta_k \quad 4) \tag{4}$$

This measure is useful for comparing the total productivity of DMU_o among the concerned DMUs. This work will not only serve managers but also regulatory agencies to facilitate comparison of DMUs from both a firm-level and a country level perspective.

3.2. Test Statistic

A t-test was applied to compare the means of the two groups in this study. The hypotheses are the same as in the large-sample test for a mean. The null hypothesis has the form $H_0: \mu = \mu_o$, and the two-sided alternative hypothesis has the form $H_1: \mu \neq \mu_o$. The one-sided alternative hypotheses are $H_1: \mu > \mu_o$ and $H_1: \mu < \mu_o$

The test statistic is the t statistic with $\mu = \mu_o$; namely

$$\mathrm{t} = \frac{\bar{Y} - \mu_0}{\widehat{\sigma_{\bar{Y}}}} = \frac{\bar{Y} - \mu_0}{S/\sqrt{n}}$$

This statistic measures the distance between the sample mean and the null hypothesis value, divided by the estimated standard error of $\bar{Y}$.

3.3. Regression Methodologies: Tobit and Hierarchical Regression Analysis

A unique form of regression analysis, called Tobit regression and Hierarchical regression, was used to analyze and further identify the value-added business activities that affect the divisional efficiency in offshoring strategy.

Tobit regression is useful for the analysis of continuous data that are censored or bounded at a limiting value. It is a suitable measure of transformed efficiency when dependent variables have sensible and partial effects over a wide range of independent variables, or they are interval-censored with the presence of both a threshold value and a saturation limit (Lewis and Mcdonald, 2014; Min and Ahn Young-Hyo, 2017; Powell, 1984). The Tobit regression model assumes that the dependent variable has its value clustered at a limiting value; usually zero. However, in the NDEA model, the dependent variable is right censored at 1.0, and the model can be written in terms of the underlying or the latent variable that is mathematically expressed as:

$$y_i^* = x_i\beta + \epsilon_i \text{ and } \epsilon_i \sim N(o, \sigma^2), \mathrm{i} = 1, \ldots \mathrm{n}$$

where y_i^* is the dependent variable, x_i a vector of independent variables, β a vector of unknown coefficients, ε_i independently distributed random error terms assumed to be normal with zero mean and constant variance σ^2, n the number of observations.

In this study, $\mathrm{y}(= y_i^*)$ is observed only when $y_i^* < c$ (right censored), where c is a constant. The values of y (NDEA scores) are censored to the right at 1, and thus the NDEA scores using Tobit regression can be described as:

$$\mathrm{E}(y_i | y_i < c, x_i = E(y_i | \varepsilon_i \leq x_i\beta_i)$$

The probability that $\varepsilon_i \leq c$ is mathematically expressed as:

$$\Phi\frac{c}{\sigma} = \int_{-INF}^{c/\sigma} \frac{1}{\sqrt{2\pi}} \exp(-t^2/2)\, dt$$

The expected value is calculated as:

$$\mathrm{E}(y_i | y_i < c, x_i) = x_i'\beta - \sigma\frac{\phi(c)}{\Phi} = x_i'\beta - \sigma\widehat{\lambda_\iota}(c)$$

where $\lambda_i(c)$ is an inverse Mill's ratio; a ratio of the probability density function and the cumulative distribution function of a distribution. It should be noted that the Tobit model accounts for truncation. A regression of the observed y values on x will lead to an unbiased estimate of β. While the Tobit regression analysis does not yield a measure of variation in the dependent variable, as opposed to the coefficient of determination (R^2), in ordinary least squares regression, it does yield a log-likelihood statistic that indicates the explanatory power of the model employed. The larger the absolute value of the log-likelihood statistic, the greater

the explanatory power of a model (Min and Lambert, 2015).

The hierarchical regression model is a way to show whether variables of interest explain a statistically significant amount of variance in the Dependent Variable (DV) after accounting for all other variables (Lankau and Scandura, 2002). Rather than a statistical method, it is a framework for model comparison. In this framework, several regression models are built by adding variables to a previous model at each step, with later models always including smaller models in previous steps. In many cases, the interest is to determine whether newly added variables show a significant improvement in R^2 (the proportion of explained variance in DV by the model).

In this paper, the first model includes production process sophistication. In the next step (Model 2), international distribution and marketing could be added as the value-added business variables in this line of research. In the next step (Model 3), perception of the value chain, is used as the last variable to identify the relative relations between value-added business activities and country efficiency.

The most important consideration is whether Model 3 statistically explains the DV better than Model 2. If the difference of R2 between Models 2 and 3 is statistically significant, it can be said that the added variables in Model 3 explain the DV above and beyond the variables in Model 2.

4. Comparative Country Performance Efficiency for Offshoring Strategy

This section will determine the rankings of the offshoring locations in terms of comparative competitiveness in raising offshoring productivity at a corporate-level. Three-step national performance efficiencies for offshoring performance are measured with the advanced consideration of wealth creation opportunities and supply chain risk management. The connectivity and continuity of internal activities among national performance are also applied to the performance efficiency measure.

The results of the relative efficiencies of host countries for hosting an offshoring strategy are shown in Table 4. Regarding overall location efficiency in offshoring performance, only the USA and Italy are efficient as host countries for offshoring, in consideration of advanced development in productivity and risk management. Our analysis reveals that, in 2018, very few countries were not performing suitably as host countries with regard to offshoring. The results demonstrate that few countries provide offshoring firms with competitive advantages to achieve the three divisions of profitability, marketability, and SCRM efficiency. That is, the overall most suitable locations to prevent failure of offshoring strategy were only the United States and Italy in the year 2018. The companies that offshore operation to the USA or Italy, not only could create opportunities to efficiently make profits and expand export markets, but also to lower supply chain risks that cause offshoring strategy failures.

Although Russia and China demonstrated relatively efficient performance in terms of marketability and management of supply chain risk, the countries' overall performance (0.998, 0.972) is inefficient due to the low efficiency of the first division (profitability). Korea (0.773) ranks 13th among 70 countries. It implies that Korea's competitiveness of production and its consequences, such as productivity and attractiveness are not sufficient to induce increased profits. It is assumed that rather rigid labor markets, lack of land/electricity, and an unstable financial sector contribute to inefficiencies in profitability, despite the competitive export-driven economy and SCRM.

Table 4. Top 20 efficient locations for offshoring strategy

No.	Country	Overall	Profitability	Marketability	SCRM
1	USA	1.000	1.000	1.000	1.000
2	Italy	1.000	1.000	1.000	1.000
3	Russia	0.998	0.994	1.000	1.000
4	China	0.972	0.916	1.000	1.000
5	Ukraine	0.892	0.874	0.859	0.941
6	Brazil	0.869	0.760	0.930	0.919
7	Nigeria	0.860	0.873	0.971	0.736
8	India	0.858	0.736	0.992	0.845
9	Mexico	0.851	0.734	0.987	0.832
10	Vietnam	0.826	0.721	0.882	0.874
11	Argentina	0.809	0.775	0.844	0.808
12	Turkey	0.791	0.729	0.890	0.755
13	Korea, Rep.	0.773	0.693	0.831	0.793
14	Bangladesh	0.772	0.636	0.935	0.746
15	Pakistan	0.772	0.669	0.974	0.674
16	Romania	0.771	0.728	0.831	0.754
17	Philippines	0.763	0.619	0.910	0.759
18	Egypt	0.762	0.631	0.883	0.771
19	Indonesia	0.759	0.631	0.913	0.734
20	Poland	0.757	0.673	0.816	0.782

Note: For the full analysis of all 70 countries considered in this study, please see Table A.

4.1. Results of Divisional Efficiency: Profitability

To analyze the national efficiency of global offshoring profitability, three requisites for production, labor, capital, and land, are converted into those for national production by the governance modes. First, labor advantages refer to labor market flexibility measured by business executives' perceptions of union-employer cooperation and the alignment between wages and productivity. Second, the availability and affordability of national financial service are substituted for capital from a host country perspective, one of the requisites for production. Lastly, the quality of blended infrastructure advantages is applied as inputs measured by the quality of electrical supply and the state of cluster development. Ultimately, profitability estimates how efficiently country-level production factors are leveraged to increase competitiveness and improve productivity and national attractiveness in terms of the business environment.

According to a comparison of profitability-efficiency, only the USA and Italy are efficient for an offshoring-company to prompt profitability. In terms of efficiency, even seemingly small productivity gains can yield significant profitable outcomes (Kaoru and Miki, 2009). Therefore, advanced and diverse environments to improve productivity for offshoring is more efficient in country-level terms of profitability. From the view of risk and wealth creation, only the USA and Italy, classified as high-wage countries, are efficient for increasing profitable competitiveness and productivity. As a country becomes more competitive, productivity will increase, and wages will rise, along with advancing development in general. Countries will move into the efficiency-driven stage of development, when they must begin to develop more efficient production processes and raise product quality, wages have risen,

and they cannot raise prices. At this point, competitiveness is increasingly driven by efficient goods markets, well-functioning labor markets, and a developed financial market. This demonstrates that advanced requisites for production are appropriate for driving the tremendous efficiency of profitability from all angles: competitiveness, productivity, and attractiveness.

On the other hand, Russia, China, Brazil, Mexico, and Vietnam, known as LCCs, are in the upper ranks in efficiency of profitability. This is because those countries' GDPs, which is used as one of the outputs, are relatively higher than others. Although they are in the relatively high rank of offshoring locations, they are not efficient in improving profitability or to providing offshoring firms with an attractive business environment.

4.2. Results of Divisional Efficiency: Marketability

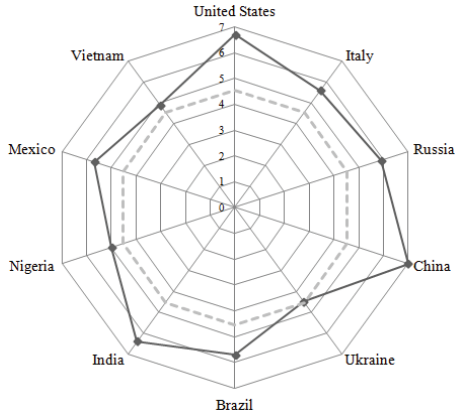
The marketability result presents how efficiently national competitive advantages perform in an export-driven economy and improve labor/goods market efficiency. Similar to the outcome of division 1 (profitability), the USA and Italy have the most efficient export-driven economies based on competitive production processes. And productivity and attractiveness of production are efficient enough to imply export-driven economies and also develop market efficiency in labor and goods.

China and Russia have made progress in the efficiency of marketability compared to the previous profitability measure. India also assumes a better position (5th) in terms of its ranking in marketability efficiency than profitability efficiency (8th). China, Russia, and India have a notable feature in common, a plentiful workforce. In 2017, almost 806 million people were available for work in China, approximatively 521 million people in India and nearly 77 million people in Russia (World Bank, 2018). With an abundant workforce, it is possible to manufacture mostly low-quality products, such as cheap electronics and textiles, through massive production. This highlights the more significant role of producing (low-end) products for export volume, even if competitive advantages for profitability lack efficiency. Moreover, market value for these nations is certainly acknowledged from an export perspective.

The efficient group for marketability, composed of the USA, Italy, Russia, and China, tend to have a huge market size, combining both domestic and foreign markets as export destinations. Two implications can be deduced from this. First, market size affects productivity, as firms can exploit economies of scale in a large market, which subsequently boosts export-driven activities. Second, from the MNF perspective, a large market size influences wealth creation opportunities to expand business. In the era of globalization, international markets are now substitute for domestic markets, especially for small countries. Thus, exports can be thought of as a substitute for domestic demand in determining the size of the market. By including both domestic and foreign markets in the measure of market size, marketability is represented by the productivity of export-driven economies and international wealth creation opportunities. Fig. 2 provides a representation of the top 10 offshoring locations in reference to market size.

Furthermore, countries with efficient goods markets are well positioned to produce the right mix of products and services, given particular supply-and-demand conditions, in addition to ensuring that goods can be most effectively traded in the economy. Moreover, countries with efficient labor markets have the flexibility to shift workers from one economic activity to another more rapidly and at lower costs. Thus, the USA, Italy, Russia, and China have a positive impact based on worker performance and the attractiveness of the country.

Fig. 2. Comparison of Market Size of Top 10 Offshoring Locations



Note: Market size refers to the value of exports of goods and services, normalized on a scale of 1–7, with 7 representing the optimal size.
Source: World Economic Forum (2018).

4.3. Results of Divisional Efficiency: Supply Chain Risk Management (SCRM)

Traditional offshoring strategy has mainly focused on cost reduction, with particular emphasis on labor expenditure. With this in mind, international firms often consider offshoring business into LCCs to increase profitability. However, expected gain from LCCs can be offset by a host of hidden costs and risks. Examples of such risks include a decline in quality, longer lead-time, and delayed delivery. The risks threaten international businesses and are accompanied by cost increase, with hidden costs such as additional logistics costs, insurance costs, and shipping costs. Questions inevitably arise on the effects of offshoring at LCCs. It is fundamentally clear that as a supply chain is stretched more geographically with the globalization of business activities, offshoring firms are increasingly exposed to potential risks.

Given that doubts exist on the effects of offshoring at LCCs, SCRM is increasingly essential to the assessment and execution of offshoring. The SCRM division presents the efficiency of national preventive actions against supply chain risks, which are probable or even possible threats for offshoring firms. Ultimately, it is imperative to explore the national capacity for managing potential host risks that may hinder international business activities.

The results of third division efficiency are similar to those of marketability efficiency. The USA, Italy, Russia, and China efficiently take governmental actions to prevent probable and possible risks in global business activities. This assumes that they stably provide offshoring firms with wealth creation opportunities by managing the potential supply chain risks.

Russia's and China's profitability efficiencies are evaluated relatively low. On the other hand, they are positioned as efficient with regard to marketability and supply chain risks. This implies that these countries focus on concentrating national efforts on the improvement of export protections, enhancing competitiveness in terms of SCRM.

The rest of the countries (66) are considered inefficient for SCRM, with the USA, Italy, Russia, and China at the top. The other countries could induce further foreign investment by managing supply chain risks at a similar level to national efforts to increase profitability.

5. Secondary Analysis with Descriptive Methods by Divisional Efficiency

5.1. Secondary Analysis with t-test by Divisional Efficiency

The main aim of implementing offshoring strategy is not only to gain a competitive advantage by reducing business cost, but also to gain an innovative competitive edge to enhance production value by exploiting the unique production process of a host country. For the secondary analysis of efficiency, a t-test examining the nature of competitive advantage and production process sophistication, was implemented as an intermediate solution, according to national and industrial characteristics using SPSS version 23.0. We assess whether there are differences between each offshoring performance regarding the classified national traits. This analysis helps offshoring firms to select an adequate offshoring location to meet overriding purpose based on offshoring strategy.

One criterion of this comparison to determine the measures by which the competitive advantage(s) of a country in the international markets is based. The natures of competitive advantages are classified into two differences: low-cost labor and natural resources or unique products and processes. The other criterion is the production process sophistication in a country. This could be divided into labor-intensive and latest technologies intensive products. As per the two criteria, a total of four groups are illustrated in Table 5.

Table 5. Results of t-test

Category	Division (Dependent)	F-value (p-value)	T-value (p-value)	
Nature of competitive advantage (low cost labor/ natural resources vs. unique product/process)	Profitability (D1)	0.329(0.568)	1.835(0.071)	1= (46), 2= (24) 1=0.91115, 2=0.86684
	Marketability (D2)	7.173(0.009) **	3.043(0.003) **	1=0.95728, 2=0.91274
	SCRM (D3)	10.679(0.002) **	-2.862(0.006) **	1=0.03957, 2=0.15104
Production process sophistication (labor intensive vs. latest technology intensive product)	Profitability (D1)	0.237(0.628)	1.158(0.251)	1= (33), 2= (37) 1= 0.91022, 2= 0.88324
	Marketability (D2)	12.186(0.001) ***	2.789(0.007) **	1=0.96272, 2=0.92353
	SCRM (D3)	4.777(0.032) **	-2.002(0.050) *	1=0.03870, 2=0.11253

Note: *p<0.1, **p<0.05, ***p<0.001.

As a result of the t-test on the nature of competitive advantage, significant differences are noted in the efficiency of marketability and SCRM. However, no differences are noted in profitable performance regarding the nature of competitive advantage. First, countries with

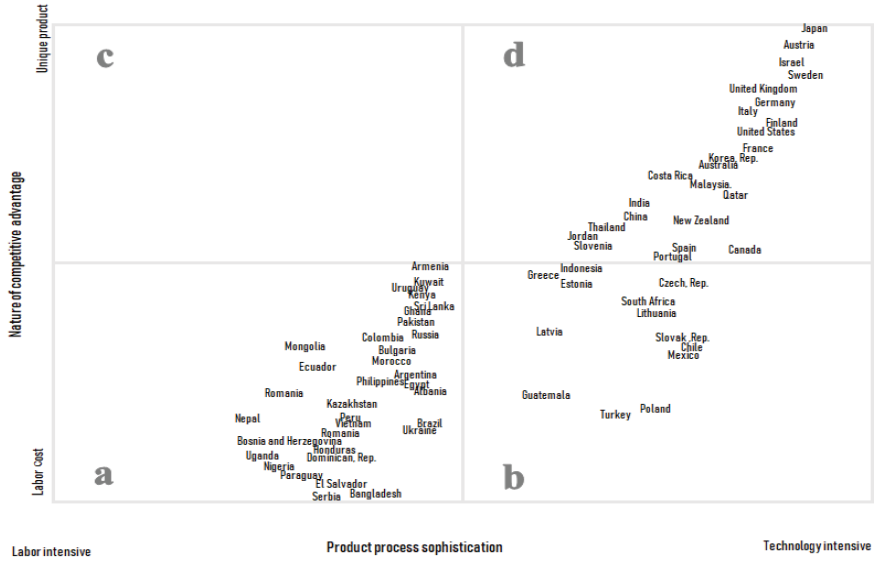
competitiveness in low-cost labor or natural resources are more efficient in marketability than others that have the opposite advantages. It assumes that low-wage or plentiful natural resources can achieve economies of scale in manufacturing. The larger the economies of scale in production, the better the export performance. Those competitive advantages, rather than technological advantages, are useful to perform export production, as the economies of scale available from plentiful labor and resources affect output for export in volume.

Conversely, a gap is revealed between the nature of competitiveness and the efficiency of SCRM. Unlike the difference between competitive advantages of marketability, countries with competitive advantages of unique product/process demonstrate higher efficiency of SCRM than those with low-wage/resource. This assumes that the more countries have competitiveness to improve product quality, the more focus is placed on predicting risks and pre-empting issues before they disrupt innovation. However, nothing in the nature of competitive advantages has an impact on the national performance of profitability.

Second, the t-test result of production process sophistication is similar to the first comparison. The differences in efficiency of marketability exist among the average of production process to a significance level. Countries with labor-intensive manufacturers perform more efficient marketable activities than those with technology-intensive manufacturers. However, late technology-intensive countries show a significant difference in SCRM efficiency. As countries consider high-technology to be a competitive advantage, it is imperative to also manage supply chain risks. As mentioned above, any characteristics of a country are not significant for the efficiency of productivity.

Significant gaps in the efficiency of marketability and SCRM from an offshoring perspective are apparent according to specific national traits, as shown in Fig. 3. On the basis of those identified characteristics, countries are divided into four groups, which can be utilized as reference points to make an offshoring site decision.

Fig. 3. Country Metrics of Competitive Advantage and Product Process Sophistication



5.2. Secondary Analysis with Tobit Regression by Divisional Efficiency

In this study, Tobit regression analysis was conducted to find the correlation between value-added business activities and each divisional efficiency using e-views version 10, aiming to examine whether each degree of value-added business activities influences the increase of offshoring productivity. The goal is to find value-added activities that simultaneously increase the firms' value and raise offshoring efficiency, such as price, quality, and brand image.

As illustrated in Table 6, value-added business activities are presented as independent variables. The efficiencies of each national performance are used as dependent variables. Independent variables are responses to the World Economic Forum's Opinion Survey, which ranks factors between 1 and 7. The score corresponds to the responses weighted according to the ranking.

Table 6. Categories of Independent Variables in Regression Analysis

Category(Variables)		Content
Value-Added Activities	Production process sophistication	In your country, how sophisticated are production processes? [1 = not at all—production uses labor-intensive processes; 7 = highly—production uses latest technologies]
	Control of international distribution	In your country, to what extent do domestic companies control the international distribution of their products? [1 = not at all; 7 = to a great extent]
	Extent of marketing	In your country, how successful are companies in using marketing to differentiate their products and services? [1 = not successful at all; 7 = extremely successful]
	Value chain breadth	In your country, how broad is the companies' presence in the value chain? [1 = narrow, primarily involved in individual steps of the value chain (e.g., resource extraction or production); 7 = broad, present across the entire value chain (e.g., production, marketing, distribution, design, etc.)

Source: World Economic Forum (2018).

The correlations between the degree of value-added activities and the national efficiencies of offshoring performance is shown in Table 7. No correlation between the degree of value-added activities and profitability was noted. As profitability composes advanced indicators, such as labor market flexibility, high-quality infrastructure, and the availability of financial service, such business activities at a firm-level do not affect national productivity from a profitability perspective. This implies that it is more crucial to develop national environments that indirectly support the performance of business activity rather than increasing national efforts to directly prompt business activities.

Relations are revealed between two value-added business activities and marketability (shown in Table 7). Marketability is analyzed by actual export volume by percent of GDP, the market value for export, and improvement of market efficiency based on production. Production process sophistication, one of the value-added business activities, has a negative influence on marketability efficiency. This means that the more sophisticated production processes, the less likely that marketability is efficient. As mentioned above in the results of the t-test, countries activating technology-intensive production help to gain product competitiveness for firms. That is, they focus more on improving the quality of products, rather than the quantity. Thus, a sophisticated production process does not affect an increase

in export. It is shown that export-oriented offshoring productions generally engage in labor-intensive rather than technology-intensive nations. It is more efficient in terms of offshoring strategy to make a large number of export-oriented products in countries with labor-intensive industries rather than technology-intensive industries.

Furthermore, the broad presence of a value chain in a country has a positive influence on marketability. In this paper, a value chain is a physical representation of the whole extensive business process, starting with raw materials, production of goods (and services), and improving product value and ending with product delivery at an industry-level. As the value chain is more widely built in a country, it can achieve efficient export-performance, which can allow offshoring firms to bring all business activities together. Offshoring firms need to consider both national characteristics of product process sophistication and to spread awareness in a value chain to improve the efficiency of marketability.

Table 7. Results of Tobit Regression Analysis

Response: Profitability efficiency	**Coefficient**	**Std. Error**	**t-score**	**p-value**
Intercept	0.547	0.166	3.294	0.000
Production process sophistication	−0.106	0.056	−1.874	0.061
Control of international distribution	0.037	0.068	0.538	0.591
Extent of marketing	−0.006	0.053	−0.112	0.912
Value chain breadth	0.097	0.061	1.590	0.114
Log-Likelihood = 42.787				
Response: Marketability efficiency				
Intercept	0.761	0.127	5.970	0.000
Production process sophistication	−0.131	0.043	−3.028	0.003***
Control of international distribution	0.037	0.052	0.696	0.486
Extent of marketing	0.011	0.040	0.261	0.794
Value chain breadth	0.099	0.047	2.106	0.035**
Log-Likelihood = 61.296				
Response: Supply Chain Risk Management efficiency				
Intercept	0.737	0.164	4.494	0.000
Production process sophistication	−0.078	0.056	−1.403	0.160
Control of international distribution	0.049	0.068	0.731	0.465
Extent of marketing	−0.051	0.052	−0.978	0.328
Value chain breadth	0.276	0.061	2.460	0.027**
Log-Likelihood = 43.624				

Note: *p<0.1, **p<0.05, ***p<0.001.

National awareness of its value chain affects efficiency of supply chain risk management. Linking each business activity into one unit is an efficient way to minimize possible risks. Therefore, offshoring needs to present across the entire supply chain for business activities to improve both efficiency of marketability and SCRM.

There are two national requirements that enable increased marketability. The first is based on plentiful workers. The more available labor, the larger the economy that can be achieved. Also, the broad presence of a value chain is a vital determinant of achieving efficient marketability and SCRM.

As an economy grows and incomes rise, industries adjust by moving up a supply chain. This is an "advanced country" phenomenon, and high-technology countries tend to perform to manage supply chain risk efficiently according to the result of t-test. Thus, advanced countries with competitive advantages in high-technology innovation offer a great attraction to offshoring firms by managing supply chain risks efficiently. Based on the finding of hierarchical regression analysis (see Table 8.), only 'Value chain breadth' affects more efficient marketability as well as SCRM. The implication is that the presence of a value chain in a country is the only considerable determinant for improving efficiencies of both marketability and SCRM. Furthermore, a combination of advanced factors to raise the importance of SCRM, such as broad awareness of a value chain and technology-focused advantages, and a large number of workers are more likely to enhance efficiency of both marketability and SCRM.

Table 8. Hierarchical Analysis Results of Supply Chain Activities of Divisional Efficiency

Variables	Model 1	Model 2	Model 3	Model 4		
Step 1: Profitability				β		
Production process sophistication	−0.241(0.810)	−1.252(0.215)	−1.246(0.217)	−0.694	−1.806(0.076)	
Control of international distribution		1.247(0.217)	1.142(0.258)	0.202	0.519(0.606)	
Extent of marketing			0.085(0.933)	−0.020	−0.108(0.914)	
Value chain breadth				0.531	1.522(0.133)	
	R2=.001, Revised R2=-.014, F=0.058(.810)	R2=.024 Revised R2=-.006, F=0.806(.451)	R2=.024, Revised R2=-.021, F=0.532(.662)	R2=.057, Revised R2=-.001, F=.986(.421), Durbin-Watson=2.456		
Step 2: Marketability						
Production process sophistication	−1.505(0.137)	−2.176(0.033)	−2.197(0.032)	−0.975	−2.918(0.005)	***
Control of international distribution		1.750(0.085)	1.481(0.143)	0.250	0.671(0.505)	
Extent of marketing			0.502(0.618)	0.046	0.252(0.802)	
Value chain breadth				0.982	2.029(0.047)	**
	R2=.032, Revised R2=.018, F=2.267(.137)	R2=.075, Revised R2=.047, F=2.699(.075)	R2=.078, Revised R2=.038, F=1.863(.144)	R2=.133, Revised R2=.080, F=2.493(.048), Durbin-Watson=2.547		

Table 8. (Continued)

Variables	Model 1	Model 2	Model 3	Model 4		
Step 3: SCRM						
Production process sophistication	−0.022(.982)	−0.917(0.335)	−0.901(0.371)	−0.522	−1.352(0.181)	
Control of international distribution		1.029(0.307)	1.228(0.224)	0.276	0.705(0.483)	
Extent of marketing			−0.731(0.431)	−0.180	−0.942(0.350)	
Value chain breadth				0.426	2.240(0.039)	**
	R2=.000, Revised R2=-.015, F=.000(.202)	R2=.016, Revised R2=-.017, F=.529(.078),	R2=.025, Revised R2=-.022, F=.560(.213),	R2=.046, Revised R2=-.026, F=1.792(.035), Durbin-Watson=2.353		

Note: * $P<0.1$ ** $P<.0.05$ *** $P<0.01$

6. Conclusion

It has been found that expected gains from LCC offshoring prompted only by the desire for reduction in labor cost can be offset by a host of hidden costs and risks (Min and Kim Il-Suk, 2011). Thus, it is crucial to determine an offshoring location based on a number of other factors beyond labor cost in order to prevent failure of offshoring strategy. Successful offshoring strategy depends significantly on the competitive advantages of the host country, as they allow MNFs to manage effectively and efficiently business. Thus, it is essential to examine the national estimates of competitive advantages for offshoring prior to deciding on an offshoring location.

According to a comparison of national capabilities for offshoring implementation, productivity improvements in offshoring are affected by common advanced factors, such as an available talent pool and a large market size. These factors are vital for raising a country's competitiveness and productivity and achieving economies of scale. This demonstrates that advanced advantages in production can fulfill functions to drive tremendous efficiency of profitability from all angles: competitiveness, productivity, and attractiveness. Furthermore, an available talent pool and a large market can subsequently boost export-driven activities, as an efficient, export-driven economy is based on labor-intensive industries. We also found that efficient outcomes (profitability) in the production process are linked to efficient marketability, including both labor and goods market efficiency. Both market efficiencies have a positive influence on worker performance and the attractiveness of a country for talent and national competitiveness to produce the right mix of products and services. To develop cutting-edge products and processes to maintain a competitive edge and move toward even higher value-added activities, countries should endeavor to improve the national capability to manage potential host risks that may hinder international business activities.

The determinants of national competitiveness depend on national traits (a nature of competitive advantage and business sophistication). Countries with labor/ resource advantages

and labor-intensive industries are more competitive in terms of marketability than others. In contrast, countries with technology-intensive industries benefit offshoring companies, particularly in the technology sector, through an advantage of supply chain risk management. Thus, offshoring companies should consider each national trait that is suitable to intended the purposes before determining an adequate offshoring location.

According to the secondary analysis with t-test and regression methods, national similarities exist among comparatively efficient countries in terms of the development of national performance. One of these considerations is the perception of the value chain in a country. As the perception of a value chain broadens in a country, it can also achieve additional efficient performance, such as in marketability and SCRM. This demonstrates that offshoring firms in specific countries that widely perceive a value chain can bring entire business activities together and improve business performance in terms of marketability and supply chain risk management.

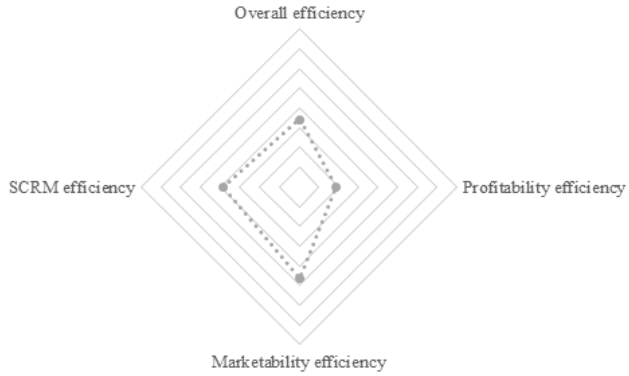
6.1. Implications Regarding National Efficiency for Offshoring in Korea

According to country efficiency for producing national competencies related to an offshoring strategy, Korea is not an attractive offshoring or reshoring location from the company perspective. Korean companies that offshore operations outside do not need to move into Korea (home country), although potential risks and costs exist in the supply chain. Thus, the Korean government should expend intense effort into making political and social changes in order to be competitive as both an attractive offshoring and reshoring location.

This section provides practical implications at the Korean government level. The findings are as follows. First, Korea is not an adequate offshoring location for offshoring companies. Its profitability, marketability, and efficiency of supply chain risk management are not suitable for the implementation of offshoring business strategy. Second, Korea is grouped in group 'd' according to Fig. 4. That is, technology and its related industries are Korea's strong suit. However, despite its national advantage, Korea fails to efficiently manage potential risks in its supply chain. It is a complex issue with no simple solution at a national level, but one that must be meaningfully and urgently addressed.

Fig. 4. Results of NDEA of Korea

Overall efficiency	Profitability	Marketability	SCRM
0.773	0.693	0.831	0.793



Korea should actively pursue wealth creation opportunities to increase national performance. Considering Korea's traits, it should be able to give offshoring companies a competitive advantage in terms of SCRM. However, Korea's efforts to manage supply chain risks are shown to lack the efficiency to enhance national competitiveness for international business.

In this case, by leveraging national traits, Korea can focus efforts on preventing potential risk factors for international business to increase its national competitiveness for offshoring strategy. Specifically, it must spread the awareness of the value chain among all industries. There should be a common perception that all businesses are interconnected, just like parts of a value chain. Korea should establish an integrated industrial support system to connect all business across its value chain. Furthermore, there is a need for a government department that manages risk prevention and oversight in all industries.

This study demonstrates that profitable competitiveness is increasingly driven by efficient goods markets, well-functioning labor markets, and a well-developed financial market. Subsequently, Korea's requisites for production are not appropriate to drive the efficiency of profitability through competitiveness, productivity, and attractiveness. In detail, Korea's country-level production factors require an overall reappraisal. Its goods, labor, and financial markets should be examined in terms of potentially improving productivity and national attractiveness to improve its business environment. For example, Korea must develop a pool of talented human resources and a less regulative labor market to advance profitability.

Marketability shows how efficiently national competitive advantages perform includes an export-driven economy. As a result, efficient countries in marketability, USA, Russia, and China have a plentiful workforce in common. There can be limits to increasing the workforce in Korea. Instead, of raising its workforce, Korea can enhance its worker efficiency through an educated workforce, production differentiation, or high technology development. Italy, which is similar to the Korean population, provides a benchmark against future direction for the export-driven economy. Italy's high-quality production resolves its labor shortages and enhances its product value. Italy has been securing its production capacity in high value-added fields to produce high-value branded goods, such as Cartier, Prada, and Ferrari, among others. Such Italian products align with high demand from the global market, and for this reason, Italy has efficient marketability and profitability. Korea should adopt advanced labor flexibility to enhance work productivity by benchmarking the USA.

6.2. Research Limitations

This research conducted a temporal cross-section analysis in a period of 2017–2018. It is limited in reflecting potential changes in countries' competitive factors worldwide, and it cannot consider time-series trends of a changing environment, such as social and political circumstances and changing market environments. Thus, it is more justifiable to evaluate competitive national performance of offshoring business annually. As this study estimates each national performance in terms of productivity, another limitation of the research is that it does not reflect variables on the corporate side, such as actual business cost. It is also limited by leaving internal corporate characteristics as an internal estimation of firms, as the research is focused on the development of a tool to aid the decision-making of offshoring strategy from a micro-business perspective.

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