OFFSHORE OUTSOURCING AND RESEARCH AND DEVELOPMENT OUTSOURCING

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The international outsourcing has been a matter of concern in recent times when the global integration generally speeds up. Its effects are considered as one of main channels for technology spillovers and productivity improvement via reducing investment costs. This paper introduces a theoretical model explaining the most recent muddles over research and development (R&D) outsourcing. The paper shows that a corporation in developed countries considers the outsourcing as opportunities for increasing output and reducing production cost and the level of outsourcing depends on the different degree of technology spillovers and wages. Results of two recent surveys have supported our theoretical model. Specifically, we also find the current business climate in Vietnam should be improved to satisfy the criteria for receiving more capital inflows from offshore and R&D outsourcing.

Keywords: Offshore outsourcing, R&D outsourcing, technology spillovers.

1. Introduction

The offshore outsourcing is playing an essential role in globalization. Globalization has required many companies to relocate their production in the best place to reduce production cost through better use of natural resources and human capital. Moreover, globalization has also forced firms to face a keener competition. Therefore, to exist in such a competitive environment, firms have to undertake various activities and organize everything better, from inputs to outputs, from product design to assembly, from research and development (R&D) to market share, from distribution to after-sales services and so on. Outsourcing is one of these essential activities in the global economy. There are many studies of offshore outsourcing in the era of globalization. For instance, Grossman and Helpman (2002-2003) studied outsourcing in the global economy. They show that the different technology between developed countries which are called the North and developing countries called the South creates the shifts in the outsourcing activity.

Additionally, the effects of outsourcing on skilled and unskilled labors; on unemployment; and on the social welfare have been studied in recent years. Wilfred J. Ethier (2005) shows that more fragmentation is associated with a more elastic demand for unskilled labor if and only if outsourcing and unskilled labor are sufficiently substitutable. Moreover, he also analyzes the level of outsourcing depending on the relationship among skilled labor, unskilled labor, equipment and government's intervention.

In an empirical study of offshore outsourcing, Bartel et al. (2005) show that outsourcing has the strongly positive relationship with the pace of technological changes. In addition, the more

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information technology (IT)-intensive the firm is, the easier for it to perform the international outsource. This trend is also examined by Mol (2005). He performs an empirical study by using data of manufacturing industries in the Netherlands in the early 1990s. He demonstrates that corporations in R&D-intensive industries have become more dependent on relations with outside suppliers.

The above debates on the international outsourcing have never stopped during the increasing trend of the economic globalization. One of the most discussed topics in recent years is R&D outsourcing. It is an outcome of the offshore outsourcing. Many studies have focused on the effects of R&D on economic growth, the role of governments in commitment or credible R&D activities. In other words, much of work done on outsourcing in international competitive markets and R&D subsidies are a more robust recommendation than export subsidies. The authors contribute to the trends, along the lines considered in Spence (1977, 1979), Friedman (1979), Dixit (1980), Eaton and Lipsey (1980, 1981), Spencer and Brander (1983), Sorensen (1999) and Leahy and Neary (2001). Meanwhile, little work has been done on R&D outsourcing. One of pioneers is Quinn (2000) giving advantages of outsourcing innovation such as resource limits, specialist talents, attracting talent and faster arrival than in-house activities. Another theoretical study, Balachandra (2005) generalizes the causes and consequences that have led to R&D outsourcing. In recent times, Lai and Wang (2005) contribute the trend of outsourcing innovation. They analyze the relationship among R&D outsourcing, information leakage and labor cost. As a result, they find that the R&D outsourcing depends on the level of information leakage, intellectual property protection and in-house research cost.

Starting from the debates of offshore outsourcing and R&D outsourcing, we present a model which provides a framework to explain the recent muddles over outsourcing. The model examines the different production cost and technology spillovers that can affect a firm's decision on the outsourcing. The firm decides to partly or completely outsource its R&D depending on two main elements. First, a domestic firm continues partly R&D outsourcing to minimize the in-house production cost and vice versa. In this case, a domestic firm can invest in R&D either at home or abroad and the R&D activities not only reduce its production cost, but also lead to information leakage occurring in its counterpart in a foreign country. In other words, a foreign firm also gets a lower cost from technological spillover. Second, a firm has to close its domestic factory and shift to foreign countries, therefore, the completely R&D outsourcing is unavoidable.

The results of two recent surveys have supported our theoretical model. In addition, we also find the current business climate of Vietnam has not been ready for attracting the capital inflows of international outsource as well as encouraging local enterprises to devote their resources to implementing R&D activities.

This paper is organized into five sections. Section 1 provides the introduction. Section 2 reviews prior researches of international and R&D outsourcing, while a model of R&D outsourcing is presented in Section 3. Section 4 presents model applications and implications. Finally, Section 5 summarizes the study's results.

2. Literature review

The international outsourcing starts from the effort to reduce production costs in which labor cost is playing a vital role during the shift of many factories from the North to the South. In the early 1980s, the shifting process only occurred in labor-intensive sectors such as low-skilled manufacturing jobs in textiles and light industries. However, the process now has occurred not only in most sectors of higher-end manufacturing of goods such as motorcycles, furniture, generators, compressors, fiber optics and computer components, but also in the outsourcing of innovation as well as services. The latter is concerned by many politicians,

journalists, white collars, blue collars and economists in recent years. The phenomenon of outsourcing services happens to not only customer call centers and data entry facilities, and clinical testing centers, credit card processing and software development, but also high-skilled professional jobs ranging from engineering, computer chip design, to nanotechnology researches, financial analysis, pharmaceuticals and R&D.

In fact, the final target of R&D outsourcing is to maximize a firm's profit. Therefore, in a firm's business strategy, the issue of R&D outsourcing needs to be carefully prepared. A corporation is pursuing the outsourcing strategy like a game: the riskier the game is the more benefit it gains. Caudy (2001) analyzes more details about the business strategy of R&D outsourcing. In addition, he breaks down the benefits and challenges of each kind of international outsource.

The meaning of outsourcing is also modified over time. In the early 1980s, outsourcing typically referred to the circumstance when a firm increased its expenditures on intermediate inputs made from outside the firm. However, it now referred to a specific segment of the growing international trade and services. Therefore, the meaning of outsourcing needs to be classified before analyzing the public stir over outsourcing. Bhagwati et al. (2004) help define the meaning of outsourcing. They have divided outsourcing into two sets of serious muddles. In the first set, outsourcing is properly defined as the international trade in arm's length services. This definition is also addressed by the World Trade Organization in its General Agreement on Trade in Services. In the second set, outsourcing is essentially just a trade phenomenon; therefore, outsourcing leads to gains from trade and increases in national income. It includes fundamental particulars of conventional trade in goods. Consequently, its effects on employment, wages, technological transfers and social welfare are not qualitatively different from those of normal trades.

The debate on outsourcing takes the center stage in the North. In particular, the US Senator Joseph Lieberman (2004) contributes a report on offshore outsourcing. He recognizes that the issues of outsourcing are complicated, combining with many elements which intersect each other. For instance, huge budget and trade deficits are making the U.S. dependent on foreign purchases of US securities, suffer unbalanced exchange rates, and lose a lot of manufacturing and servicing jobs. Therefore, the solution to the current problem is not easy at all and so sensitive that it must be comprehensive and fully supported by both the North and the South.

R&D outsourcing was one of the most remarkable developments in the 1990s. For instance, in France, the R&D outsourcing expenses rapidly increased from less than 15% of total R&D expenses in the early 1980s to more than 23% in the 1990s (Paul et al. 1999, and Blanchard et al. 2003). This trend continues to increase in recent years. In Table 1, the global R&D expenditures reached US$1,143.2 billion in 2009, 3.2% higher than the 2008 figure.

Table 1: Global R&D spending (US$ billion)

	2007 GERD PPP	2008 GERD PPP	2009 GERD PPP
Americas	413.8	429.4	437.1
U.S.	362.7	376.9	383.5
Asia	334.4	362.6	386.9
Japan	142.9	143.9	144.6
China	100	122.7	142.5
India	20.6	22.6	24.1
Europe	274.2	278.7	280.2
Rest of World	35.2	37.3	39
Total	**1,057.6**	**1,108**	**1,143.2**

PPP: Purchasing power parity

GERD: Gross Domestic Expenditure on R&D

Source: Battelle, *R&D Magazine*

Recently, most of developed countries are facing budget deficit, therefore, they are only able to maintain budgets for R&D in defense and

some public health care projects. In other words, many developed governments have to cut subsidy for unnecessary R&D projects. A firm has to deal with the shortage of fund for in-house R&D and the R&D competition, as a result, many R&D projects have been moved to the South to save money and time, reduce risks and free up available resources. Especially, developing countries with large markets and high stable growth rates such as China and India have attracted so much capital inflows for R&D activities. Together with low costs and plentiful talent in both countries, multinational companies have shifted many R&D activities to these destinations.

Types of R&D projects are also diversified including basic research, product localization, technical support, applied development, software project management and after-sales services. Nowadays, the R&D projects focus on not only the local markets but also the global one. For example, Motorola has released some new products for global market based on R&D activities undertaken mainly by Chinese labs.

Magnani (2002), under a theoretical framework and an empirical study from the data of technological diffusion since the 1970s, shows that the technological diffusion increases outsourcing in high-tech industries. However, the spread of outsourcing will depend on a particular type of spillovers, "rent" or "pure knowledge" spillovers. Rent spillovers are positively correlated with outsource, meanwhile pure knowledge spillovers often lead to a decrease in the incentive to outsource. Furthermore, Bartel et al. (2005) show that the speed of technological change is playing a significant role in international outsourcing since it allows firms to use services based on leading-edge technologies without incurring any extra cost except the sunk costs of adopting these new technologies. Besides, the more IT-based services are provided, the more comparative advantages of outsourcing of these services a firm enjoys. The effects of R&D outsourcing on technology transfer, productivity and geographic locations have been matters of concern in recent years. Keller (2002) finds that over time, the technological knowledge has expanded globally due to the development of IT. Geographic distance also ceases to be an important element if there is a pool of technological knowledge and then the results of R&D activities quickly spill over into all countries. The more technical diffusion, the higher productivity and lower input prices are in the South. Additionally, language skills and education are among essential factors in determining R&D outsourcing.

In general, there are many previous studies about the international outsourcing. They have contributed to the enrichment of theoretical trade connecting industries with sources of intermediate inputs. In other words, they not only analyze the horizontal aspects but also explore the vertical aspects of offshore outsourcing. Spencer (2005) contributes a valuable survey classifying most of the cutting edge of literatures of international outsourcing.

During the process of globalization, every firm is facing the competitive pressure. Therefore, every firm has to lower production costs and selling prices and enlarge its share in both domestic and foreign markets. Besides, every firm has to manage efficiently all operations such as R&D activities, production, marketing, sales and warrantee services. In other words, every firm has to increase R&D and create a suitable method to utilize all resources in a more productive way. Therefore, R&D outsourcing is one of the many strategies for a firm to be sustainable in globalization.

Moreover, due to differences in culture, consumer's behavior, weather, environment, regulations and even political system between the North and the South, production of goods for developing markets should deal with those differences. For instance, automobiles produced for the Chinese market require attention to many particular aspects such as engines adaptable to gasoline of lower quality, heavier-duty air filters and stronger suspensions. Nevertheless, the horns are designed especially because Chinese

drivers use it more frequently than most of their counterparts in other countries (*Wall Street Journal,* March 28, 2006). Hence, the R&D should be carried out in the South in order to meet such special requirements posed by local customers, environment, culture and even religion.

3. Model

There is a 2x2 model, two countries including home country (H) and foreign country (F) and two firms, firm 1 and firm 2. H is in the North, the high-wage economy and F is in the South, the low-wage economy. Firm 1 can produce commodity 1 in both countries. Firm 2 produces only commodity 2 in the South.

Under the free trade, markets are assumed to be fully integrated so that in equilibrium the two countries face the same market prices of each commodity. Furthermore, we assume that commodity 1 and commodity 2 are imperfect substitutes. Two inverse demand functions are as follows:

$$P_1 = P_1(Q_1^H + Q_1^F, Q_2)$$
$$P_2 = P_2(Q_1^H + Q_1^F, Q_2)$$

Where: Q_1^H : output of commodity 1 produced in H.

Q_1^F : output of commodity 1 produced in F.

We also assume that

$$\frac{\partial P_i}{\partial Q_i} < 0 \text{ where i =1, 2 .} \qquad \text{(a)}$$

Initially, Firm 1 is able to produce commodity 1 in both markets. Firm 1 produces commodity 1 in H with marginal cost C^H and in F with marginal cost C^F. Every firm can improve its technology by investing in R&D to lower marginal cost. In the stage 1, Firm 1 decides to spend k^H units of capital in R&D activities in H and k^F units of capital in F. In other words, Firm 1 performs partially R&D outsourcing activities in F. The resulting investment in R&D leads to lower marginal cost for Firm 1, $f(k^H)$ and $g(k^F)$ in H and F, respectively. Where $f'(k^H) > 0$; $f''(k^H) < 0$ and $f(0) = 0$; and $g'(k^F) > 0$; $g''(k^F) < 0$ and $g(0) = 0$.

On the other hand, R&D also leads to technological spillover inside as well as outside of Firm 1. Let us use variable $\beta \in [0,1]$ to represent the degree of technological spillover inside Firm 1 and $\alpha \in [0,1]$ to represent the degree of technological spillover outside Firm 1. In other words, resulting R&D outsourcing of Firm 1 in F can expect to lower marginal cost of Firm 2 by $\alpha g(k^F)$.

Throughout marginal costs, R&D, spillover of Firm 1 in H, F and Firm 2 in F are given by, respectively.

$$MC_1^H = C_1^H - f(k^H) - \beta g(k^F) \qquad \text{(1a)}$$

$$MC_1^F = C_1^F - g(k^F) - \beta f(k^H) \qquad \text{(1b)}$$

$$MC_2 = C_2 - \alpha g(k^F) \qquad \text{(1c)}$$

We assume that R&D is not too important to lead to negative marginal costs. Two firms compete in a Cournot-Nash fashion.

This paper is concerned with effects of R&D on lower marginal costs but not trade policies. Thus, trade remains free between two countries. Furthermore, because of government's budget deficit in most developed countries, we do not consider government's subsidy in our model.

We consider a two-stage game. In the first stage, Firm 1 chooses level of R&D, k^H, k^F in H and F, respectively. In the second stage, the firms, facing given level of R&D and rates of spillover, compete in a Cournot-Nash fashion in H.

Denote output of firm i by Q_i, i = 1,2 and $Q_1 = Q_1^H + Q_1^F$ when Q_1^H and Q_1^F denote the output of Firm 1 in H and F, respectively.

In equilibrium the total supply is equal to the total demand:

$Q_1+Q_2 = X_1+X_2$

Profit maximization of firms: Firms have identical technologies which exhibit increasing return to scale. To produce Q^j_1 units of commodity 1, firm 1 employs $(k^J + MC_1^J Q_1^J)$ units of human capital, where j = H,F. Meanwhile, to produce Q_2 units of commodity 2, Firm 2 employs MC_2 units

of human capital. The wages per unit of human capital are W^H and W^F in H and F, respectively. Since H is a developed country and F is an underdeveloped country, $W^H > W^F$.

The home and foreign firms' profits are:

$$\pi_1 = P_1(Q_1^H + Q_1^F, Q_2)(Q_1^D + Q_1^F) - W^H(k^H + MC_1^H Q_1^H) - W^F(k^F + MC_1^F Q_1^F) \quad (2a)$$

$$\pi_2 = P_2(Q_1^H + Q_1^F, Q_2)Q_2 - W^F MC_2 Q_2 \quad (2b)$$

We now consider the optimization problem of Firm 1. We assume that given Q_2, Firm 1 chooses Q_1^H and Q_1^F to maximize its profit. The first order conditions are:

$$\frac{\partial \pi_1}{\partial Q_1^H} = \frac{\partial P_1}{\partial Q_1} Q_1 + P_1 - W^H MC_1^H \le 0 \quad (3a)$$

$$\frac{\partial \pi_1}{\partial Q_1^F} = \frac{\partial P_1}{\partial Q_1} Q_1 + P_1 - W^F MC_1^F \le 0 \quad (3b)$$

If $MC_1^F < MC_1^H$, then Firm 1 will outsource all of its output and R&D activities. This result was also proved by Long (2005). Otherwise, Firm 1 may not determine its strategy of international outsourcing because it depends on the difference between $W^H MC^H$ and $W^F MC^F$. We now consider the case in which Firm 1 diversifies its production and R&D. In other words, Firm 1 produces commodity 1 and undertakes R&D activities in both locations.

The remaining issue is that we will analyze each firm's strategies to maximize its profits with given investment in R&D and under the Cournot-Nash behavior. Each firm, taking given the other outputs, chooses its output to maximize the profit.

The first order conditions are:

$$\frac{\partial \pi_1}{\partial Q_1^H} = \frac{\partial P_1}{\partial Q_1^H} Q_1^H + P_1 - W^H MC_1^H = 0 \quad (4a)$$

$$\frac{\partial \pi_1}{\partial Q_1^F} = \frac{\partial P_1}{\partial Q_1^F} Q_1^F + P_1 - W^F MC_1^F = 0 \quad (4b)$$

$$\frac{\partial \pi_2}{\partial Q_2} = \frac{\partial P_2}{\partial Q_2} Q_2 + P_2 - W^F MC_2 = 0 \quad (4c)$$

We suppose the demand functions are linear:

$$P_1 = a_0 - a_1(Q_1^H + Q_1^F) - a_2 Q_2 \quad (5a)$$

$$P_2 = b_0 - b_2 Q_2 - b_1(Q_1^H + Q_1^F) \quad (5b)$$

where a_i and b_i are nonnegative and i = 0,1,2. Both equalities (5) satisfy the condition (a).

To simplify the analysis, we set $a_0 = a_1 = b_0 = b_2 = 1$ and $a_2 = b_1 = b$. Then we can rewrite the demand functions as follows:

$$P_1 = 1 - (Q_1^H + Q_1^F) - bQ_2 \quad (5c)$$

$$P_2 = 1 - Q_2 - b(Q_1^H + Q_1^F) \quad (5d)$$

From the reaction functions (4a, 4b and 4c) and the inverse demand functions (5c and 5d), we can derive the output of each firm:

$$\tilde{Q}_1^H = \frac{1 - 2W^H MC_1^H + W^F MC_1^F - b\tilde{Q}_2}{3} \quad (6a)$$

$$\tilde{Q}_1^F = \frac{1 - 2W^F MC_1^F + W^H MC_1^H - b\tilde{Q}_2}{3} \quad (6b)$$

$$\tilde{Q}_2 = \frac{3 - 3W^F MC_2 - b(2 - W^H MC_1^H - W^F MC_1^F)}{2(3 - b^2)} \quad (6c)$$

and

$$\frac{\partial Q_2}{\partial Q_1^H} = \frac{\partial Q_2}{\partial Q_1^F} = -\frac{3}{b} < 0 \text{ for } \beta \in (0,1] \quad (7)$$

So, an increase in Q_1 makes Firm 2 decrease its output. In this case, both commodities are substitutes.

We substitute the results of equations (6) into the inverse demand functions and profit functions and then differentiate with respect to k^H and k^F, taking the other parameters as given. We can yield following results:

$$\frac{\partial \tilde{P}_1}{\partial k^H} = -\frac{2 - b^2}{2(3 - b^2)}[W^H f'(k^H) + W^F \beta f'(k^H)] < 0 \quad (8a)$$

$$\frac{\partial \tilde{P}_1}{\partial k^F} = -\frac{2 - b^2}{2(3 - b^2)}[W^F g'(k^F) + W^H \beta g'(k^F)] - \frac{b}{2(3 - b^2)} W^F \alpha g'(k^F) < 0 \quad (8b)$$

$$\frac{\partial \tilde{P}_2}{\partial k^H} = -\frac{b}{6}[W^H f'(k^H) + W^F \beta f'(k^H)] < 0 \quad (8c)$$

$$\frac{\partial \tilde{P}_2}{\partial k^F} = -\frac{b}{6}[W^F g'(k^F) + W^H \beta g'(k^F)] - \frac{1}{2} W^F \alpha g'(k^F) < 0 \quad (8d)$$

$$\frac{\partial \tilde{Q}_1}{\partial k^H} = \frac{3-2b^2}{3-b^2}[W^H f'(k^H) + W^F \beta f'(k^H)] > 0 \quad (8e)$$

$$\frac{\partial \tilde{Q}_1}{\partial k^F} = \frac{1}{3-b^2}[\beta W^F g'(k^F) + W^F g'(k^F)(1-b\alpha)] > 0 \quad (8f)$$

$$\frac{\partial \tilde{Q}_2}{\partial k^F} = \frac{g'(k^F)}{2(3-b^2)}[3\alpha W^F - b\beta W^H - bW^F] \quad (8g)$$

where $\beta \in [0,1]$.

From the resulting equations (8), we easily recognize that an increase in investment in R&D and R&D outsourcing leads to reduced costs as well as lower commodity prices. Moreover, an expansion of R&D activities and R&D outsourcing leads to an increase in Firm 1's total output. However, the sign of equation (8g) remains ambiguous. It depends on the level of technological spillover inside and outside Firm 1, and the wages as well as the parameter b. In the case its sign is negative, resulting outsourcing makes Firm 1 gain more comparative advantages and get bigger market shares when commodities 1 and 2 are imperfect substitutes. Obviously, if there is not any spillover effects outside Firm 1 (i.e. $\alpha = 0$), then the sign of equation (8g) is negative. Therefore, the more the R&D outsourcing, the larger the market share for Firm 1. In this case, Firm 1 could outsource most of R&D activities to foreign country. In case of $\alpha > 0$, offshore outsourcing of R&D may have positive effects on domestic global competitiveness. R&D collaboration including foreign-based firms is a central part of scientific research and increases in essential research activities (Austin et al., 2003). Furthermore, R&D outsourcing can be interpreted as a form of collaboration that fosters both domestic and foreign R&D abilities. Strategic technology alliances can create an opportunity for the South to corporate with the North to undertake and share results of R&D activities. The collaboration can be performed under many types involving enterprises, governments, and academia. Additionally, the impacts of spillover can lead to establishment of new rivals in the South. In reality, because of existence of the degree of technological spillover, a firm in the North has to sustain high proportional rate of R&D activities at home.

4. Model applications and implications

One of the most important factors determining a successful R&D project is the quality of human resource. Recently, China has gained a huge talent pool to meet almost R&D activities with a low labor cost. There are around five million university graduates annually, including around 600,000 new graduates who major in science or engineering. Moreover, the market size is a very important factor. Intuitively, China has a huge market of 1.3 billion consumers and the middle class is growing in big cities. Besides, China has sent many students to make study abroad and issued policies to allure them to return after graduation. China is trying its best to persuade high-quality academics to return to run R&D projects with generous research grants. From the above factors, it can explain why multinational companies, drawn by a huge and inexpensive talent pool, are pouring money into R&D activities in China - a trend that promises to broaden the country's huge role in the global economy (*Wall Street Journal*, March 13, 2006)

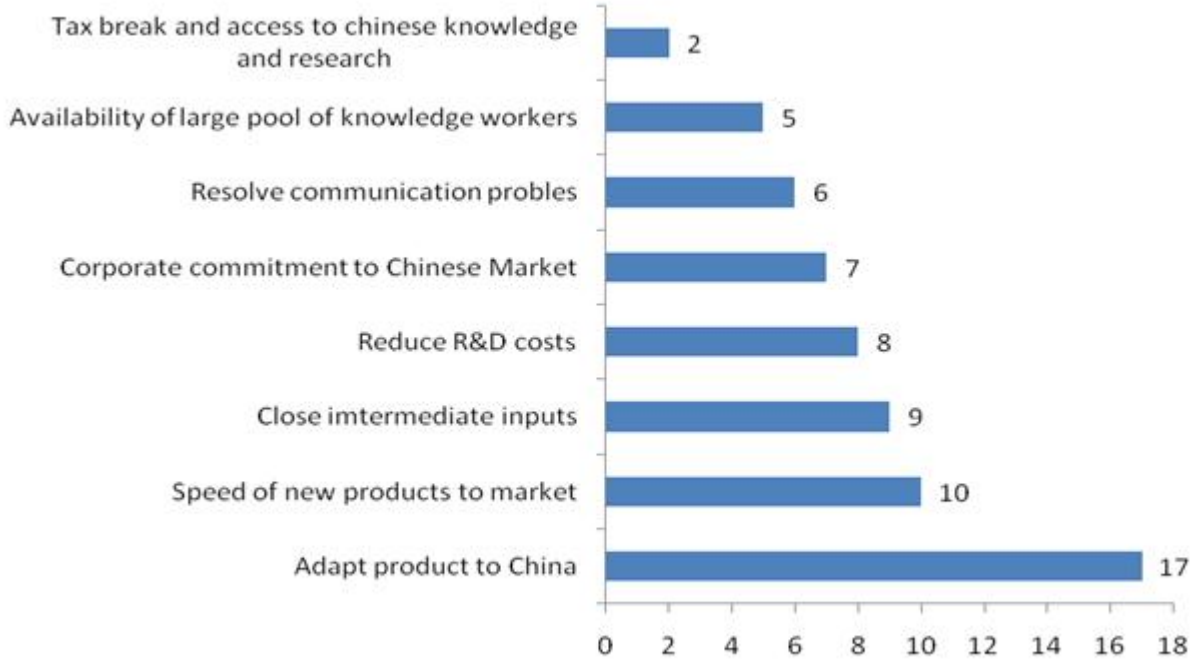
Our model can be used to explain the results of R&D activities in China from the recent survey from China Europe International Business School (CEIBS) in 2011, "Challenges for Foreign Business in China". The survey interviews 28 companies outsourcing R&D in China.

The survey has found the reasons for having opened or planning to open an R&D unit or center in China. Figure 1 shows that the largest amount of foreign firms have chosen China to implement R&D activities due to better adapting product to China or increasing in speed of new products to market. The results have supported our theoretical model that foreign firms increase in R&D activities when their objectives are to achieve more market shares in the host countries. In addition, Figure 1 also illustrates that some foreign firms are outsourcing R&D

activities because their objectives are to lower the cost of factor inputs. The results have been demonstrated in our theoretical model.

Furthermore, the current tax policy of Vietnam is a main barrier for new entrants into R&D outsourcing projects. For instance, local Vietnamese companies are facing an unfavorable tax policy for imported equipment to implement R&D projects. Meanwhile, in some other countries such as India, China and Russia, the imported equipment for R&D projects is exempted from all taxes (see *Saigon Times,* July 30, 2010).

Figure 1: The reasons for having R&D activities in China



Source: China Europe International Business School 2011 Survey

Our model also reflects new findings of another survey conducted by KPMG in 2010, "KPMG Pulse Survey: Shared Services and Outsourcing in China". Even though China, the Philippines and Vietnam are considered as the lowest cost locations in Asia Pacific, most foreign firms in the survey have chosen China to locate shared services centers. Figure 2 illustrates that there are only two percentages of firms in the survey choosing Vietnam to outsource shared services centers. The criteria for choosing the preferred destinations are language, skills, infrastructure and domestic market potential. Obviously, the current business climate in Vietnam has not completely satisfied these criteria and been lacking comparative advantages to encourage international outsourcing and execute R&D outsourcing projects.

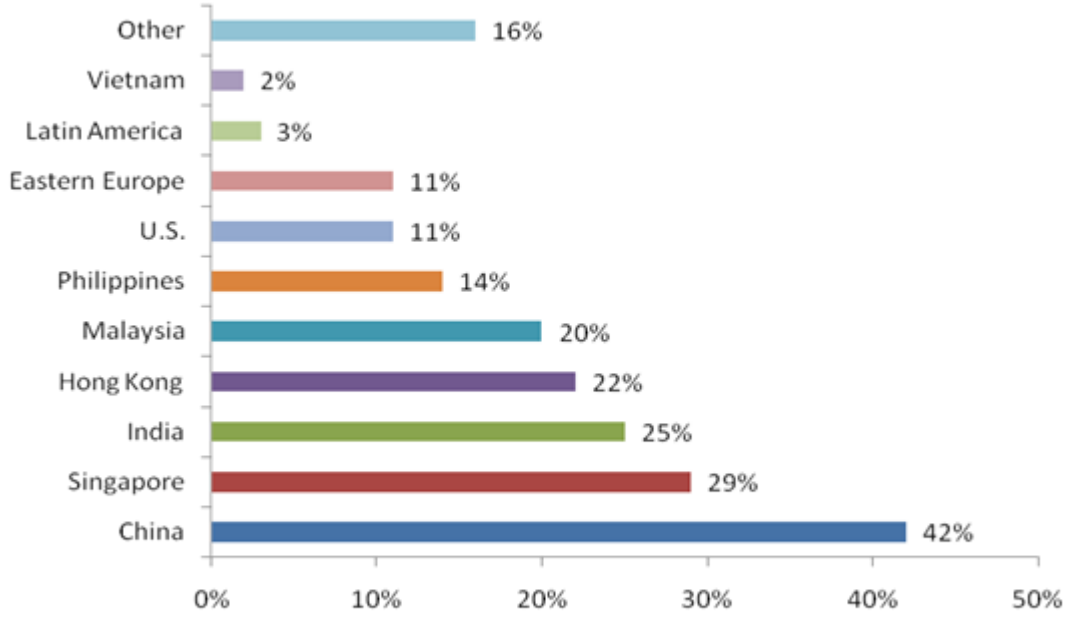
Therefore, to attract more international outsourcing and encourage more Vietnamese firms to cooperate on investment in R&D activities, the Vietnamese government should focus on improving the business environment to meet the above criteria as well as remove the current barrier.

5. Conclusion

Globalization is one of main factors leading to international and R&D outsourcing from the North to the South. The development of

computers and communications contribute to the increase in offshore outsourcing. The international outsourcing is a considerable stir by everyone in society. Especially, R&D outsourcing in recent times has become the credible debate. Many corporations consider outsourcing as a strategy to reduce production costs and expand market shares; employees consider it as the main reasons leading to unemployment and consumers are better off from it since they can choose from diversified goods with comparative prices. Our model shows that Firm 1 considers the R&D outsourcing as new opportunities for enlarging market shares and reducing production costs. The recent results of two surveys supported our theoretical model. Specifically, we also find that the current business environment in Vietnam has not fully met the criteria for choosing preferred destination of capital inflows from offshore and R&D outsourcing. Therefore, the Vietnamese government should improve the business environment to attract more international outsourcing and encourage cooperative R&D projects in Vietnam■

Figure 2: The Preferred Location for Shared Services Center



Source: KPMG Pulse Survey: Shared Services and Outsourcing in China, 2010

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