Research Article

A Model for Determining Expected Revenues within Strategic Alliances

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Abstract

The paper describes a model that calculates the expected revenues as a result of the development of new products within strategic alliances. By using the new updated "return on sales" formula, the partners will have the opportunity to find out their expected revenues ($V_{i;n}$). To this end, firms need to be aware of the total costs that one company needs to allocate in order to develop the group of products in collaboration with its partners. Moreover, they need to know the costs allocated by all of the companies together in order to develop a certain product from the group of products. Due to this fact, by calculating the expected revenues, the firms can figure out the product quantities that belong to each of them according to their previous investments.

Keywords: strategic alliances, expected revenues, R&D, ROS

Introduction

The main goal of the strategic alliances is to create growth conditions for the companies on the market. DePamphilis (2015) considered that the role of the partner remains essential within a strategic alliance. If the firms pursue common growth objectives on the market, the partner will offer a source of new information, it will be an assistant needed for developing new products and it will provide the support for continuous development initiatives and perspectives for the other collaborating companies. Pooling resources, information, know-how, technologies as well as allocating significant amounts of money for research and development could represent sources for gaining a step ahead of the competitors, increasing customer loyalty as well as attracting new clients by satisfying their continuously changing needs. Investments in research and development (R&D) (Owen and Yawson, 2015), implementing all of the proposed activities, fulfilling the established objectives, carrying out persuading actions on clients' needs, as well as a proper management of decisions, resources and time could contribute to the maintenance of the partnership's equilibrium. The company may choose its strategic alliance by knowing and being aware of its own competitive

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advantages on the market and its continuous need for standing out on the market (Brouthers et al 1995). If we were to adapt Marcio Barrios's saying "ambition is the perfect ally of the winner", to the economic world, it would mean that a firm's ambition represents an essential item for its own development. The firm's constant flow of motivation and the acceptance of the idea of collaboration with another firm enable it to achieve its desired objectives, surpass its condition as an individual entity on the market and reach high performance by achieving a leading position on the market and obtaining the proposed results regarding sales.

Strategic Alliances

Twarowska and Kakol (2013) had quoted Campbell E. and Reurer J.J (2001) in their paper. They believe that "a strategic alliance represents a cooperative arrangement between firms that targets the research, the establishment of joint ventures or the participation with minor capital". They argue that: "strategic alliances are often encountered between companies from strongly industrialized countries; the purpose of strategic alliances is based on the development of new products and technologies on a short period of time". Even though it is difficult to quantify the joint ventures' contribution to the Gross Domestic Product, it cannot be questioned that the interest of the firms for these types of alliances is continuously growing. According to the economists Chen and Ross (2003), the variety of these types of agreements appears due to the firms' interest for alliances in order to trade and distribute common products, as well as alliances for sharing production capacity (aeronautics industry), technical information exchange agreements, research and development projects.

The establishment of a joint venture consists in a bipolar process by the use of which firms share all types of resources in order to develop a product on a market. In their analysis, economists Chen Z. and Ross T. (2003) develop a pricing strategy for the new

company founded by two competing mother companies. They also calculate the impact of the strategy on the downstream chain on the market. The results of the analysis shape the fact that establishing a joint venture is the equivalent of a complete merger between two mother companies because it has an impact on prices, final production and costs. The effect on the market's efficiency will depend on the degree to which the economies of scale compensate the reduced level of competition between the partners. Likewise, another result of the analysis shapes the fact that a firm prefers to enter a new market with the help of an established operator that is vertically integrated, and set up a joint venture agreement, instead of establishing its own supply source. This would lead to low prices and high profits for both the operator and the firm. Furthermore, if the mother firms adopt different pricing strategies and different demand visions, they will have different preferences in case of a joint venture as well, when setting an optimal pricing strategy.

This different approach on prices might generate tension between partners. Therefore, the method for harmonizing the interests regarding the price, that the two economists have developed, is based on adjusting the property shares in a way that if one of the companies has a larger property quota (share) it will be interested in lower prices, and the other firm, holding a smaller property share will choose the higher prices. This case is valid only in the situation where the firms are using similar products. In order to surpass the barriers to entry imposed by the competition on the market, the development of new products remains essential for the firms. Overall, the company itself establishes the lifetime cycle of a firm.

The growth strategies on the market represent one of the most important framework subjects in business literature. In their paper, Romero-Merino and García-Manjón (2012) quote Geroski (1995) and Sutton (1997) who associate the growth on the market with the guarantee of the firm's

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survival as well as with the establishment of economies of scale. Therewith, Geroski (1995) argued the fact that "the entry (on the market) is easy but the survival isn't". This means that if a firm enters a certain market, it faces the situation of keeping pace with the customers/clients' requests as well as with the competition on the market. In my opinion, I think that a "beginner" on the market, that has no perspective in innovation, research and development or openness towards strategic alliances with other companies, will find it hard to grow on its own simultaneously with its adversaries. Pooling resources and sharing know-how may lead to successful synergies that may provide substantial revenues for the actors involved. Thus, Romero-Merino and García-Manjón (2012) reveal the fact that there is a positive effect of the research and development intensity upon the partners' sales growth. The authors have developed regressions and system estimators for a sample of 754 European firms for a period of 4 years, between 2003 and 2007. They have found a strong correlation between the research and development (R&D) domain and the high-tech sectors.

Frankort's paper (2016) is centered on describing the knowledge achieved through to R&D alliances. In addition, he analyses the R&D alliances that offer the possibility for firms to apply their acquired technological knowledge for the development of new products. The author emphasizes the fact that the development benefits of the new product will increase if the actors of the partnership activate on similar technological sectors and will decrease if they are active on similar product markets. Likewise, Frankort (2016) quotes Hagedoorn (1993) who thinks that the research and development alliances are official agreements that allow the firms to conduct common research and development activities with the help of new technologies, products and processes on the market. In their paper, Mowery et al (1996) examine the inter-firm transfer of knowledge in a strategic alliance. According to Jagersma (2005), the exchange of technology remains a major objective for many strategic collaboration agreements. It is well known that technological innovations are rather rare among firms that hold limited resources; therefore these companies will opt for resort to other market actors in order to increase the life cycle of their products and the survival of the firm on the market, by fulfilling the innovative and competitive objectives. Besides the numerous advantages listed above, strategic alliances also involve disadvantages that could further expose the firm to risks. Thus, Grant and Baden-Fuller (2004) consider the strategic alliances to have a significant disadvantage regarding the "risk of competitive collaboration". In this case, the actual intentions of the companies involved in the alliance are being hidden. Thereby, there is a risk that a partner could try to use the entire alliance with the purpose to achieve an advantage over the other partners. According to the economists Camino and Trecu (1996), a strategic alliance is "an emerging form of international business organization (...), a species of joint venture in which an innovation of technology contracts with another firm for the joint exploitation of technology and other assets across a number of national territories". Strategic alliances remain complex collaboration agreements established between partners with multiple characteristics that can create R&D alliances (Li et al 2008), joint ventures (Inkpen and Currall, 2004), international alliances (Oxley and Sampson, 2004) as well as other forms or organization.

According to Albers et al (2016), there are three criteria on which different types of strategic alliances are being set: activity-domain-based (this criterion focuses on the different tasks that partners are specialized in and that they carry out in the alliance <<R&D, marketing, production, sales>>); partner-characteristics-based (it focuses on the characteristics of the firms involved in the alliance or on the relevant position within the value chain of their industry), alliance-structure-based (it focuses on the

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way that relations between partners are being organized and managed).

Methodology

The aim of the quantitative instrument $V_{i;n}$ is to calculate the expected revenues resulted from the development of new products within strategic alliances. Thus, $V_{i;n}$ can be applied to the alliances/collaboration, cooperation or partnership agreements created by three firms that unite their strengths in order to develop new products on the market. The partners should adopt the same pricing strategy for each product "i" on the market. Due to this fact, by calculating the expected revenue, we can find out the product quantities that belong to each company after the investments allocation.

I consider the quantitative instrument ($V_{i;n}$) to be a method for calculating the expected revenue that every company receives within a strategic alliance/collaboration or cooperation agreement /partnership

agreement. $V_{i;n}$ is based on the total costs allocated by company "n" for product "i" after calculating the adjustment of the initial costs and the new value of the return on sales (ROS$_{i;n}$). The companies need to start by calculating the total costs that one firm needs to allocate in order to develop the group of products 1...n, and the costs allocated by all the companies together in order to develop a product "i" from the group of products 1...n.

With the help of this instrument, we can determine the equitable profit ($\pi_{i;n}$) for the companies within the alliance. In other words, based on the method for calculating the new value of ROS, the partners will have the opportunity to calculate their expected revenues. Moreover, the firms will have the possibility to calculate the profit that is assigned to them.

As known, the ROS formula represents the ratio between a firm's profit and its revenue. By processing the formula, I have extracted the firm's revenue depending on ROS (1).

$$ROS = \frac{Profit}{Revenue} = \frac{Total\ Revenue - Total\ Cost}{Total\ Cost} = \frac{p*Q - [Fixed\ Cost + Q*Variable\ Cost]}{p*Q} =>$$
$$=> p*Q = \frac{Total\ Cost}{1-ROS} = V, \text{where} \tag{1}$$

p = price;
Q= quantity;
ROS = return on sales;
V = revenue.

By processing the general ROS formula, I will consider $V_{i;n}$ to be the ratio between the total costs allocated by company "n" for product "i" after calculating the adjustment of initial costs and the new value ROS$_{i;n}$ that is assigned to every company "n" for a product "i".

$$V_{i;n} = P_{i;n}*Q_{i;n} = \frac{Ct_{i;n}}{1-ROS_{i;n}}, \text{where} \tag{2}$$

i = product; n = company;

$V_{i;n}$= expected revenues resulted from the development of new products within strategic alliances;
$Ct_{i;n}$= total costs allocated by company "n" for product "i" after calculating the adjustment of initial costs.

$$Ct_{i;n} = (C_{i;n} - difN_{i;n})) * P\%_{i;n}, \text{where} \tag{3}$$

C$_{i;n}$ = initial cost of company "n" for product "i" calculated depending on the total cost of product "i";
P%$_{i;n}$ = initial indicative percentage negotiated by the partner firms.

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$$difN_{i;n} = (\sum C_{i;n} - C_{f_p}) * P\%_{i;n} \text{ with two cases described below:} \tag{4}$$

I) If $\sum C_{i:k} - C_{f_p} > 0$ and $\sum C_{i:l} - C_{f_p} > 0$ and $\sum C_{i;m} - C_{f_p} < 0$ then we will calculate the following:
$difN_{i;k} + difN_{i;l} = - difN_{i;m}$ where k, l, m = companies; i = product;

II) If $\sum C_{i:k} - C_{f_p} < 0$ and $\sum C_{i:l} - C_{f_p} < 0$ and $\sum C_{i;m} - C_{f_p} > 0$ then we will calculate the following:
$-(difN_{i;k} + difN_{i;l}) = difN_{i;m}$ where "k"," l", "m" – companies;"i" – product;

C_{f_p} = the mandatory cost set according to the negotiation;
$difN_{i;n}$ =The total surplus/deficit per company;
$ROS_{i;n}$ = the new value of the return on sales for each company;

$$ROS_{i;n} = Pc_{i;n} * Pp_{i;n}, \text{ where} \tag{5}$$

$Pc_{i;n}$= the percentage that is calculated depending on $Ct_{i;n}$; it represents the cost percentage of company "n" depending on its total costs;

$Pp_{i;n}$ = the percentage that is calculated depending on $Ct_{\overline{1,..i}}$; it represents the cost percentage of company "n" depending on the total costs of product "i";

$$Pp_{i;n} = \frac{Ct_{i;n}}{Cp_i} = \frac{(C_{i;n} - difN_{i;n})) * P\%_{i;n}}{Cp_i}, \text{ where} \tag{6}$$

Cp_i = the total cost of product "i";

$$Pc_{i;n} = \frac{\sum_n^1 \frac{(C_{i;n} - difN_{i;n}) * P\%_{i;n} * 100}{Cf_p}}{\sum n}, \text{ where} \tag{7}$$

$\sum n$= the number of companies within the strategic alliance/agreement/collaboration/cooperation. Replacing inside formula (2), the formulas (3), (5), (6), (7) we obtain the detailed version of formula $V_{i;n}$ (7):

$$V_{i;n} = \frac{Ct_{i;n}}{1 - ROS_{i;n}} = \frac{(C_{i;n} - difN_{i;n}) * P\%_{i;n}}{1 - Pc_{i;n} * Pp_{i;n}} = \frac{(C_{i;n} - difN_{i;n}) * P\%_{i;n}}{1 - \frac{(C_{i;n} - difN_{i;n}) * P\%_{i;n}}{Cp_i} * 100 * \frac{\sum_n^1 \frac{(C_{i;n} - difN_{i;n}) * P\%_{i;n} * 100}{Cf_p}}{n}} \tag{7}$$

Simulation

For the simulation, I chose three companies that wanted to develop three products on the market. The input values of the simulation are randomly given. Accordingly, company X, Y, Z team up (pooling resources, sharing know-how) in order to create a strategic alliance/collaboration/cooperation/partnership agreement for the development of three products A, B, C that require the following total costs: product A – Euro 1,200,000, product B – Euro 800,000, product C – Euro 400,000. Thus, the total cost of the group of products is Euro 2,400,000. The firms had assumed the costs for the development of the products. Each company will comply with the initial indicative percentage negotiated by the partner firms in order to calculate the new value of $ROS_{i;n}$. As mentioned above, the companies will comply with the same mandatory cost established within the negotiation in order to develop products A, B, C. In the analyzed case, we consider C_{f_p}= Euro 800,000. Thus, the values of $P\%_{i;n}$ are presented in Table 1:

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Table 1: The Initial Indicative Percentage Established Throughout the Negotiation

i	$P\%_{i;x}$	$P\%_{i;y}$	$P\%_{i;z}$	Cp_i
A	50%	30%	20%	1,200,000
B	30%	60%	10%	800,000
C	20%	10%	70%	400,000

Source: Made by the author

First, we will calculate the costs of the products $C_{i;n}$ for each company X, Y, Z (Table 2):

Table 2: Product costs for each company

i	$P\%_{i;x}$	$C_{i;x}$	$P\%_{i;y}$	$C_{i;y}$	$P\%_{i;z}$	$C_{i;z}$
A	50%	600,000	30%	360,000	20%	240,000
B	30%	240,000	60%	480,000	10%	80,000
C	20%	80,000	10%	40,000	70%	280,000

*It can be noticed that C_{f_p}= Euro 800,000 is not respected.
Source: Made by the author

Adding up the values on each $C_{i;n}$ column, I have achieved the results in Table 3:

Table 3: Total product costs for each company

$\sum C_{A,B,C;x}$	$\sum C_{A,B,C;y}$	$\sum C_{A,B,C;z}$
920,000*	360,000*	240,000*

* It can be noticed that the total cost is maintained and its value is Euro 2,400,000
Source: Made by the author

Further, I have calculated $dif N_{i;n}$ (the total surplus/deficit per company) using the formula $(\sum C_{i;n} - C_{f_p}) * P\%_{i;n}$. The results achieved in the analyzed case show the fact that there is a surplus recorded by companies X and Y, and company Z records a deficit of Euro 200,000.

Table 4: Total surplus/deficit per company

	X	Y	Z
$\sum C_{i;n}$	920,000	880,000	600,000
C_{f_p}	800,000	800,000	800,000
$dif N_{i;n}$	(+)120,000	(+)80,000	(-)200,000

Source: Made by the author

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The differences obtained for each product per company will be allocated according to $P\%_{i;n}$. The new allocation can be observed in .

Table 5. For company "Z" we will apply case II: $-(difN_{i;k} + difN_{i;l})= difN_{i;m}$

Table 5: The new allocation $difX_{i;n}$, $difY_{i;n}$, $difZ_{i;n}$

	$difX_{i;n} = (\sum C_{i;n} - C_{f_p})$ * $P\%_{i;n}$	$difY_{i;n} = (\sum C_{i;n} - C_{f_p})$ * $P\%_{i;n}$	$difZ_{i;n} = - (difX_{i;n} + difY_{i;n})$
$difX_{i;n}$	+ 60,000	+ 24,000	-84,000
$difX_{i;n}$	+ 36,000	+ 48,000	-84,000
$difX_{i;n}$	+ 24,000	+ 8,000	-32,000
$\sum difN_{i;n}$	+120,000	+80,000	-200,000

Source: Made by the author

The values of Table 5 will be subtracted from the values of Table 2; the new results are found in Table 6:

Table 6: Total costs allocated by the company after the adjustment

	$Ct_{i;n}$	$Ct_{i;n}$	$Ct_{i;n}$	Cp_i
A	540,000	336,000	324,000	1,200,000
B	204,000	432,000	164,000	800,000
C	56,000	32,000	312,000	400,000
C_{f_p}	800,000	800,000	800,000	2,400,000

Source: Made by the author

The cost percentages of company "n" depending on its total costs and the cost percentages of company "n" depending on the total costs of product "i" are different as shown in Table 7:

Table 7: $Pc_{i;n}$ and $Pp_{i;n}$

i	X		Y		Z		(%)
	$Pc_{i;x}$	$Pp_{i;x}$	$Pc_{i;y}$	$Pp_{i;y}$	$Pc_{i;z}$	$Pp_{i;z}$	
A	68%		42%		41%		
		45%		28%		27%	100%
B*	26%		54%		21%		
		26%		54%		21%	100%
C	7%		4%		39%		
		14%		8%		78%	100%
(%)	100%		100%		100%		

*We obtained the same percentages for product B because the Cp_i values are equal to C_{f_p} values.
Source: Made by the author

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After calculating the arithmetical average of the percentages of product "i", I have obtained: $Pc_{A;n}$ = 50,3%, $Pc_{B;n}$ = 33,7% and $Pc_{C;n}$ =16,7%. Therefore, the new ROS values are detailed in the table below, (Table 8):

Table 8: The new ROS values

i	$ROS_{i;x}$	$ROS_{i;y}$	$ROS_{i;z}$
A	0.226	0.140	0.136
B	0.087	0.182	0.070
C	0.023	0.013	0.130

Source: Made by the author

Thus, in order to achieve an equitable allocation, the companies will use the same selling price for each product "i", therefore ($P_{A;X}$= P_A;Y=$P_{A;z}$ and $Q_{A;X} \neq Q_{A;Y} \neq Q_{A;Z}$):

Table 8: the expected revenues resulted from the development of products a, B, C

i	$V_{i;x}$	$V_{i;y}$	$V_{i;z}$	$V_{i;n}$
A	697,674.42	390,697.67	375,000	1,463,372.09
B	223,439.21	528,117.36	176,344.09	927,900.66
C	57,318.32	32,421.48	358,620.69	448,360.49
	978,431.95	951,236.51	909,964.78	

Source: Made by the author

Table 9 reflects the equitable profit for each company.

Table 9: The values of the equitable profit $\pi_{i;n}$ for the companies X, Y, Z

i	$\pi_{i;x}$	$\pi_{i;y}$	$\pi_{i;z}$
A	157,674.42	54,697.67	51,000.00
B	19,439.21	96,117.36	12,344.09
C	1,318.32	421.48	46,620.69
	178,431.95	151,236.51	109,964.78

Source: Made by the author

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For a total investment of Euro 2,400,000, the firms obtain a total profit of Euro 439,633.24, representing 18% of the total initial costs. The profit for each firm is differently scattered, so for firm X the equitable profit records Euro 178,431.95 Euro, firm Y the equitable profit records Euro 151,236.51, firm Z the equitable profit records Euro 109,964.78. To conclude, the simulation reveals the fact that if a company invests in a product with higher costs, it will get higher profits than the other partners within the strategic alliance.

Conclusion

As known, a successful collaboration may generate great profits compared to the case in which the firm would operate on its own on the market alongside its other direct competitors. Therefore, it is important for the firm to keep its openness to a future collaboration or cooperation with its main rivals in order to develop new products.

As mentioned above, the paper keeps in attention the use of a quantitative instrument $V_{i;n}$, which helps calculate the expected revenues resulted from the development of new products within strategic alliances. One of the constraints of this research is that the instrument can be applied only for a few range of firms, namely three of them within alliances/collaboration, cooperation or partnership agreements. In order for the effect described in the paper to take place, the partners should adopt the same pricing strategy for each product "i" on the market; only the product quantities will depend on the new ROS value. Due to this fact, by calculating the expected revenues, the firms can find out the product quantities that belong to each of them after the investments allocation.

As highlighted above, the detailed simulation reveals the fact that if a company invests in a product with higher costs, it will get higher profits than the other partners within the strategic alliance.

In business, the constant need for innovation and the tendency for research and development ensure the economic growth for a company on the market. Pooling resources, sharing know-how and maintaining the desire for achieving the established goals, can be considered factors for founding new agreements with a suitable partner in order to rein the competition and extend the life cycle of the firm. By having a partner on their side, firms can become more confident about their actions on the market. In my opinion, even if the openness towards a partner might be interpreted as a risky exposure for a firm on the market, this may represent a step forward regarding awareness. In addition, the risky exposure can be rooted out by vigorous terms stipulated in the contract agreement.

In conclusion, the firm's constant flow of motivation and the acceptance of the idea of collaborating with another firm enable it to achieve its desired objectives, surpass its condition as an individual entity on the market and reach high performance by achieving a leading position on the market and obtaining the proposed amount of sales.

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