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Supply Chain Management and Its Influence on the Performance of Pharmaceutical Companies

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ABSTRACT
This study aims to investigate the trends in supply chain management for analyzing the performance of pharmaceutical companies in Thailand. Supply chain management is reflected through SCM1 which indicates the supply chain production flexibility as measured through five items, whereas SCM2 represents the supply chain sourcing flexibility as observed through five items too. For measuring the business performance, three items were added in the study. For the data collection purpose, we have focused on the questionnaire survey technique based on the stated items of both supply chain dimension and performance measures too. Overall data is recorded through a scaling method of five points, where one shows strongly disagree and five shows strongly agree about a particular statement. A sample of 247 respondents of different suppliers and key individuals who were somehow engage with supply chain of pharmaceutical companies were targeted for the data collection. Additionally, our results have considered the age, gender, and working experience as main demographic factors. For data analysis, descriptive results through frequency distribution of the respondents and cross tabulation of the demographic factors were provided and explained. In addition, our study has observed the factors loadings through confirmatory factor analysis for checking the internal reliability of each of the item, whereas overall conceptual framework is observed through structural equation modelling. Results of the study show that there is a significant and positive impact of supply chain production flexibility and supply chain sourcing flexibility on the performance measures of pharmaceutical companies as working in Thailand. As per originality, it was found that very little research has expatriate the supply chain flexibly in terms of production and outsourcing as a performance determinants of pharma industry were observed. Therefore, it is stated that present research is a significant contribution in the literature for various stakeholders. However, future studies may incorporate the other supply chain dynamics like postponement flexibility, key types of the suppliers (Captain category and secondary suppliers) for examining the business performance in pharma sector.

Keywords: supply chain flexibility, outsourcing, production, business performance, Thailand.

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INTRODUCTION: A THEORETICAL SIGNIFICANCE OF SUPPLY CHAIN

In the most economical way, supply chain management or more precisely SCM is the array of actions for plan, control and get product from materials to production, and finally to distribution [1-3]. Integrated planning and performance of procedure is essential to improve the flow of materials, data and capital; therefore, they are included under the shadow of SCM [4, 5].More Widely, SCM covers the sourcing, production, inventory management, demand planning and logistic / transportation and storage of the various type of business catalogues [6-8]. To make a competitive advantages over the rivals, companies utilize both specific software and business plan to develop an overall structure for efficient supply chain management practices both in local and international environment [9-11].

However, it is also believed that supply chain management is costly and complicated task that depends upon each partner from supplier to manufactures [12]. Due to this reason, to make the arrangement and communication between all the members, the effective supply chain requisites [13], the change management [14], and risk management [15] are needed to integrate with each other. Additionally, environmental, social, and legal issues includes in supply chain are also observed with the title of sustainability. For the business organizations, there are many advantages of supply chain management such as new competences, lower cost, and high profit [16, 17]. Due to SCM, companies accomplish an overall well market demand, dealing with disturbances, and carry the right amount of portfolio, keeping the cost to a minimal level and fulfillment of customer plea in most effective way. To manage the rising difficulty of current supply chains, the merits of SCM are gained by selecting effective policies and proper software in the contemporary market [18, 19]. Customer facilities can be recovered by undertaking the different dynamics of supply chain management. By making specific, the important products are presented at exact area with an accurate time with the capability to certify the customer satisfaction.

Additionally, by minimizing operating cost, SCM has main benefit for companies either working in any market [20]. The cost of purchasing, production, and total supply chain can be minimized by SCM practices. Business firms also gain good market position with better earnings while focusing more on integrated supply chain [21]. Meanwhile, SCM activities reduce the misuse of large fixed asset like warehouses and automobiles. Besides, supply chain specialists rebuilt their system, for example, with the help of decreasing the cost of owing extra services and through operating a greater number of warehouses [22].

SCM play a vital role in society. By recovering healthcare, defending people from atmospheric dissipations and sustaining life, SCM can ensure human existence. Due to supply necessities like food and water as well as medicines and health protection, humans believe more on supply chain of various necessities in day to day life [23]. Supply chain is also necessary to provide the energy required for light, heat, air conditioning and also refrigeration and supplying the electricity to homes and businesses as well [24]. SCM plays a very important role by promoting job creation, improving standards of living and providing a base for economic development. Many job opportunities are provided by SCM in the society along with tending warehousing, packaging, inventory control and logistics [25, 26]. Moreover, deficiency of developed supply chains is the

main feature of most poor nations. Through developing a strong supply chain infrastructures like large railroads systems, arrangements of airports, seaports, and regional highway networks, nations can properly exchange goods at lower costs. In addition, by providing economic development and increasing the standard of living, it allows the customer to purchase high quality products with some competitive prices too [27].

PERFORMANCE MANAGEMENT

The keystone of management research is the effective performance measures with their ultimate influence on the business. Undisputed concept of performance management system is main function of rational and efficient corporate sectors. Experts and academics discuss the best method suited to corporation regarding the business performance and its measurement. Stakeholders and shareholders models of organization and organizational control are design to support and criticize specific performance measures [28].The advantages of financial and non-financial performance assessment are also widely explored in the literature. By utilizing the reviews of 'perception' of success, assessment of performance evaluation system is also practiced and observed in the literature [29]. In addition, various research studies have targeted both financial and non-financial performance measures. However, financial measures are under more consideration because of their global significance and easy understanding about the business trend over time [30].

SUPPLY CHAIN AND PHARMACEUTICAL INDUSTRY: AN OVERVIEW

In the modern pharmaceutical supply chain, to develop and endure an economical benefit, it is challenging for an organization to progress and endure a competitive improvement of supply chain management. Trading partners in the pharmaceutical industry have shared a mutual 'world view', specifying the benefit for both the business firm and their key partners as well. In the pharmaceutical activities, several agencies are involved and accepted under the title of supply chain partners. From a variety of perspectives like risk management, strategic management, and strategic resilience management, supply chain disturbance research has been covered in different areas of the pharma industry as well. Increases supply chain susceptibility, financial resources and multiple interfaces have to be integrated like flow of goods and information. This concept is also implemented in the pharma industry where manufacturer of different drugs are directly linked with the different agencies to collect the news about latest trends and issues in the health care sector.

In addition, the countries like India and china are enjoying a positive cost benefits due to increasing trend in manufacturing and outsourcing of production of medicines. This has provided these countries with an overall supply chain efficiencies not only for their suppliers but also for the other business partners too. To improve drug supply monitoring efforts have actually provided some significant output to these states. On the other hand, due to the structure of the pharmaceutical chain and complex nature of regulatory measures, it is now a complex phenomenon to compete the global pharmaceutical industry. To more cost-effective market, different sellers of pharma products have adopted different supply chain models which are found as an effective tool.

VARIABLES AND RESEARCH METHODS

This study has selected two title of supply chain dynamics for the research objective. The first one is SCM1 which indicates the supply chain production flexibility as measured through five items named as SCM1 and further reflected through SCPC1 (developing many new products on yearly basis), SCPC2 (performing multiple design for the products), SCPC3 (handling various projects for new product development), SCPC4 (managing time and cost for new products), and SCPC5 (modifying features for existing products). Whereas SCM2 represents the supply chain sourcing flexibility as observed through five items; SCSF1(operating efficiency at different level), SCSF2 (relationship with the supplier for changing environment), SCSF3(supplier is coping with changing environment), SCSF4(supplier is coping with changing product variety), and SCF5(supplier is dealing with immediate changing schedules).on the other hand, business performance is measured through three sub items; BPER1 (profit growth), BPER2(sales growth), BPER3 (assets growth) respectively. All of these items were observed through five points scales where 1 refers to ass strongly disagree to 5=strongly agree about the stated responses. Meanwhile, our study has added the demographic factors like age of the respondents, gender of the respondents and their working experience respectively.

For the analysis purpose, descriptive results through percentage of the responses, data collected through per likert scale responses, demographic factors through cross tabulation and factors loadings were provided. After the factor loadings, a structural model was developed where SCM1 and SCM2 are main latent but exogenous variables, and business performance is main dependent or endogenous variable is accepted. The results are provided in the subsequent section.

RESULTS AND DISCUSSION

For the distribution of relative frequency along with the percentage of each of the scales, results are integrated in second table of this research. It is found that overall 70 and 81 respondents with the percentage of 28.3 and 32.8 percent have shown the agree and strongly agree response on the likert scale.

SCPC2 the trends for the frequency distribution is observed as 22.3 percent and 17.4 percent for the agree and strongly agree. Whereas 26.3 percent of the respondents have shown their response on the likert scale of neither agree nor disagree/neutral. Meanwhile, for SCPC3,SCPC4, and SCPC5, the mean trend in the data set is found as 26.7 for the neutral cases, 17 percent for the agree, and 18.2 percent for strongly agree. On the other hand, 30.8 percent and 19.8 percent have indicated their response with the value of 24.7 percent and 15.8 percent respectively.

In addition, SCF1 and SCF2 overall frequency distribution and percentage score for the five points of likert scale have provided the evidence for the mixed findings. Lastly, the factors for the business performance are presented through three items like BPER1, BPER2 and finally BPER3 respectively. It is observed that overall above the mean trend score for BPER1 is 68 for agree, and 39 as strongly agree. Similarly, for BPER2, overall findings for the strongly agree is presented through a score of 27.5 percent and 15.8 percent. In the end, BPER3 is covered through a score of 30 percent or 74 individuals for the agree and 17 percent or 42 individuals are providing a score for the strongly agree. Figure 1 indicates the frequency distribution for each of the response along with the relative percentage of each item for the supply chain and firm performance in pharmaceutical companies of Thailand.

TABLE 1. Frequency Distribution of the Responses

name of Items	Descriptive Measures	strongly disagree	Disagree	neither agree nor disagree	agree	strongly agree
SCPC1	Frequency	19	35	42	70	81
	Percent	7.7	14.2	17.0	28.3	32.8
SCPC2	Frequency	34	50	65	55	43
	Percent	13.8	20.2	26.3	22.3	17.4
SCPC3	Frequency	46	48	66	42	45
	Percent	18.6	19.4	26.7	17.0	18.2
SCPC4	Frequency	20	45	57	76	49
	Percent	8.1	18.2	23.1	30.8	19.8
SCPC5	Frequency	40	56	51	61	39
	Percent	16.2	22.7	20.6	24.7	15.8
SCSF1	Frequency	27	27	64	78	51
	Percent	10.9	10.9	25.9	31.6	20.6
SCSF2	Frequency	15	32	71	77	52
	Percent	6.1	13.0	28.7	31.2	21.1
SCSF3	Frequency	72	45	60	33	37
	Percent	29.1	18.2	24.3	13.4	15.0
SCSF4	Frequency	43	40	72	56	36
	Percent	17.4	16.2	29.1	22.7	14.6
SCSF5	Frequency	34	46	55	73	39
	Percent	13.8	18.6	22.3	29.6	15.8
BPER1	Frequency	24	43	60	72	48
	Percent	9.7	17.4	24.3	29.1	19.4
BPER2	Frequency	38	42	60	68	39
	Percent	15.4	17.0	24.3	27.5	15.8
BPER3	Frequency	30	33	68	74	42
	Percent	12.1	13.4	27.5	30.0	17.0

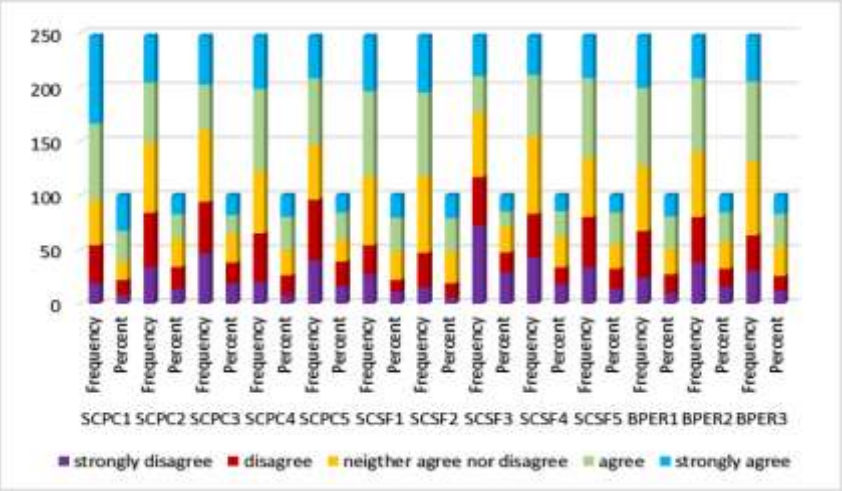

FIGURE 1. Frequency distribution and percentage for Each Item

Source: Researchers

After the discussion for the relative responses of each of the item entitled under supply chain and business performance, Table 2 has shown the cross tabulation for the demographic characteristics of the study. Our research has integrated the gender factor, working experience, and age groups of different respondents as observed under present study. It is explained that total 22 male members are those who have a working experience of 0-1 years, while 29 are those who have a working profile of 0-1 years. Meanwhile, in terms of age distribution, 20-25 years of age has covered 23 respondents, 26-30 with 6 respondents, 31-35 with total 14 respondents from both of the genders, 36-40 years of 3 respondents, while above 40 there are 5 respondents who are in the working experience of 0-1 years. For the working experience of 1-3 years, it is observed that the cross tabulation for the male member is 7 and for the female is 3, covering the age profile of 20-25 years. Meanwhile, for the age profile of 26-30 years, it is accepted that total 5 members are the male while 14 are the females. Similar distributional criteria is found while dealing with the other age groups. For the working experience of 3 years and up to 5 years, our study has reflected that total 27 are the males, and 25 are the females under present study analysis. Additionally, those respondents who are falling in the working profile of 5-7 years have shown a total number of 23 and 25 for both of the genders respectively. Our results have revealed the further findings that for greater than 7 years a limited number of both genders where found. More specifically, only 21 are the males and 20 are the females which are getting a work related experience of greater than 7 years. Overall, our research has provided the evidence that there are 119 male and 128 female members which are targeted as main respondents under this research for the purpose of data collection.

TABLE 2: GENDER * AGE * EXPER Crosstabulation

EXPER			AGE					Total
			20-25	26-30	31-35	36-40	above 40	
0-1	GENDER	Male	10	3	7	1	1	22
		female	13	3	7	2	4	29
	Total		23	6	14	3	5	51
>1 and Up to 3	GENDER	Male	7	5	11	2	1	26
		female	3	14	8	3	1	29
	Total		10	19	19	5	2	55
>3 and up to 5	GENDER	Male	4	3	11	3	6	27
		female	4	6	8	5	2	25
	Total		8	9	19	8	8	52
>5 and up to 7	GENDER	Male	2	8	5	4	4	23
		female	1	2	6	11	5	25
	Total		3	10	11	15	9	48
>7	GENDER	Male	3	2	3	3	10	21
		female	1	1	5	2	11	20
	Total		4	3	8	5	21	41
Total	GENDER	Male	26	21	37	13	22	119
		female	22	26	34	23	23	128
	Total		48	47	71	36	45	247

Furthermore, our research has provided the findings for the factor loadings known as confirmatory factor analysis or CFA, providing the individual reliability of each item, being observed in this research. As expressed earlier SCM1 and SCM2 both are reflected with the five items under each where error terms from e1 to e5 are attached with the SCPC1 to SCPC5, and e6 to e10 are linked with the SCM2 factors. Figure 2 is providing an overview for the input measurement diagram for CFA as observed in this research.

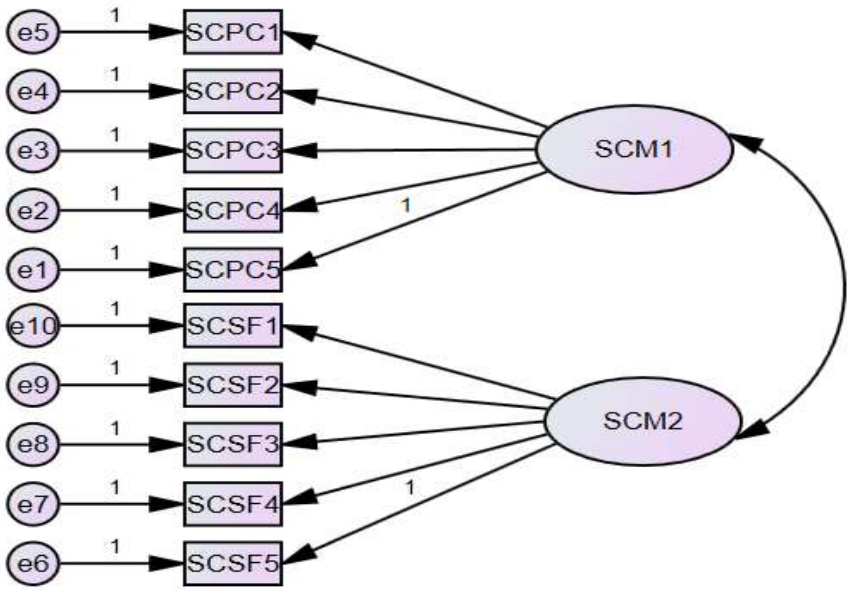

FIGURE 2: Factor Analysis Measurement Model

Source: Researchers

Based on the figure 3, following results are found through SPSS-AMOS 22. Details are as follow:

SCPC1 has a factor loading of .68, SCPC2 has a factor loading of .82, SCPC3 has a factor loading of .69 SCPC4 has a factor loading of .72, SCP5 has a factor loading of .69, SCSF1 has a factor loading of .66, SCSF2 has a factor loading of .78, SCSF3 has a factor loading of .76, SCSF4 has a factor loading of .77, SCSF5 has a factor loading of .79. All these results have shown the evidence that there is no problem for the internal consistency of our measurement model, hence all items have their individual significance. Following by the same approach, business performance is observed as main endogenous variable for which Figure 5 is providing its structural input layout. It shows the three items. For their relative loadings of each item, Figure 6 is very helpful. Our results have indicated a good trend for the factor loadings in all three items of business performance. As per the results for the factor loadings of business performance, BPER1 has a score of .69, BPER2 has a loading of .78, and BPER3 has a loading value of .77

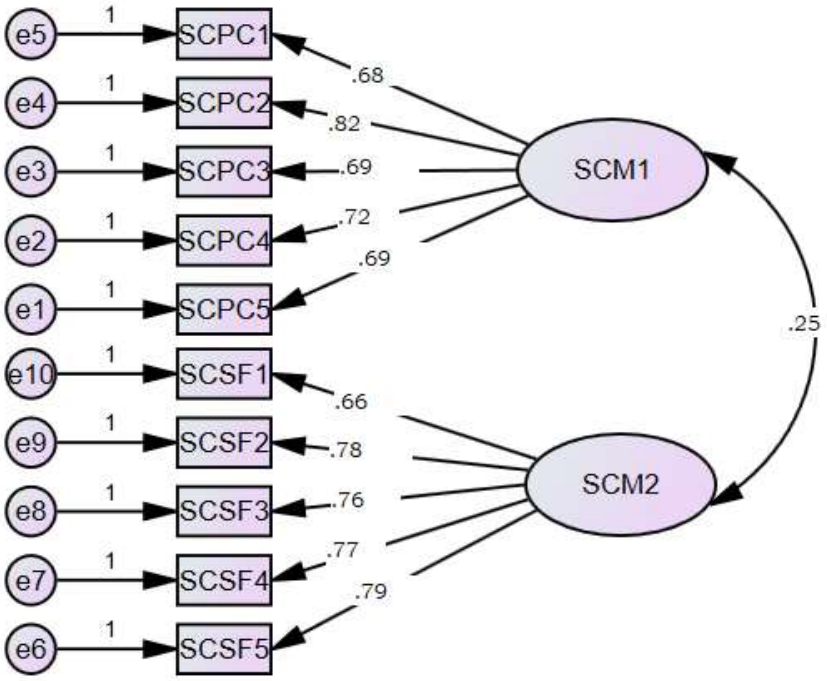

FIGURE 3: Factor loadings for the items of supply chain management

Source: Researchers

TABLE 3: Factor loadings as found through SPSS_AMOS-22.

Items	Direction	Variables	Estimate
SCPC5	<---	SCM1	.691
SCPC4	<---	SCM1	.720
SCPC3	<---	SCM1	.692
SCPC2	<---	SCM1	.821
SCPC1	<---	SCM1	.685
SCSF5	<---	SCM2	.795
SCSF4	<---	SCM2	.774
SCSF3	<---	SCM2	.761
SCSF2	<---	SCM2	.782
SCSF1	<---	SCM2	.662

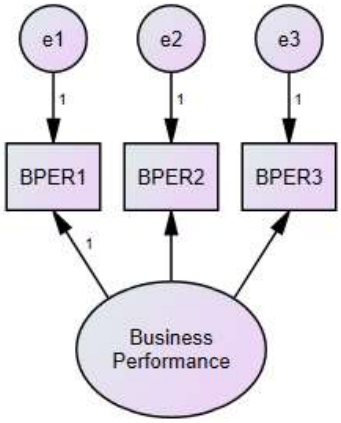

FIGURE 4: Input Model for the Factor loadings of Business Performance

Source: Researchers

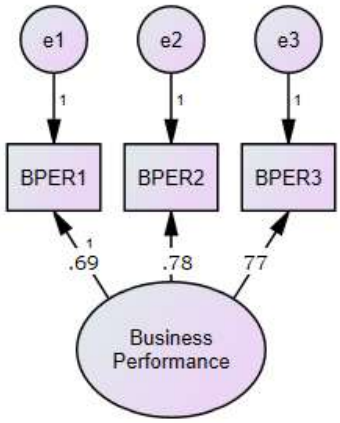

FIGURE 5: Factor Loadings for the business performance

Source: Researchers

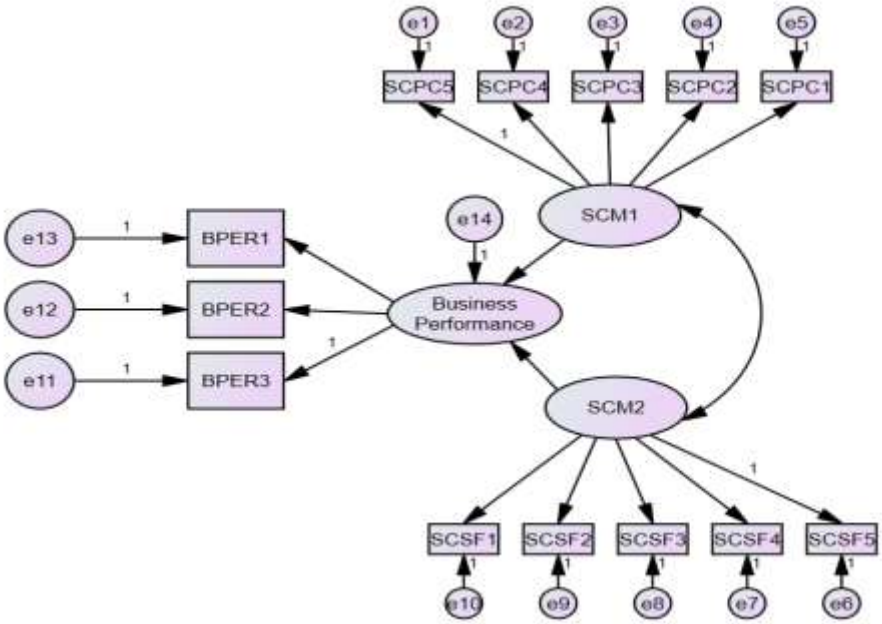

FIGURE 6: Input Path Diagram, covering the impact of supply chain on business performance

Source: Researchers

Figure 6 above reflects the relationship between the SCM1, SCM2 and their impact on the business performance in pharmaceutical industry of Thailand. It is also accepted that correlation is developed between SCM1 and SCM2 under full sample consideration, where individual regression weights for error terms along with the regression weight for SCSF5 and SCPC5 was also assigned. Our overall results for the measurement model under Figure 6 are presented in Table 4 which has tested the following null and alternative hypotheses

H0a: the impact of SCM1 on business performance is not statistically significant

H1: the impact of SCM1 on business performance is statistically significant

H0b: the impact of SCM2 on business performance is not statistically significant

H2: the impact of SCM2 on business performance is statistically significant

TABLE 4: Regression Weights: (Group number 1 - Default model)

Variables/items	Directions	Variables	Estimate	S.E.	C.R.	P
Business Performance	<---	SCM1	.502	.152	3.17	0.000
Business Performance	<---	SCM2	.344	.107	3.21	0.000

The results under Table 4 has provided the directional arrows which shows the nature of SCM1 and SCM2 as main exogenous variables are reflected under Figure 6. Additionally, the standardized regression coefficient is presented through estimated value of .502 and standard error of .152. It means that SCM1 has its positive influence in determining the business performance in the pharma industry of Thailand. This effect is further observed with the help of critical ration which is 3.17. This ratio is above 1.96, hence proved that the influence of SCM1 on business performance is statistically significant, therefore, H1 is supported with the help of above results.

In addition, our 2nd research hypotheses was tested with the help of output as provided in Table 4. The coefficient of SCM2 to business performance is .344 showing that unit change in SCM2 is positively affecting the business performance for pharmaceutical industry in Thailand. This effect is further supported through lower standard error of .107 which has provided a critical ration of 3.21. This means that there is a positive and significant impact of SCM2 on business performance in the pharmaceutical industry of Thailand. So, our study has accepted the 2nd research hypotheses which is earlier explained.

CONCLUSION, LIMITATIONS AND FUTURE PATH OF THE RESEARCH

This study has observed the supply chain dynamics as measured through production flexibility and sourcing flexibility in examining the business performance for the pharmaceutical companies as working in Thailand. For the targeting the desired respondents, primary data was collected and empirically results are provided through both descriptive and inferential statistical techniques. Descriptive results have provided an initial understanding of the responses, while structural equation modelling results have proven the fact that both SCM1 and SCM2 are positively and significantly impacting on the business performance in a sense that higher supply chain management practices will

lead towards more business performance in the form of growth by all three means. As per originality, it was found that very little research has expatriate the supply chain flexibly in terms of production and outsourcing as a performance determinants of pharma industry were observed. Therefore, it is stated that present research is a significant contribution in the literature for various stakeholders. However, future studies may incorporate the other supply chain dynamics like postponement flexibility, key types of the suppliers (Captain category and secondary suppliers) for examining the business performance in pharma sector.

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