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EFFECT OF BUSINESS ANALYTICS ON PERFORMANCE IN PHARMACEUTICAL INDUSTRY IN THAILAND

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Abstract

Data infrastructure, planning and evaluation function are those important technical aspects of any organization that might affect the financial performance of the organization in one way or the other. The basic objective of this study is to find out the impact of data infrastructure sophistication, planning function and evaluation function on the financial performance of an organization in the mediating role of business analytics. For research purpose, data was collected from 302 employees of pharmaceutical companies having varied age and experience in the organization. The collected data was subjected to SPSS and AMOS for analysis purpose. The results indicate that the impact of data infrastructure sophistication on financial performance is significant. In the similar way, the imapct of planning function has also been found as significant but the impact of evaluation function on financial performance is insignificant. As far as the mediating variable is concerned, it has been found out that the impact of mediating variable between evaluation function and data infrastructure sophistication; and financial performance is significant but the similar impact between planning function and financial performance has been found as insignificant. Several benefits and implications as well as limitations and futiure research indications have also been disucssed by the researcher.

Keywords: Business Analytics, Data Infrastructure Sophistication, Planning and Evaluation Function, Thailand.

1. INTRODUCTION

The traditional methods used for the financial management usually requires a lot of time and the obtained results are not worth the time and cost (Lu & Blokpoel, 2016; Mileski, Galvão, & von Zharen, 2016; Wu, Ota, Dong, & Li, 2016). Moreover, the guesswork and the unsupported assumptions are not considered while the use of traditional methods for financial budget development and management (Collum, Menachemi, & Sen, 2016; Dobrzykowski, McFadden, & Vonderembse, 2016).

That is why the need to have efficient and more effective financial performance increased and resulted in the introduction of advanced methods and ways to manage financial assets of the organizations so that best outcomes could be obtained (Dart & Wehner, 2017; Ran & Nedovic-Budic, 2016; Song, Zhao, & Zeng, 2017; Wilson, Wilson, Deligne, Blake, & Cole, 2017). The role of sophistication of the infrastructure needed for data management and its proper planning and evaluation is equally important (Ehtesham, Ghorooneh, & Hayat, 2019; Pineda, Liou, Hsu, & Chuang, 2018).

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Businesses around the world have improved and modified their information technology infrastructure for the better handling of the work related to the accounting and budgeting (Côrte-Real, Ruivo, & Oliveira, 2020; Ferreira, 2019; Lichfield, Kettle, & Whitbread, 2016; Lim & Welty, 2018; Shil, 2017). In order to improve the financial performance of the businesses, the business analytics have been used and thus, the use of business intelligence solutions (Cho, Kim, Choi, & Staggers, 2016; Fletcher et al., 2017; Furlong, De Silva, Guthrie, & Considine, 2016; Nair & Dreyfus, 2018). The use of business intelligence solutions introduced new opportunities and the ways to make best use out of these. It included the use of evaluation function of different strategies so that the financial performance of the company could be improved (Dobrzykowski et al., 2016; Ehtesham et al., 2019; Pineda et al., 2018).

Table 1: Best footprint in the emerging market

Company	*Growth percentage*
Unilever	53
Cp	47
Henkel	41
Nestle	39
Loreal	34

Source: (Unilever report)

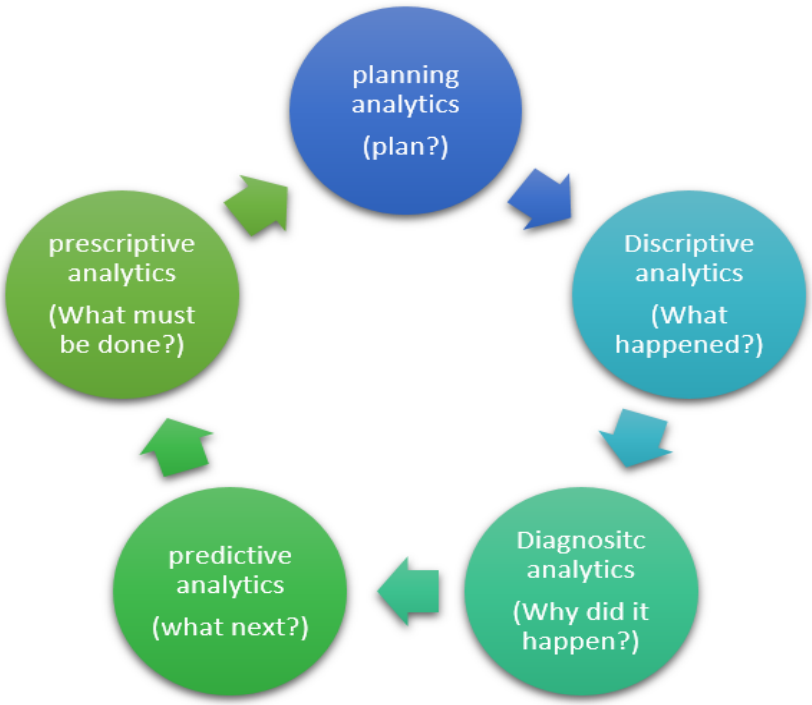

Figure 1: Business analytics solutions

Source: (IBM)

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Thus, the objective, around which the study will be focused include:

1) To analyze the impact of data infrastructure sophistication on the business analytics.
2) To analyze the impact of planning function on the business analytics.
3) To analyze the impact of evaluation function on the business analytics.
4) To determine the impact business analytics on the financial performance of the business.

The research study will focus on the potential determinants that will benefit the organizational budgeting and financial management through the use of business analytics. The study will also provide the theoretical and practical evidence for the use of technology and how this use can improve the budgeting process and financial planning and evaluation process of the organizations. The introduction of the modification methods in the infrastructure of the organizations help them to improve their methods of planning and evaluation. The use of such infrastructure improvements through the business analytics results in the overall improvement and progressive increase of the financial performance of firms (Dobrzykowski et al., 2016; Ehtesham et al., 2019; Pineda et al., 2018) especially the pharmaceutical ones. Moreover, the research study will also contribute to the theoretical availability of the studies and provide empirical evidence for the practical use of these business analytics in the pharmaceutical industries.

2. REVIEW OF LITERATURE AND THEORETICAL BACKGROUND

For the better understanding of the business data analytics and strategic management of the financial performance of the companies, the use of resource based theory is an empirical approach (Barney, 2018; Sedera, Lokuge, Grover, Sarker, & Sarker, 2016; Zhao & Fan, 2018). The use of resource based theory makes it easy to understand the methods that can help the company to gain competitive advantages in the market and the methods to sustain them accurately as a result of their own resources or the ones that are under their control. According to the resource based theory (Alvarez & Barney, 2017; Hitt, Xu, & Carnes, 2016), the availability of tangible and intangible valuable resources of any organization helps it to have competitive performance.

2.1 The impact of data infrastructure sophistication on the business analytics

Researchers (Côrte-Real et al., 2020; Lichfield et al., 2016; Lim & Welty, 2018) have considered data infrastructure sophistication as a part of the information technology infrastructure sophistication. With the help of data sophistication infrastructure, the advanced technologies and information technology related system is diffused in the foundation of the business and also supports the business applications (Cho et al., 2016; Ferreira, 2019; Nair & Dreyfus, 2018; Shil, 2017). To have relevant data and to evaluate this data effectively, the companies tend to use its resources and this is covered by the business analytics.

Therefore, the use of advanced data infrastructure sophistication results in improving the collection and analysis of the data and thus, the overall business performance gets improved (Lu & Blokpoel, 2016; Mileski et al., 2016; Wu et al., 2016).

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Thus, the following hypothesis has been supported from the literature studies:

H1: There is a significant relationship between the data infrastructure sophistication and the business analytics.

The impact of planning function on the business analytics

The proper planning of the financial assets is important so that a clear economic logic is obtained. According to the literature studies (Dart & Wehner, 2017; Ran & Nedovic-Budic, 2016; Wilson et al., 2017), this helps in the proper assigning of the budget to the selected tasks. With the help of advanced technologies and business analytics, the planning process of budgeting can easily be improved and provide convenience to the employees. Moreover, the planning function also allows to predict future developments and thus, simplifying the scenario analysis. With the help of predicted results, the actual outcomes of the business performance in future could be estimated. Thus, literature studies (Collum et al., 2016; Dobrzykowski et al., 2016; Song et al., 2017) shows that this prediction enables a more precise planning and improve the decision making skills of the company. Thus, the following hypothesis has been supported from the literature studies:

H2: There is a significant relationship between the planning function and the business analytics.

The impact of evaluation function on the business analytics

The evaluation function has also a significant impact on the budget planning and financial management of the organizations. According to the research studies (Côrte-Real et al., 2020; Fletcher et al., 2017; Lichfield et al., 2016; Lim & Welty, 2018; Nair & Dreyfus, 2018; Pappa, Ashok, & Govindarasu, 2017), the use of evaluation function enables the firms to have an efficient budgeting processes. This also enables the determination of the realistic estimates and deduction of the budgets. Researchers (Lu & Blokpoel, 2016; Mileski et al., 2016; Wilson et al., 2017; Wu et al., 2016) have also stated that the companies that want their employees to participate in the budgeting process more actively, tends to refrain from using the business analytics. On the other hand, the development of a more precise financial management is done with the use of business analytics. Because the human estimates ensures the consideration of unpredictable circumstances that may arise in future which cannot be done with the use of machines (Dart & Wehner, 2017; Ran & Nedovic-Budic, 2016; Song et al., 2017). Thus, the following hypothesis has been supported from the literature studies:

H3: The relationship between the evaluation function and the business analytics is not significant.

The impact business analytics on the financial performance of the business

The use of business analytics is helpful for the increase of work related satisfaction of the employees which in turn increases their working performance and thus, the overall business performance also gets improved (Ehtesham et al., 2019; Furlong et al., 2016; Pappa et al., 2017; Pineda et al., 2018). The use of only business analytics is not capable of eliminating all the problems in the way. Moreover, only a limited number of resources are required for it and

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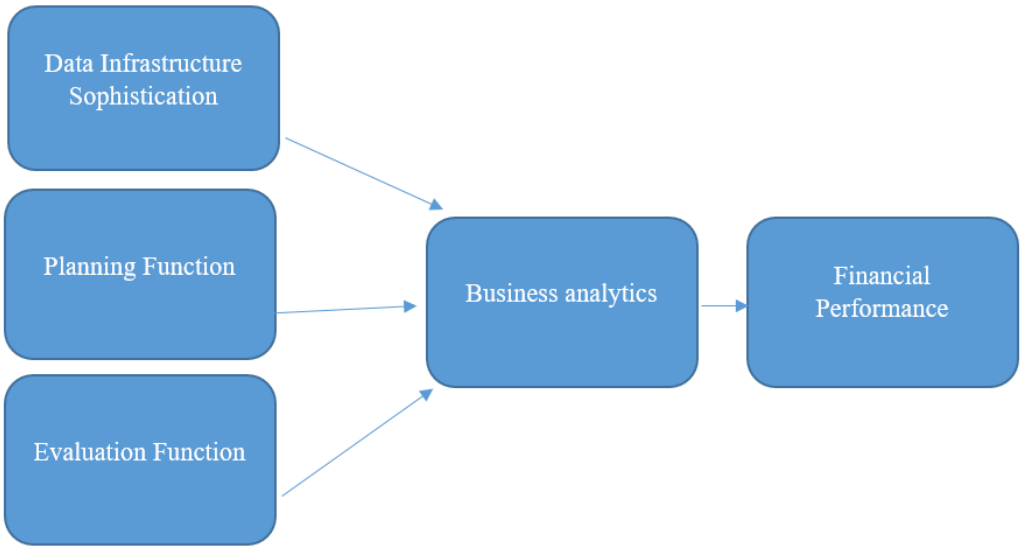
because of this the overall cost gets reduced and only limited number of resources are used. The use of business analytics also results in increasing the automation of the process taking place at the organization (Cho et al., 2016; Ferreira, 2019; Nair & Dreyfus, 2018). Therefore, the use of automation in the processes aids the employees responsible for the management of finance and thus, the performance of the employees also gets improved. This ultimately improves the business performance. Thus, the following hypothesis has been supported from the literature studies,

H4: There is a significant relationship between the business analytics and the financial performance of the business.

2.2 Theoretical model



3. METHODOLOGY

3.1 Sample Description

The data has been collected by the author from the pharmaceutical companies of Thailand. The purposive sampling technique has been employed by the researcher for the selection of the sample. The criteria have been set for the selection of the companies. Only those companies have been selected that contain more than 100 employees. Only these employees were selected from the companies that are working in the controlling department of the selected companies. The questionnaire that has been effectively designed by the researcher is a good blend of different questions that cover the entire topic of the study in an effective way. It has been made sure that the questions are having a good order and very simple language has been used so that the potential respondents may understand these questions easily and respond in the required manner. In order to maintain the validity and reliability of the data, questionnaire has been pre tested by the field experts so that any error may be probed and eradicated before the administration of the questionnaire.

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3.2 Measurement

The measurement items of different types of variables have been discussed in this section. The variables that are included in this study are financial performance, data infrastructure sophistication, planning function, and evaluation function and business analytics.

First of all, financial performance is the dependent variable and has been measured by different items that have been developed by the studies conducted in the past (McGuire, Sundgren, & Schneeweis, 1988). In addition, data infrastructure sophistication is an independent variable and it has been measured by eight measurement items that have been taken from the past study (Goodchild, 2007). One of these measurement items is "standardized master data".

In the similar way, planning function is another independent variable, measured by five measurement items taken from the past studies and one of these items is "Assignment of decision-making and spending rights" (Williams & Olaniran, 1998). Evaluation function is the last independent variable of this study and measured by just three items, developed by the past studies (Wind, Green, & Robinson, 1968).

One of these items is "motivating target attainment". In the last we have one mediating variable in the study too, names as business analytics. This variable construct has been measured by seven items, taken from the studies conducted in the past in the similar context (Kohavi, Rothleder, & Simoudis, 2002). One of these items is "data automation".

In this way all the variables and their constructs are measured by using their particularly related items. These items have been taken from the past studies so that the validity of the content may be enhanced. All these items have been measured on a five point Likert scale.

3.3 Statistical Analysis

The collected data has been effectively analyzed by using the specialized software SPSS and AMOS, by the researcher. These are used for various tests and techniques that are applied on the collected data.

For instance, demographic analysis, descriptive analysis and factor analysis have been obtained from SPSS. On the other hand, confirmatory factor analysis and structure equation modeling have been obtained by using AMOS.

4. DATA ANALYSIS

4.1 Demographics

In this study, the data has been collected from 302 employees working in various pharmaceutical companies of Thailand and among these employees; there were 154 males and 148 females, indicating almost similar percentage of both among the respondents.

In addition, it has been found out that 35 of the respondents were graduated, 127 were post graduated, 103 employees were having Masters Degree and remaining 37 employees were having other educational qualifications. As far as the age of the employees is concerned, different categories have been made by the researcher.

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There are 77 employees having age from 21 to 30 years. 91 employees were having age from 31 to 40 years. 90 employees had the age ranging from 41 to 50. In the last, 44 employees were having the age more than 50 years.

4.2 Descriptive Statistics

According to the results of descriptive statistics presented in table 1, it can be seen that as the maximum and minimum values are present between 1 and 5 or in other words, within the limit of five points Likert scale, therefore it suggests that there is no outlier in the collected data. It can also be observed that the skewness value of all the variables is within the threshold range which shows that the collected data is normal and valid to be subjected to other tests.

Descriptive Statistics							
	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
DataInfSo	302	1	4.9	3.5841	1.12262	-0.885	0.14
PlanFun	302	1	5	3.5152	1.1739	-0.735	0.14
EvaluFun	302	1	5	3.5914	1.11543	-0.838	0.14
FinaPerf	302	1	5	3.5907	1.09456	-0.905	0.14
BusiAnal	302	1	5	3.4793	1.11108	-0.679	0.14
Valid N (listwise)	302						

KMO and Bartlett's Test

KMO and Bartlett’s test indicate whether the factor analysis of the variables in useful for the study or not. As the value of KMO test is 0.927 which is close to 1.00, this suggests that the factor analysis will be useful for the collected data.

On the other hand, the value of Bartlett’s test is very small i.e. less than 0.05, which means that the factor analysis will be useful for the study.

Table 2: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.927
Bartlett's Test of Sphericity	Approx. Chi-Square	9040.781
	Df	325
	Sig.	.000

4.3 Rotated Component Matrix

It can be seen in table 3, that the factor loading of almost all the indicators of the study are greater than 0.7. These values are the indicators that the collected data is totally eligible for research and applying various tests. In addition, no cross loading issue has been observed in the collected data.

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Table 3: Rotated Component Matrix[a]

	Component				
	1	2	3	4	5
DS1	.688				
DS2	.772				
DS3	.835				
DS4	.859				
DS5	.838				
DS6	.843				
DS7	.835				
DS8	.835				
PF1			.802		
PF2			.838		
PF3			.845		
PF4			.859		
PF5			.855		
EG1				.818	
EG2				.842	
EG3				.882	
FP1					.804
FP2					.855
FP3					.804
BA1		.832			
BA2		.887			
BA3		.887			
BA4		.894			
BA5		.898			
BA6		.898			
BA7		.882			

Convergent and Discriminant Validity

The results of convergent and discriminant validity have been presented in table 4. It can be seen that the values for all variables are more than 0.7 in case of composite reliability while these are more than 0.5 in case of average variance extracted (Hassan, Hameed, Basheer, & Ali, 2020; Iqbal & Hameed, 2020). On the other hand, it has been found out that the variables are having loadings different from each other thus validating the authenticity of the collected data.

Table 4: Convergent and Discriminant Validity

	CR	AVE	MSV	DS	EG	FP	BA	PF
DS	0.960	0.751	0.325	0.867				
EG	0.930	0.817	0.329	0.483	0.904			
FP	0.905	0.760	0.312	0.531	0.433	0.872		
BA	0.966	0.804	0.211	0.459	0.394	0.399	0.896	
PF	0.955	0.809	0.329	0.570	0.574	0.559	0.317	0.899

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Confirmatory Factors Analysis

As per the results of confirmatory factor analysis presented in table 5, it can be seen that the values for all the indicators of CFA are within the threshold range as given in the table, suggesting that the hypothetical model is fit for use.

Table 5: Confirmatory Factors Analysis

Indicators	Threshold range	Current values
CMIN/DF	Less or equal 3	2.949
GFI	Equal or greater .80	.826
CFI	Equal or greater .90	.938
IFI	Equal or greater .90	.938
RMSEA	Less or equal .08	.080

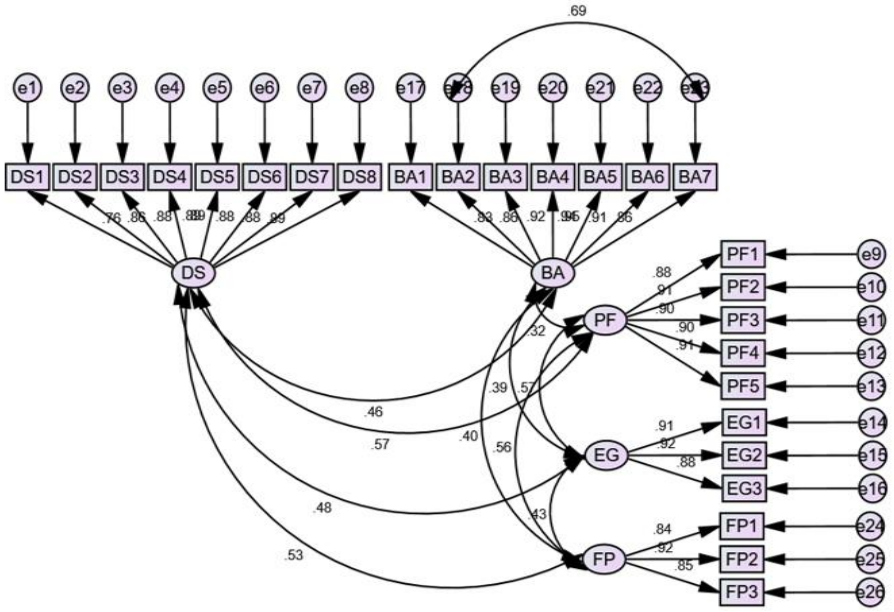

Figure 1: CFA

4.5 Structural Equation Modeling

As per the results of structre equation modeling presented in table 6, it is found out that the impact of data infrastructure sophistication on financial performance is significant. In the similar way, the imapct of planning function has also been found as significant but the impact of evaluation function on financial performance is insignificant. As far as the mediating variable is concerned, it has been found out that the impact of mediating variable between evaluation function and data infrastructure sophistication; and financial performance is significant but the similar impact between planning function and financial performance has been found as insignificant.

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Table 6: Structural Equation Modeling

Total Effect	EvaluFun	PlanFun	DataInfSo	BusiAnal
BusiAnal	.234**	-.015	.365***	.000
FinaPerf	.073	.339***	.307***	.167**
Direct Effect	EvaluFun	PlanFun	DataInfSo	BusiAnal
BusiAnal	.234**	-.015	.365***	.000
FinaPerf	.034	.342**	.246**	.167**
Indirect Effect	EvaluFun	PlanFun	DataInfSo	BusiAnal
BusiAnal	.000	.000	.000	.000
FinaPerf	.039**	-.003	.061**	.000

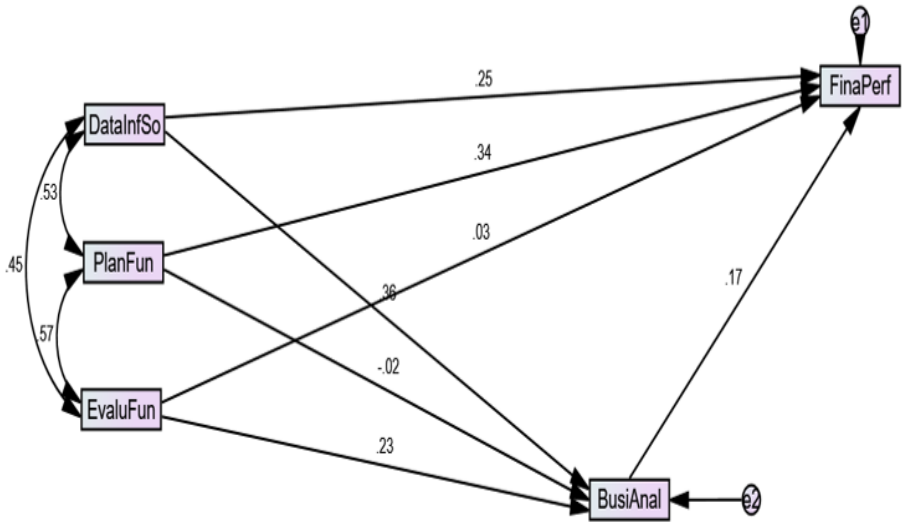

Figure 2: SEM

5. DISCUSSION AND CONCLUSION

5.1 Discussion

The researcher was supposed to find out the impact of data infrastructure sophistication, planning function and evaluation function on the financial performance of an organization in the mediating role of business analytics. The first hypothesis has been accepted as the impact of data infrastructure sophistication is significant on financial performance, which is in accordance with the studies conducted in the past (Jabbour, Rey-Valette, Maurel, & Salles, 2019). In the same way, the second hypothesis has also been accepted as the impact of planning function is found to be significant as also presented in the past studies (Chen, Ko, & Yeh, 2017). However, the the next hypothesis has been rejected because the impact of evaluation on financial performance have been found as insignificant, which is in accordance with the studies conducted in the past (Zhong, Guo, & Yang, 2016). On the other hand, the next hypothesis has been accepted indicating that business analytics has significant mediating impact between data infrastructure sophistication and financial performance as also presented in the past studies

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(Appelbaum, Kogan, Vasarhelyi, & Yan, 2017). The next hypothesis has been rejected as the mediating impact of business analytics between planning function and financial performance is insignificant, which is in accordance with the studies conducted in the past (Qiu, Shaukat, & Tharyan, 2016). The last hypothesis has also been accepted as the mediating impact of business analytics between evaluation function and financial performance is significant as also presented in the past studies (Wang & Sarkis, 2017).

5.2 Conclusion

Data infrastructure, planning and evaluation function are important aspects of any organization that have impact on the financial performance of the organization in one way or the other. The basic objective of this study is to find out the impact of data infrastructure sophistication, planning function and evaluation function on the financial performance of an organization in the mediating role of business analytics. The results of the study indicate that data infrastructure and planning function have significant impact on financial performance but evaluation function has insignificant impact. The mediation impact of business analytics is found to be significant between data infrastructure sophistication and evaluation function; and financial performance but is insignificant in case of planning function.

5.3 Implications

This study can provide assistance on the matters of Data infrastructure, planning and evaluation function and their impact on financial performance, to the other researchers. It may also act as the guide for the organizations to give attention to the aforementioned aspects to enhance their performance and the policy makers may also get guidance while making policies and regulations in the similar context.

5.4 Limitations and Future Research Indications

The similar study should be conducted in the countries and regions other than Thailand. In addition, the other researcher must enhance the sample size of the study to get more generalized results. The other variables may also be used along with these variables and a more detailed perspective may be obtained in future.

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