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Business Analysis For New Product Novelty, New Product Meaningfulness, New Product Performance On Innovation Performance Of Thai Herbal Sector In Ranong Thailand

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Abstract

The advancements in Business analytics and big data technology have provided extraordinary opportunities and benefits for many sectors to innovate their existing systems. In the past few years, few studies have explored the mechanism of innovation in which business analytics play a significant role. However, the main aim of this research study is to address some gaps in past studies. The main goal of the given study is to investigate the impact of using business analytics on the innovative performance of the Thai Herbal sector of Thailand. From a data processing perspective, a study model is recommended and experimentally validated with data gathering from a survey with the top Thai Herbal firms of Thailand. The proof from the survey of 422 participants completely supports the study model that mainly gives am an authentic point of view on the role of business analytics in enhancing innovation performance. The significant results and findings of the study indicate that the impact of business analytics on the innovational performance of the Thai Herbal sector of Thailand was significant. The results of the study also suggest that the mediating impact of new product novelty, meaningfulness and performance were also positive on the relationship between BA and innovation performance.

Keywords: Innovation, business analytics, new drug novelty, meaningfulness, performance

I Introduction

Business analytics is considered as an important part of the business field which majorly based on collecting, storing, analyzing and then interpreting diverse data in such a way, which helps a business to improve its efficiency and the revenue become increases (Winn, 2016). In the current entrepreneurial environment, most of the enterprises hired a critical thinker to analyze the market condition and predict about the future performance. This approach helps management to make some innovation in their product range and then drive meaningful and efficient performance-based strategies and business plans of an organization (Turner, 2020).

In Thailand, the majority of the business sectors are now focusing on this innovation factor in their operating activities. In their Thai Herbal activities, they majorly worked to critically evaluate the entrepreneurial factor to make an innovative performance level within an organization (Narang & Singh, 2016). The majority of the Thai Herbal companies are making some major innovation in their production process.

In the current era, the management of the pharmacies in Thailand majorly considered an innovation performance as a bottom line, where the whole building of their operating, financing and investing activities is based on. According to the survey, they made key strategies in order to make innovative health drugs in the market (Koczwara & Dressman, 2017; Luppi, 2016). The following figure shows the innovative health drug development is given below;

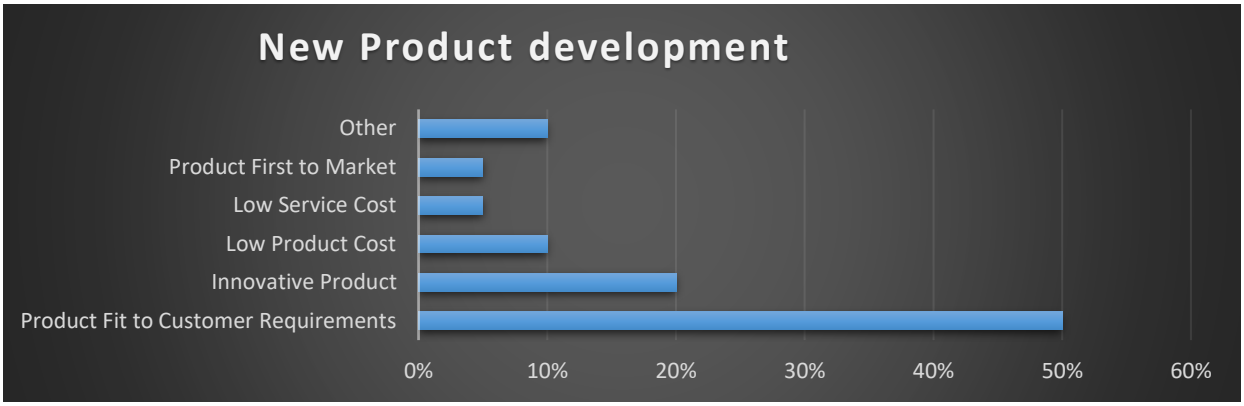


Figure 1: New Product development in Thailand's Thai Herbal sector

The above percentage in the current health drug-making process shows that the productivity of an organization is majorly based on its analytical approach, regarding how much attainment must be given to the business sectors. It is a product approach to maintain the future position of the pharmacies in the competitors and a highly diverse market (Khalifa, 2018). In such a situation, technological implication plays a major role to secure the efficient manufacturing process of a company. In Thailand, the market share of different sectors in the Thai Herbal market is given below;

Category	Market share% value in Thailand
Anti-infective	20.4
Opthologicals 1.7	3.7
Pain/Analgesics	9.5
Neuro psychiatry	5.3
Gastrointestinal	10.9
Respiratory	10.2
Vit./Minerals/Nutrient	9.6
Cardiac	10.3
Antidiabetics	7.4
Dermatologic	7.4
Gynecology	5.3
Total	**100**

Table 1: Total Thai Herbal Market in Thailand

The above figures show that the market share of Anti-infection, Gastrointestinal and Cardiac is much higher than the remaining sectors. This range will help the upcoming entrepreneurs to critically evaluate the collected data and then drive effective policies in order to make an efficient product range in the diverse market (Chetthamrongchai & Jermsittiparsert, 2019). In Thailand, it is quite an efficient approach to effectively make a business analytics procedure before developing new health drugs. In the Thailand market, chronic theory areas like

respiratory, gastro, ant diabetics, cardiac and neuropsychiatry, are majorly dominating in is market for the long run (Chandra, Sridharan, & Shwetha, 2016). So being a businessman and entrepreneur, there is a need to make some innovative product development that will generate profit in these areas market (Chandra et al., 2016; Chetthamrongchai & Jermsittiparsert, 2019).

2 Literature Review

2.1 Business Analytics and innovation Performance

In 2018, Ashrafi and others majorly worked to critically evaluate the direct relationship between business analytics and the efficient innovative performance in the workplace (Ashrafi & Ravasan, 2018). According to the researchers, such market orientation based strategic approach helps a critical thinker to critically evaluate the things and drive such ways which strengthens the relationship between the customers and the company's owner. They stated that innovative ideas are only generated in the intellect mindset of managers, who drive different ways to inspire the targeted customers in the long run. In 2019, constructive analysis based research was made by the researcher to critically evaluate the impact of the firm performance with the strategic approach of its owners (Aydiner, Tatoglu, Bayraktar, Zaim, & Delen, 2019).

According to them, a piece of collected diverse information drives new innovative ways to maintain the company position in the customer market. They stated that the business analytics upgrade the data drive culture and makes a scanning based environment (Ashrafi, Ravasan, Trkman, & Afshari, 2019). They stated that such data-driven culture helps management to upgrade the impact of the business analytics on the innovation. They consulted that in a current digital and highly diverse era, it is a major need to critically work on the environmental scanning based analytics data in order to secure the position of a company (Duan, Cao, & Edwards, 2020). Hence, such research studies proposed the following hypothesis;

H1: Business Analytics has a significant impact on innovation Performance

2.2 Mediating role of New Product Novelty between Business Analytics and Innovation Performance

Lazzarotti and Osman with other researchers (2017) worked on critically evaluating the impact of the novelty factor of new product innovation on enhancing the innovation-based performance of an organization in their different researches (Gök & Peker, 2017; Lazzarotti, Bengtsson, Manzini, Pellegrini, & Rippa, 2017). They critically evaluate how the novelty factor enhances the loyalty and reliability factor in the company's product, which upgrades the performance level of an organization. It is an informative approach to critically elaborate the relationship between the organizational performance with the analytical approach of its management by considering the new product and service novelty as a mediating factor between them (Hu & Chen, 2016).

These are constructive researches which highlight the importance of the product range. According to them, if the uniqueness of the new product is higher than the existing products, then the position perception regarding the company's products will be generated in the customer's market, and they become loyal with the brand name (Lazzarotti et al., 2017; Rajapathirana & Hui, 2018). According to them, an unusual Thai Herbal products makes a new market in front of the companies to earn a long term profit margin. In the end, they concluded that such approach enhances the reliability factor in the customer preference level in the market (Rajapathirana & Hui, 2018). So, the proposed hypothesis of these studies is given below;

H2: New Product Novelty plays a significant mediating role between Business Analytics and Innovation Performance

Mediating role of New Product Meaningfulness between Business Analytics and Innovation Performance

In last year, many researchers were conducted by researchers to critically evaluate the importance of the meaningfulness and its impacts on the product innovation factor of an organization (Dabrowski, 2019). According to them, this factor positively enhance the performance level of a company in the customer market and also

helps them to create such an innovative product which has a higher demand in the market. According to them, majority of the entrepreneurs create a need and demand in the customer market and then motivate them to buy such products in a quite productive way (Heimonen & Kohtamäki, 2019). According to them, the performance level of the Thai Herbal and other related industries is upgraded due to the presence of such entrepreneurial activities in their operating, investing and financing activities.

According to them, the majority of the products in the medical market are based on some specific purpose in the market (Sunpuwan, Punpuing, Jaruruengpaisan, Kinsman, & Wertheim, 2019). According to them, innovators create a positive word of mouth regarding the new derived health drugs in the market. To make some meaningful products, a large number of innovative health drugs are creating on a daily bases (Zuo, Fisher, & Yang, 2019). According to them, such innovation upgrades the confidence level of the customers**.** In the end, they concluded that such a glance in the new product upgrades the performance level of a company. Hence, such research studies suggested the following hypothesis;

H3: New Product Meaningfulness plays a significant mediating role between Business Analytics and Innovation Performance

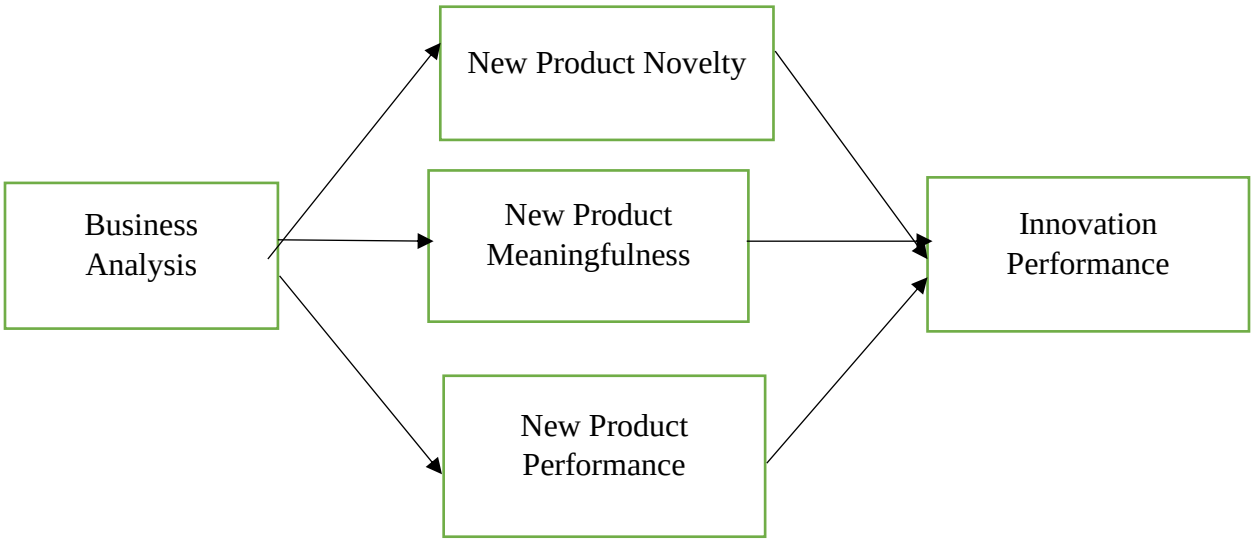
2.3 Mediating role of New Product Performance between Business Analytics and Innovation Performance

In 2017, a research was conducted by different scholars in their journals, where they critically elaborate the mediating and the moderating role of new product performance on the efficient performance of the new product development in the customer market (Grimpe, Sofka, Bhargava, & Chatterjee, 2017). According to them, such an innovative product upgrades the performance level of the organization and its reputation in the customer and competitive market. In 2019, Jin, Jason and others critically evaluate the product newness and its efficient performance in the customer market that direct results in the higher profit margin in the innovative operating activities of an organization (Jin, Shu, & Zhou, 2019). According to them, such approach will upgrade the performance level of the company in the market.

According to them, such a productive response from the targeted customer regarding the innovative products, enhance the reputation and reduce the risk factor in their operational activities. The majority of the scholars are in the point of view that management must focus on customer-oriented production strategies, if they want to earn a long term profit margin from their products (Situmeang, Leenders, & Wijnberg, 2017). According to them, an efficient research and development department within an organization upgrade the performance e level of the company and secure its future in the diverse market. In the end of making a critical research analysis, they are in the point of view that the perfect business analysis is only performed if the true and fair operating activities are working in the workplace. The reason is that they enhance the innovation performance in the customer market (Grimpe et al., 2017). So, such critical researchers have proposed the following hypothesis;

H4: New Product Performance plays a significant mediating role between Business Analytics and Innovation Performance

2.4 Theoretical Framework



3 Methodology

3.1 Sample and data collection

This empirical study was conducted in Thailand's Thai Herbal industry. For this study data was collected by conducting a survey in Thai Herbal firms working in Thailand. Main reason behind selecting this sector was that it is the fastest growing market in Thailand and is subjective to innovation. Based on purposive sample, 350 firms operating in this industry were selected as final sample. Data was collected in two rounds, firstly questionnaire to all firms were sent through email, when a reasonable number of responses was not received, questionnaires were personally delivered in the firms. In round one 245 responses were obtained whereas in round two further 186 questionnaires were added to responses. After scanning the questionnaires only 350 responses were usable for our analysis, rest were excluded due to incomplete and invalid data. Main participants were managers of these firm that have high qualification with understanding of business analytics and its impact on performance to ensure authentic information. Statistical analysis shows that 52.70% were male managers and 47.30% were females, 30% have post-graduation degree, 45% have graduation level education and 25% had college level qualification. 30% of respondents were senior managers and rest were middle and line managers with average working experience of 5 years in the industry.

3.2 Instruments

To test the research model purposed in this study, multiple scales and their items have been applied in this survey. A self-administrative questionnaire survey was developed using a Five-point Likert scale (ranging from 1 - strongly disagree to 5 - strongly agree) to record the responses of all constructs. The measures of questionnaire were based on existing literature review and dissected by research experts. As Business Analytics is a new research area so there are limited authenticated measurement items, so new constructs and measures were developed by (Cao & Duan, 2014), drawn on exiting literature (Kiron, Prentice, & Ferguson, 2012);(Davenport, 2006). Three items were used to determine the level a firm use business analytics to examine their data, for example '' Descriptive Analytics provides the context of and trending information on past or current events'' Respondents graded the level of BA on 5-point scale. CFA test showed $\alpha = 0.94$ representing high reliability. Another construct 'new product novelty' was measured by adapting NPN scale presented by Droge (2008), three items were modified including ''firm had marketed no new lines of drugs'' to estimate product innovation of Thai Herbal firms using 5 point-Likert scale showing $\alpha = 0.92$.

Measures of New Product Meaningfulness were drawn from Kim, Im, and Slater (2013) NPM scale, four items were picked and altered to fit in study context. Sample item of this scale is ‘’ is this product relevant to customers’ needs and expectations ‘’. Respondents were asked to quantify the degree of product meaningfulness on 5 point Likert scale. Ranging from 1= very poor to 5=very good, on testing results presented α = 0.90 Cronbach alpha. Innovation performance measurements were adapted from Miller and Friesen (1982). 3 items were used to measure Innovation Performance (The level of newness (novelty) of our firm’s new products). Innovation performance reflects the new products, process and technologies used in firms. Results showed α =0.83 for innovation performance.

4 Results and Analysis

Comprising of 56.6% males and 43.40% females, a sample of 422 respondents was developed by purposive sample. This survey was established to test the usage of business analytics in Thailand’s Thai Herbal sector. Majority of our sample were male respondents, out of 422 workers 239 were male and 183 were female, 126 were less than 25 years of age, majority of respondents 193 aged between 25 years to 35 years, 88 belongs to age group of 35 years to 45 years old and 15 respondents aged more than 45 years. 18.2% respondents have worked for at less than 2 and 187 have working experience of 2 to 5 years in this industry, 118 have 5 to 8 years of experience however, only 40 workers have 8 years of experience, this show that majority 44.3% are experienced employees. Data collected from this sample was analyzed by operating different tests, this section presents the results and analysis of the test below:

Table 1 presents the summary of sample and data by quantifying Descriptive Statistics. Here N is total number of observation that it is 422 in this study, No outlier variables are there in the data as Minimum value and maximum value is 1 and 5 for all constructs. The mean of nominated constructs such as Business Analytics, new product novelty, New Product Meaningfulness, New product performance and Innovation performance is 3.1718, 3.3961, 3.4949, 3.4159 and 3.5419 individually for each construct, which is inclining towards 4 indicating majority of respondents were agreed with the questions. To test the normality of data skewness values are considered, here these values are in range of -1+1 confirming normal distribution.

Table 1: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error
BusAnal	422	1.00	5.00	3.1718	1.11003	-.167	.119
InnoPerf	422	1.00	5.00	3.3961	1.03715	-.388	.119
NewProNorl	422	1.00	5.00	3.4949	1.16979	-.523	.119
NewProMeaF	422	1.00	5.28	3.4159	1.16982	-.503	.119
NewProPerf	422	1.00	5.00	3.5419	1.17737	-.576	.119
Valid N (listwise)	422						

Table 2 presents Kaiser-Meyer-Olkin Measure and Bartlett's Test of Sphericity that check the suitability of sample in accordance to research. The results came up with Kaiser-Meyer-Olkin Measure of Sampling Adequacy =.913 that is within threshold values of 0.8 to 1 which shows adequacy of selected sample

Table 2: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.913
Bartlett's Test of Sphericity	Approx. Chi-Square	8121.638
	df	190
	Sig.	.000

adequacy. In Bartlett's Test of Sphericity The approximate of Chi-square = 8121.638 along 190 is the degree of freedom.

Table 3 contains Factor loading for items calculated by Confirmatory factor analysis. Rotated Component Matrix basically indicates data accuracy and validity of content. All the item's factor loading is greater than 0.7 and there is no cross loading error reported which confirms data is valid and accurate.

Table 3: Rotated Component Matrix[a]

	Component				
	1	2	3	4	5
BA1				.835	
BA2				.850	
BA3				.844	
IP1					.745
IP2					.832
IP3					.798
PN1			.837		
PN2			.849		
PN3			.857		
PN4			.883		
PM1		.865			
PM2		.879			
PM3		.868			
PM4		.871			
PP1	.822				
PP2	.857				
PP3	.886				
PP4	.875				
PP5	.874				
PP6	.897				

Table 4: Convergent and Discriminant Validity

	CR	AVE	MSV	PP	BA	PN	PM	IP
PP	0.956	0.783	0.235	**0.885**				
BA	0.929	0.813	0.379	0.447	**0.902**			
PN	0.943	0.805	0.278	0.421	0.505	**0.897**		
PM	0.943	0.806	0.278	0.330	0.469	0.527	**0.898**	
IP	0.829	0.619	0.379	0.485	0.616	0.435	0.452	**0.787**

Table 4 is integration of Convergent and Discriminant Validity, composite reliability (CR) and Average Variance Extracted (AVE) are indicators for Convergent validity to measure relatedness of each variable (Hassan, Hameed, Basheer, & Ali, 2020; Iqbal & Hameed, 2020). Statistical values suggest that product performance has highest composite reliability 0.956 which means scale items are internally consistent. Contrary innovation performance endeavors lowest composite reliability 0.829 and lowest AVE as well as 0.619. The values for composite reliabilty falls in thershold values of 0.5 and 0.7 so varaibles are convergently valid. Additionally, the values in diagonal form that are increasing are indicating discrimanting validaty as value for each consruct is greater then previous value.

Table 5: Confirmatory Factors Analysis

Indicators	Threshold range	Current values
CMIN/DF	Less or equal 3	2.7633
GFI	Equal or greater .80	.906
CFI	Equal or greater .90	.968
IFI	Equal or greater .90	.968
RMSEA	Less or equal .08	.062

Table number 5 is model fitness table . All values are lying between threshold value as for CMIN/DF (discrepancy function) is 2.7633 which is less than 3, GFI (goodness of fit index) is.906 or greater from .80 , CFI (comparative fit index) and IFI (incremental fit index) is .968 greater than 0.9, and RMSEA is 0.62 that is less than 0.8 verifies that model is a good fit.

Figure 1: CFA

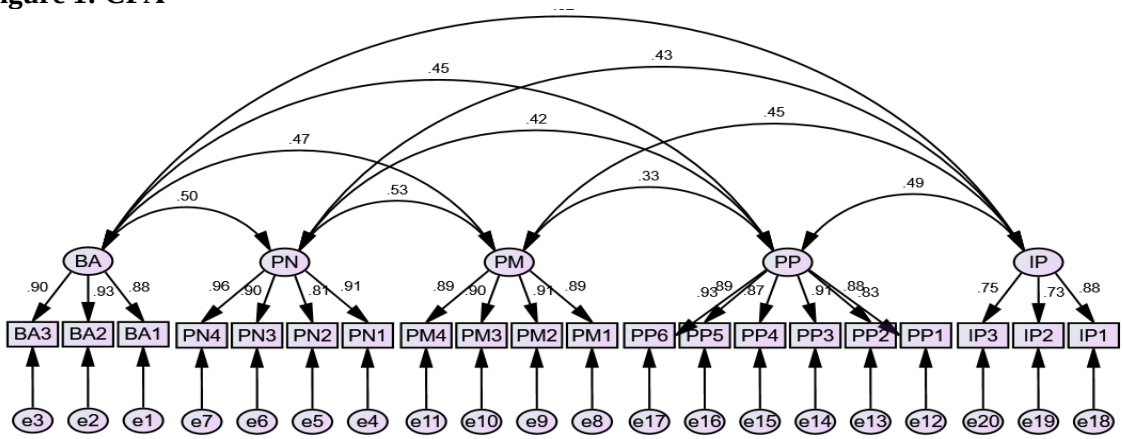


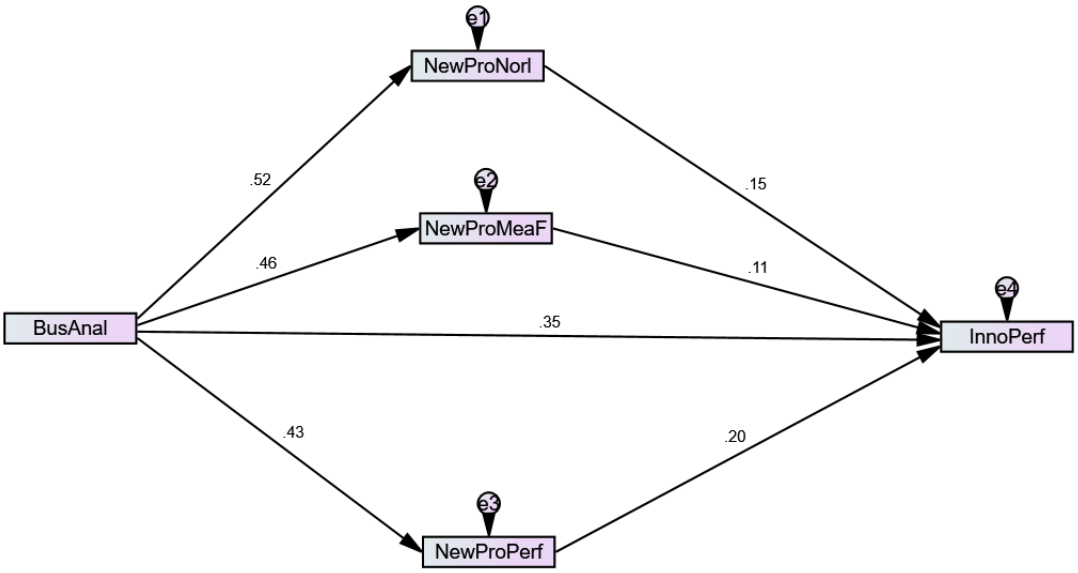
Table 6: Structural Equation Modeling

Total Effect	**BusAnal**	**NewProPerf**	**NewProMeaF**	**NewProNorl**
NewProPerf	.427***	.000	.000	.000
NewProMeaF	.464***	.000	.000	.000
NewProNorl	.520***	.000	.000	.000
InnoPerf	.564***	.202**	.113*	.152*
Direct Effect	BusAnal	NewProPerf	NewProMeaF	NewProNorl
NewProPerf	.427***	.000	.000	.000
NewProMeaF	.464***	.000	.000	.000
NewProNorl	.520***	.000	.000	.000
InnoPerf	.346***	.202**	.113*	.152**
Indrect Effect	BusAnal	NewProPerf	NewProMeaF	NewProNorl
NewProPerf	.000	.000	.000	.000
NewProMeaF	.000	.000	.000	.000
NewProNorl	.000	.000	.000	.000
InnoPerf	.218**	.000	.000	.000

Table no 6 is illustrating the findings hypothesis by administrating SEM on AMOS to draw results regarding relationship of the variables. It was shown that if one-unit increase is made into business analytics it will directly stimulates innovation performance by 34.6 % and direct increase of 52% in new product novelty

and 46.4% new product meaningfulness, which make this relationship significant and leads towards acceptance of theses variables. The mediation of business analytics increases innovation performance by 21.8 percent through new product novelty, New Product Meaningfulness and New product performance. It can be observed that all relationships are significant and positive.

Figure 2: SEM



5 Discussion

Business analytics contributes to effective performance and differentiation in the overall performance of any particular sector (Müller, Fay, & vom Brocke, 2018). Correct use of business analytics has a direct influence on the operational performance and outcomes of the firm. The results of the given study with respect to business analytics and innovation performance indicate that the role of business analytics has a positive impact on innovation and the technological performance of the companies in the Thailand Thai Herbal sector. A prior recent study by Wang, Gunasekaran, Ngai, and Papadopoulos (2016) has also explained that business analytics and update technology do not only help in the performance of the companies but also help in daily tasks and operations under a smooth way. The further results also demonstrate that new product performance, new product meaningfulness, and new product novelty has a positive mediating role in the relationship between business analytics and innovation performance of the companies. Thus, the new product of an company in the market attracts the new customers and urge them to buy the product for use.

6 Conclusion

The main focus of the research study is on using the business analytics systems in order to enhance the innovation performance of the Thai Herbal sector of Thailand. The study also focuses on using the mediating roles of new product novelty, new product performance, and the new product meaningfulness. To find the impact of mediating variables, the researcher collects data from about 422 employees and workers of 350 different Thai Herbal firms in Thailand. The research study also used many significant techniques and methods to compute the data of the study including structural equation modeling, confirmatory analysis, and Bartlett's test.

6.1 Implications and Limitations

The results of the study have a wider scope in the Thai Herbal sector of Thailand and it will also apply to the firms that use the technology of business analytics. The positive outcomes of the research study also provide crucial platforms for those analysts that want to understand the

importance of business analysts in enhancing the innovation performance of the sector. It will also assist future scholars to understand the mediating role of new product novelty, new product performance and the new product meaningfulness.

Even though the study has useful and effective implications, it is limited to the Thai Herbal sector of Thailand and just focuses on the innovation performance of the sector. Thus, it is proposed to future scholars and researchers that they should incorporate a study and research in the future that focus on other counties in order to gain useful results. Future researchers also proposed that they should add some other independent as well as dependent variables to get wider information and data.

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