

The Role of Big Data Analytics in Determine the Relationship between Green Product Innovation, Market Demand and the Performance of Motorcycle Manufacturing Firms in Thailand

Saroge Vasuvanich^{#1}, Sudawan Somjai^{#2}, Komkrit Rattamanee^{#3}, Kittisak Jermstittiparsert^{*4}

^{#1,2}Graduate School, Suan Sunandha Rajabhat University, Thailand

^{#3}Faculty of Science and Technology, Suan Sunandha Rajabhat University, Thailand

^{*4}Social Research Institute, Chulalongkorn University, Thailand

¹saroge.va@ssru.ac.th

²sudawan.so@ssru.ac.th

³komkrit.ra@ssru.ac.th

Corresponding author: E-mail: kittisak.j@chula.ac.th

Abstract-The study is carried out to explore the role of big data analytics in determine the relationship between green product innovation, market demand and the performance of motorcycle manufacturing firms in Thailand. The current study which basically is an empirical research theoretically as well as methodologically contributed in the existing literature, particularly, in the Thailand's motorcycle industry. It is obvious that adopting green product innovation in highly competitive market is imperative, since it facilitates in achieving competitive advantage and product differentiation [1].the data is collected from the motorcycle manufacturing firms in Thailand. The SEM-PLS is used to analyse the data. The findings of the study have shown consistency with the hypothesized results as well as the prior findings. Although, the results have shown that it is important for firms to understand the requirements of its consumers, followed by the alignment of product innovation initiatives to the values of consumers. In the recent green conscious competitive environment, brand identity and design, price, fuel consumption, and exhaust emission are some of the important criteria which are generally considered by consumers while taking a motorbike purchasing decision. Another study has attempted to analyse BDA and the computer-assisted textual analysis, as well as its application in the transportation and logistics system. For the managers, the current research emphasizes the strategic significance of green product decisions. It also explains that firm performance and green product innovation must also integrate knowledge of market demand as important consideration.

Keywords: Green Product Innovation, Big Data Analytics, Thailand

1. Background

The increased debate on green product innovation has drawn considerable attention during the past few years. Green product innovation is presented as an opportunity by some while others regard it as a win-win situation i.e. be green and stay competitive. Such as, the case of hybrid cars by Toyota and cosmetics product range of Body Shop. It has been argued that in these companies the sustainable product innovation is either market-driven or induced through public policy. However, there is still a continuing debate regarding what forms the basis for a green product or what is sustainable. [2] suggested that the green product innovation explicitly deal with the environmental issues, however it is uncertain whether such products are capable of achieving market success. Although, only a limited empirical evidence is available which could demonstrate the way firm performance gets affected by the green product innovation.

A few empirical studies have reported the existence of positive association among firm performance and product innovation [35], but a large number of researches have failed to confirm this relationship. Furthermore, it has been argued that market demand acts as a significant element to promote green product innovation. Besides, [3] also reinforced the critical role of market demand in the innovation performance of an organization. They also raised an important point that is, addressing each and every demand of customer may cause harm to the organization's performance of innovation. Firms which collaborate to its rival firms tend to bring better innovative processes through cooperation in R&D and can enhance their capabilities for enabling them to minimize the risk and time associated to product innovation.

The inconsistent research findings have developed a research gap in the literature of product innovation.

Therefore, an in-depth analysis is required to enhance understanding and knowledge about green product innovation and for the sake of marketers, senior managers and market designers. Therefore, the present study tries to bridge the underlying research gap, such as developing an understanding about the association among market demand, firm performance, and green product innovation. In particular, following are the two research questions of this study:

- 1) In what way does the green product innovation of a firm is influenced by market demand? and
- 2) How a firm's performance is affected by green product innovation?
- 3) What is the role of big data analytics in the relationship between market demand and the performance of firms?

Such issues are of great importance while introducing new product and for sustainable manufacturing operations. Basically, green pressures induce firms to initiate new product introduction (NPI) strategy and also evolve operations in an organization. Thus, interpreting the strategic positioning of green NPI, firm performance, and market demand act as important aspects of operational management. The current research focuses on the motorcycle industry in Thailand due to following reasons:

- 1) It is the fourth largest market around the globe, therefore, without Thailand, no strategic or operational theory will be completed;
- 2) Thailand shares a number of significant development paths among China, Indonesia, and Philippine, which may also help through its experience in paving future growth, particularly in Asian region;
- 3) In Asia, motorcycle industry is considered to be a key source of Asian pollution; and
- 4) Thailand is one of the emerging economic superpower, therefore, getting knowledge and understanding from Thailand's experience and its firms may provide considerable implications for future operations.

2. Hypothesis development

In current business environment, market demand is considered as an imperative factor. The cut-throat market competition induces firms towards adopting flexible process and product strategies. Several empirical researches have emphasized price and customer benefit as the key market demand elements. In a study, [4] stated that since customers' perception of value is different therefore they exhibit heterogeneous and diverse demands. In addition, [5] also declared that customers' sensitivity grows and they become fussier over time. Therefore, it is essential for the firms to fully understand the targeted audience and they must also be capable of anticipating the ever-changing customers' preferences to quickly respond to market demand and achieve competitive position in market. However, price also influences the customer preferences which may sometimes create a conflicting

situation among customer requirements. Such as, customers demand for adopting green manufacturing compel manufacturers towards sustainable product introduction and adopting environmentally friendly production. The present study is carried out on the motorcycle industry of Thailand. The market demand of mother bike in Thailand is falling as evident from the figure 1.

Manufacturer	2017	2017 (First five months)	2018 (First five months)	% change	% share
Honda	1,417,835	607,128	584,769	-3.68	77.43
Yamaha	268,135	113,477	117,109	3.2	15.51
GPX	30,961	12,279	14,155	15.28	1.87
Suzuki	21,434	9,999	8,516	-14.83	1.13
Kawasaki	16,530	7,859	8,151	3.72	1.08
Vespa	14,609	5,811	7,504	29.13	0.99
All Companies	1,810,856	773,794	755,214	-2.4	100

Figure 1. market demand of Thai motorcycle
Source: Thailand ministry of land transport

In view of [6], a large customer base is prepared to reciprocate green product attributes and product qualities. Furthermore, there may be unaligned customer buying behaviour and their demand for green attributes. For these reasons, manufacturing firms have been facing a huge challenge to bring harmony among these factors for satisfying market demand. Meanwhile, it has been argued by [7] that timely detection of supply-demand gap in market may enable firms to step forward and try to abridge the existing gap using successful product innovations. Thus, in case of manufacturing firms, innovation acts as a critical source to improve and be able to survive in competitive market.

[8] concluded in their study that product innovation is insignificantly influenced by customer collaboration. According to [9], market orientation acts as an important indicator of successful product performance. Furthermore, another essential element of environmental innovation is the market demand. [2] have observed that customers are increasingly concerned about green manufacturing, such as those products are preferred which are environment friendly and fuel efficient. Hence, firms adopt innovation, to satisfy market demand as well as to attain competitive advantage and competitive position. The above discussion

demonstrates that it is the green value demand from customers which drive manufacturers towards innovation process, for surpassing competition and meeting customer demand.

H1: the green product innovation significant effected by the market demand of the Thai motorcycle manufacturing firms.

For manufacturing organizations, market position and reputation are the significant competitive factors. According to [10], several firms have been recognizing the deteriorating global environment and the significance of sustainable environment. However, it is not easy to be applied directly to the business activities of organizations. Therefore, these issues must be addressed by firms for their development and survival in competitive market. [11] suggested that in motorcycle industry, it is actually true, since environmental issues have become an important area of concern. Although, conflicting findings were observed among firm performance and market demand. Market critically contributes to innovation performance of a firm although, organizational performance is not seemed to be dependent upon market. Therefore, market demand acts as a central element in the organizational performance. It has been reported by [12] that firms can detect or anticipate the needs of inactive customers by closely integrating customer, and influential customers in particular. Contrarily, while understanding the purchasing behaviour of customers, price and fuel consumption are also important measures which should be observed. Thus, those manufacturing firms which are the pioneers of integrating green products would also be the ones to be successful in meeting green customer demand and benefit from “first mover advantage”.

H2: The firm performance is significant effected by the market demand of the Thai motorcycle manufacturing firms

In recent times, product innovation acts as an important organizational mean or weapon to survive and achieve sustainable competitive advantage in the market. Successful performance of product innovation may facilitate manufacturing firms in declaring brand name, enhancing market position, attracting new customers, leapfrog competition, and achieving innovation. In another study, [13] discovered that emphasizing more upon environmental performance improvements, such as removing undesirable emissions or outputs may unquestionably influence economic performance. But still there is a continuous debate that whether economic performance can actually be improved through green product design.

The green product innovation is defined by [14], as the product which may overcome the risks and negative impacts on the environment, prevents generation of waste at the disposal phase, with minimum utilization of

resources. Alternatively, the green product innovation offers environmental benefits and also preserves natural environment. Furthermore, [15] and [16] have reported that product innovation also significantly influences the environment, whereas, environmental standards and poor product design in developing economies could divert waste issues to a serious issue. Thus, according to [17], a firm incorporates green manufacturing or product innovation for achieving competitive advantage and product differentiation.

Therefore, green product innovation works as one of the basic means to accomplish organizational targets and sustainable development. In modern businesses, the green innovation production has been significantly increasing. Green production innovation has three basic dimensions of firm performance, these are: environmental performance, economic performance, and product performance. Therefore, it can be concluded that organizational performance can be influenced by green product innovation. Hence,

H3: The firm performance is significant effected by the green product innovation of the Thai motorcycle manufacturing firms.

H4: The green product innovation mediates between market demand and firm performance of the Thai motorcycle manufacturing firms.

The literature has characterized big data into 5Vs, namely velocity, variety, volume, value and veracity. The value and veracity factors are important because real value for big data is revealed through data analysis. Big data analytics (BDA) is established to extract knowledge from enormous data volume and taking decisions on the basis of hard data. Pharmapacks deliver those products which are expected to be available in a drug store. The company use Master Mind, a pricing software, for expanding its revenue and market share. With the use of this software, the prices are updated after every 45 minutes and the demand or sales forecasts and inventory is also managed through it. [18] also stated that Mercedes Benz apply predictive analytics for manufacturing cylinder heads in Untertürkheim, Germany, with an aim of examining above 600 parameters which are assumed to affect quality.

Since the past decade, BDA is certainly the most detailed area of applying digital technologies on the SCM. A few studies have examined the BDA's application on retail. Therefore, in order to expand market share and revenue margins, the retailer must strive hard continuously. One such way is to incorporate price optimisation models, since these models estimate the variation in demand following the rise or fall in price levels, and integrate the obtained information to the inventory data and relevant cost, and propose those prices which may bring maximum profits and revenue [19]. In prescriptive analytics application, optimisation is reported

to be a popular approach, particularly in the area of transportation and logistics. In SCM, the application of BPA can also be considered for manufacturing shop floors, routing optimisation, procurement process, safety management, in promotions during the omni-channel model, and monitoring of real-time traffic operations.

H5: The firm performance is significant effected by the big data analytics of the Thai motorcycle manufacturing firms.

H6: Big data analytics moderates between market demand and firm performance of the Thai motorcycle manufacturing firms.

3. Method and Measures

For hypotheses testing, Thailand's motorcycle industry is chosen as an empirical area of research. Surveying all the manufacturers in Thailand's motorcycle industry is practically non-feasible. Therefore, the current research used two criteria for narrowing down the number of potential respondents for the survey, i.e. a) Market, that is, firms which occupies a significant position in the motorcycle industry of Thailand, and b) Green, i.e. firms having a green motorcycle models' variety. Thus, four Thailand's motorcycle companies i.e. three foreign and one local company were identified after closely inspecting the motorcycle industry. Before the data collection process, instruments of the survey were tested in two stages, to confirm the content validity [20].

Initially, the questionnaires were sent to six experienced researchers for removing any ambiguity, or to assess the appropriateness and clarity of the items that were employed for each construct's operationalization. Therefore, to enhance appropriateness and clarity of the involved measures, the instrument has gone through some modifications. Subsequently, the survey was sent to five motorcycle industry's management executives through mail and were asked for reviewing the survey in terms of ambiguity, readability, completeness and structure. Afterwards, data for this study was obtained through conducting field study, for further empirical investigation. Afterwards, a multiple-source method was employed to identify the list of respondents [21]. For this purpose, only those respondents will be targeted which have basic knowledge about green product innovation, firm performance, and market demand. Thus, the targeted respondents include marketing director, CEOs, R&D managers, and manufacturing directors. For conceptual equivalence, the questionnaire was then translated into Thailand's, which was then translated back into English, using the services of independent translators. The items of the survey were extracted from the literature.

Thus, information and data were gathered from all firms, and face-to-face interviews were also conducted with manufacturing in-charge or executives and relative departments. Since, it is generally assumed that

administrators are the reliable source of information regarding basic green product innovation, organizational performance, and market demand. Feedback from the executives have improved the instruments' clarity. The interviews were conducted gradually between January to July 2019.

4. Results

In order to analyze the occurrence of any relationship between the conceptual model's constructs, the study employed Smart PLS-SEM. The PLS-SEM is a suitable alternative to first generation techniques, such as multiple regression, and it is a second-generation statistical technique. The multiple regression deals with a single endogenous variable whereas, the SEM can simultaneously estimate a set of endogenous variables involved in the model. According to [22], structural equation modeling has drawn considerable attention among researchers, particularly by behavioral science researchers. Since it allows to incorporate unobserved variables in the model, followed by the adoption of path analytic modeling.

The current research aims to determine all latent variables by their corresponding indicators. The latent variables are defined as the ones which are not able to be observed or measured directly and requires a set of measures or indicators for their approximation. Thus, the partial least square structural equation modeling integrates the measurement (outer) and the structural (inner) models, where the measurement or outer model assigns items for each construct, whereas, the structural model attempts to analyse the existing association among dependent and exogenous variables. Thus, SEM enables researchers to simplify, measure and predict nature of association among the latent set of constructs. Since, the goodness-of-fit measure is not reported as an appropriate measure for assessing the model validation, therefore, it is essential to observe other measures such as reliability/internal consistency, each item's content validity and item validity, discriminant as well as convergent validity to estimate the outer model. It has also been suggested that adding only few indicators such as only one or two, are insufficient, therefore, there must be at least two measured indicators for each latent variable, which would add more degrees of freedom in the estimation of complex models.

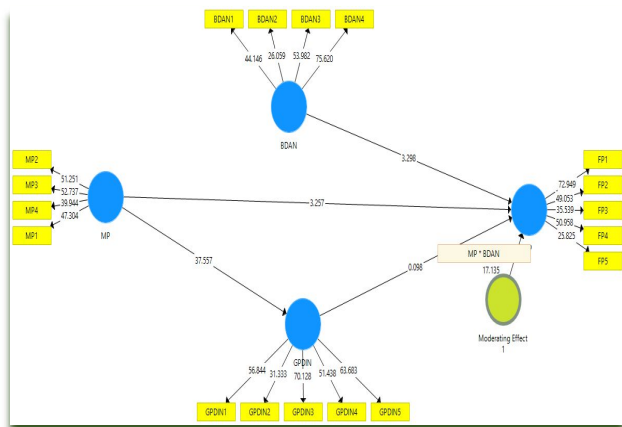


Figure 2. Outer model

Initially a confirmatory factor analysis was performed, in which researcher compares the actual model with the theoretical measurement model. Confirmatory factor analysis is the other name for measurement model assessment. However, the outcomes obtained from the CFA should correspond to the validity of the constructs. Afterwards, the composite reliability is performed for analysing the reliability and internal consistency for latent variables.

Table 1. Outer loading

	BDAN	FP	GPDIN	MP
BDAN1	0.897			
BDAN2	0.833			
BDAN3	0.907			
BDAN4	0.922			
FP1		0.926		
FP2		0.898		
FP3		0.881		
FP4		0.894		
FP5		0.839		
GPDIN1			0.918	
GPDIN2			0.874	
GPDIN3			0.929	
GPDIN4			0.906	
GPDIN5			0.925	
MP2				0.909
MP3				0.902
MP4				0.890
MP1				0.900

To ensure appropriate composite reliability, the recommended CR value must be CR >0.70 or above. One of the common tests for measuring internal consistency is the Cronbach alpha test to confirm the reliability of all constructs involved in the model, and the value for α must be above 0.70. For underlying model, all constructs exhibited reliability that is consistent with the threshold level [23].

Before proceeding to the structural model estimation, the convergent validity and discriminant validity were observed for analysing the outer or measurement model. [24] defined convergent validity as an extent where a measurement indicator or item positively correlates with another item of the same construct. For measuring convergent validity, average variance extracted (AVE) is generally used. Therefore, AVE was employed which indicated value of AVE>0.50 for all the indicators, thereby confirming the convergent validity. However, if the AVE<0 then it indicates that items of the constructs still involve some additional errors.

	Cronbach's Alpha	rho_A	CR	(AVE)
BDAN	0.913	0.918	0.939	0.793
FP	0.933	0.934	0.949	0.789
GPDIN	0.948	0.949	0.960	0.829
MP	0.922	0.922	0.945	0.810

Discriminant validity is defined as an extent that a construct is empirically different from another construct. The discriminant validity measure is also employed for analysing the existence of any correlation between the two concepts and their possibility of partial convergence. For accessing discriminant validity, Fornell-Larcker criterion was used [25]. According to [26], the construct must be capable of describing its own variance instead of other constructs' variance. The square roots of AVE were compared to the latent variables' correlations. [27] suggested that the AVE square roots should be higher than the other latent variables' correlations. Table3 shows the adequate discriminant level, since all the AVE's squares roots were in line with the given criteria.

	BDAN	FP	GPDIN	MP
BDAN	0.890			
FP	0.792	0.888		
GPDIN	0.791	0.749	0.891	
MP	0.884	0.778	0.872	0.900

Furthermore, for analysing the structural model, it is important to check for any collinearity issues among the indicators, since presence of such issues may cause problematic interpretations. For this purpose, the related measure is the variance inflator (VIF). According to [28], in PLS-SEM context, VIF>5 or tolerance level less than or equal to 0.2 indicates the presence of collinearity. However, no collinearity issue was detected in current research [29].

Subsequent to collinearity detection test, the next step is to analyse the structural model through key measures, such as, significance of path-coefficients, coefficient of

determination or predictive power, and the predictive relevance.

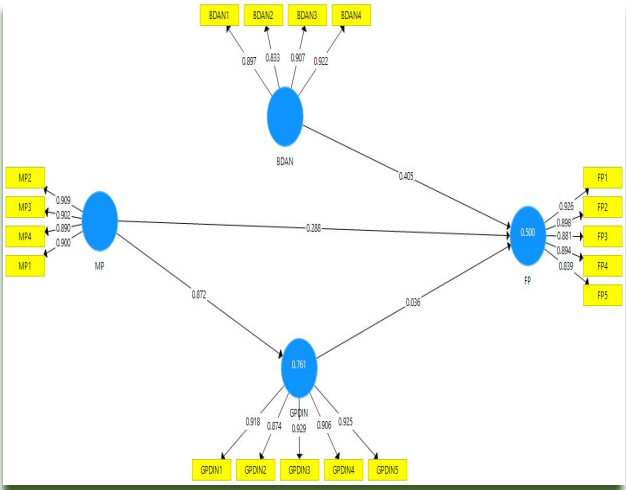


Figure 3. Structural model

Thus, for the structural model estimation, a systematic analysis was carried out to clearly depict the outcomes of hypotheses testing. Thus, evaluation of the inner model is done through observing the direct linkage among the set of dependent and independent variables. The size of path coefficients was determined by performing bootstrapping method through PLS-SEM Algorithm. Afterwards, the significance of these linkages was also checked through SmartPLS adoption. The original number was used for the number of cases, while 5000 samples were used for bootstrapping procedure [29].

Table 4. Direct and moderation results

	Beta	(M)	(STDEV)	t	P Values
BDAN -> FP	0.457	0.455	0.139	3.298	0.000
GPDIN -> FP	0.009	0.003	0.097	0.098	0.461
MP -> FP	0.358	0.355	0.110	3.257	0.001
MP -> GPDIN	0.872	0.872	0.023	37.557	0.000
Moderating Effect 1 -> FP	0.484	0.084	0.063	1.346	0.089

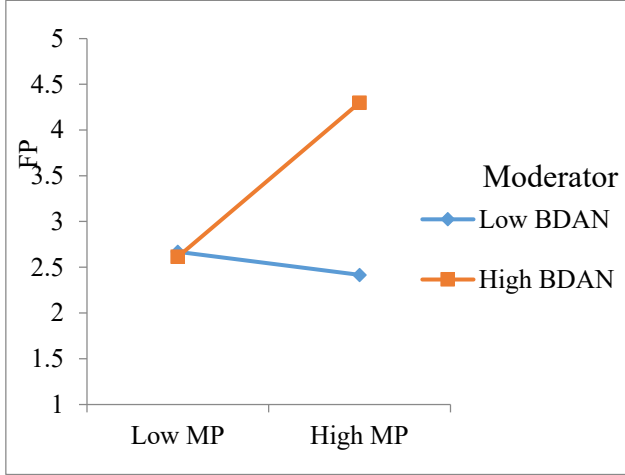


Figure 4. moderating effect of the big data analytics

Table 5. mediation

	Beta	(M)	(STDEV)	t	P Values
MP -> GPDIN -> FP	0.008	0.002	0.085	3.257	0.001

For assessing the predictive power of the model, coefficient of determination (R^2) was employed. Its' value ranges from 0-1, here, 1 signifies greater predictive accuracy and 0 signifies no or zero predictive accuracy. In current study, the endogenous variable is found to be 48.7% explained by the set of underlying independent variables involved in the model.

Table 6. R-Square

	R Square
FP	0.500
GPDIN	0.761

After the R^2 valuation, a cross-validated redundancy measure or Stone-Geisser test (Q^2) was performed for assessing the predictive relevance of the exogenous latent constructs. This measure is generally computed through carrying out a blindfolding procedure. The Q^2 of blindfolding represent the measure of how well the path model can predict the originally observed variables. It must exhibit value greater than 0.5 to be regarded as predictive model, otherwise if it exhibits value below 0.5 then is signifies no predictive relevance of the model. The values obtained for Q^2 are as follows:

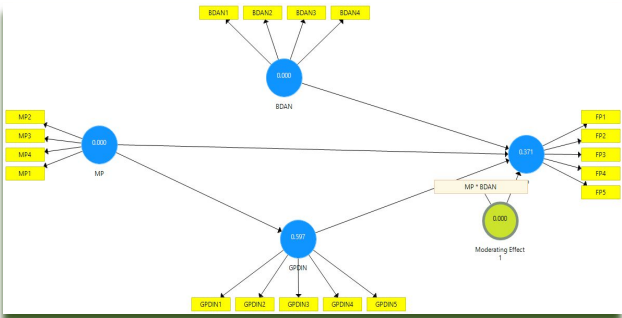


Figure 5. Blindfolding

5. Dissuasions

The results show that firm performance and green product innovation are significantly affected through market demand. In addition, positive correlation was found among firm performance and performance of green product innovation. Hence, the results support the hypotheses 1-3. Putting differently, the greater the consideration of market demand, the greater will be the firm performance and green product innovation performance. The study also revealed the partial and positive mediation of green product innovation performance in the firm performance and market demand relationship [12].

The present research theoretically as well as methodologically contributed in the existing literature, particularly, in the Thailand's motorcycle industry. It is obvious that adopting green product innovation in highly competitive market is imperative, since it facilitates in achieving competitive advantage and product differentiation [1]. Although, the results have shown that it is important for firms to understand the requirements of its consumers, followed by the alignment of product innovation initiatives to the values of consumers. In the recent green conscious competitive environment, brand identity and design, price, fuel consumption, and exhaust emission are some of the important criteria which are generally considered by consumers while taking a motorbike purchasing decision.

Price of fuel is increasing all the time, in addition, availability of fuel is limited, particularly gasoline. Nowadays, consumers demand goods that are manufactured through environmentally friendly production processes. Therefore, a successful green product innovation depends largely upon sustainable business processes and its market demand appreciation. The results obtained from this study revealed that more attention should be given by the motorcycle firms to the economic, environmental and their product performance [30]. Economic and product performance are essential to successfully attain green product innovation, whereas, environmental performance signifies as a consequence or an outcome.

Thus, manufacturers must develop new motorbike technology that is environmentally friendly and should also improve their quality to secure leadership position and surpass their competitors. However, the new designs must be eye-catching, practical and impressive, such as its U-box should have a storage space for at least one helmet. Furthermore, unnecessary production costs must also be reduced for achieving lower prices. Putting differently, the current study signifies that for the manufacturing firms in motorcycle industry, green product innovation serves as a significant strategy for attracting more customers, enhancing market position and competitive advantage to

fully understand the market demand [31]. In addition, some areas have also been identified by [32] which would make the BDA application possible in SCM in coming years. These include order picking, in-transit inventory management and dynamic vehicle routing, quality control manufacturing, and warehouse inventory control system. Furthermore, BDA is found to be helpful in disaster resistance and in enhancing the risk management in the SC. Another study has attempted to analyse BDA and the computer-assisted textual analysis, as well as its application in the transportation and logistics system.

6. Conclusion and limitations

The results show that firm performance and green product innovation are significantly affected through market demand. In addition, positive correlation was found among firm performance and performance of green product innovation. Hence, the research findings have supported all the hypotheses proposed in this study. Alternatively, product innovation and firm performance are found to be regulated by market demand. Therefore, improving economic and product performance and achieving sustainable environmental performance are imperative particularly for the motorcycle industry.

For managers, the current research emphasizes the strategic significance of green product decisions. It also explains that firm performance and green product innovation must also integrate knowledge of market demand as important consideration. The result shows that more focus should be given to market demand by Thailanders motorcycle manufacturers for comprehensive understanding of the interrelated and complicated market demand criteria, firm performance, and green product innovation and must also determine the expected demand for green products. The results have revealed that integrating green product innovation indicates the occurrence of latter mechanisms, i.e. investing more for satisfying the market needs [33].

The current study contributes in the literature as follows: 1) this study attempts to consider the market demand perspective for analysing how green product innovation orientation by a firm is affected by customer value, resulting in its influence on the firm performance. 2) This research examines the customer response against market offerings by motorcycle manufacturers, particularly in the form of new product launch. The results suggested that in order to achieve greater market performance, firms must surpass its competitors in green innovation. In other words, meeting customer needs and requirements is critical for improving firm performance.

Just like other studies, this study also involves some limitations. Since this study particularly emphasizes upon Thailand's motorcycle manufacturing industry, therefore, the outcomes can be generalized in other markets, such as Asian motorcycle markets. Furthermore, other Thailand's

industries such as automotive industry or a comparative study can also be performed in future. The three main constructs that were chosen after reviewing the literature may be incomprehensive. Thus, in future researches, wider variables can be incorporated for comprehensively analysing the impact of green product innovation, firm performance, and market demand [34].

References

- [1] X. Xie, J. Huo and H. Zou, "Green process innovation, green product innovation, and corporate financial performance: A content analysis method," *Journal of Business Research*, Vol. 101, pp. 697-706, 2019.
- [2] M. Tang, "Green innovation, managerial concern and firm performance: An empirical study," *Business Strategy and the Environment*, Vol. 27, No.1, pp. 39-51, 2018.
- [3] F. Eggers, "To network or not to network—Is that really the question? The impact of networking intensity and strategic orientations on innovation success," *Technological Forecasting and Social Change*, 2018.
- [4] H.-J. Chou and C.-H. Lin, "A case study of innovation of the versatile hat," *International Journal of Systematic Innovation*, Vol. 3, No.4, 2016.
- [5] L. Ardito and R.M. Dangelico, "Firm environmental performance under scrutiny: The role of strategic and organizational orientations," *Corporate Social Responsibility and Environmental Management*, Vol. 25, No.4, pp. 426-440, 2018.
- [6] H.V. Nguyen, C.H. Nguyen and T.T.B. Hoang, "Green consumption: Closing the intention-behavior gap," *Sustainable Development*, Vol. 27, No.1, pp. 118-129, 2019.
- [7] R. Chierici, *Transforming big data into knowledge: The role of knowledge management practice*. Management Decision, 2018.
- [8] F. Le Roy, F. Lasch and M. Robert, *Are competitors the best partners in innovation networks?* Routledge Companion to Coopetition Strategies, 2018.
- [9] J. Hussain, K. Ismail and C.S. Akhtar, "Market orientation and organizational performance: case of Pakistani SMEs," *Arabian Journal of Business and Management Review*, Vol. 5, No.5, pp. 1-6, 2015.
- [10] E.A. Severo, J.C.F. de Guimarães, and E.C.H. Dorion, "Cleaner production and environmental management as sustainable product innovation antecedents: A survey in Brazilian industries," *Journal of Cleaner Production*, Vol. 142, pp. 87-97, 2017.
- [11] D. Wahyuni and J. Ratnatunga, "Carbon strategies and management practices in an uncertain carbonomic environment—lessons learned from the coal-face," *Journal of Cleaner Production*, Vol. 96, pp. 397-406, 2015.
- [12] R.M. Dangelico, D. Pujari, and P. Pontrandolfo, "Green product innovation in manufacturing firms: A sustainability-oriented dynamic capability perspective," *Business Strategy and the Environment*, Vol. 26, No.4, pp. 490-506, 2017.
- [13] J. Przychodzen and W. Przychodzen, "Relationships between eco-innovation and financial performance—evidence from publicly traded companies in Poland and Hungary," *Journal of Cleaner Production*, Vol. 90, pp. 253-263, 2015.
- [14] C. Lyall, *New modes of governance: developing an integrated policy approach to science, technology, risk and the environment*. Routledge, 2017.
- [15] K.R. Nielsen, L.A. Reisch and J. Thøgersen, "Sustainable user innovation from a policy perspective: A systematic literature review," *Journal of Cleaner Production*, Vol. 133, pp. 65-77, 2016.
- [16] R.M. Dangelico, "What drives green product development and how do different antecedents affect market performance? A survey of Italian companies with eco-labels," *Business Strategy and the Environment*, Vol. 26, No.8, pp. 1144-1161, 2017.
- [17] R. Panwar, "The effect of small firms' competitive strategies on their community and environmental engagement," *Journal of Cleaner Production*, Vol. 129, pp. 578-585, 2016.
- [18] D. Ivanov, A. Dolgui, and B. Sokolov, "The impact of digital technology and Industry 4.0 on the ripple effect and supply chain risk analytics," *International Journal of Production Research*, Vol. 57, No.3, pp. 829-846, 2019.
- [19] Y. Díaz-Mateus, "Pricing and lot sizing optimization in a two-echelon supply chain with a constrained Logit demand function," *International Journal of Industrial Engineering Computations*, Vol. 9, No.2, pp. 205-220, 2018.
- [20] P.H. Rossi, M.W. Lipsey and G.T. Henry, *Evaluation: A systematic approach*. Sage Publications, 2018.
- [21] H. Bayer, M. Aksogan, E. Celik and A. Kondiloglu, "Big data mining and business intelligence trends," *Journal of Asian Business Strategy*, Vol. 7, No. 1, pp. 23-33, 2017.
- [22] D. Skoumpopoulou, "Factors that affect the acceptance of new technologies in the workplace: A cross case analysis between UK and Hong Kong," 2018.
- [23] S. Hosany, "Measuring tourists' emotional experiences: Further validation of the destination emotion scale," *Journal of Travel Research*, Vol. 54, No.4, pp. 482-495, 2015.

- [24] M. Sarstedt, "Estimation issues with PLS and CBSEM: Where the bias lies!," *Journal of Business Research*, Vol. 69, No.10, pp. 3998-4010, 2016.
- [25] N. Tzempelikos and S. Gounaris, *A conceptual and empirical examination of key account management orientation and its implications—the role of trust*, in *The Customer is NOT Always Right? Marketing Orientations in a Dynamic Business World*. Springer. pp. 673-681, 2017.
- [26] M. Sarstedt and J.-H. Cheah, "Partial least squares structural equation modeling using SmartPLS: A software review," *Journal of Marketing Analytics*, pp. 1-7, 2019.
- [27] G. Shmueli, "Predictive model assessment in PLS-SEM: Guidelines for using PLSpredict," *European Journal of Marketing*, 2019.
- [28] Hair, *A primer on partial least squares structural equation modeling, No.PLS-SEM*. Sage Publications, 2016.
- [29] Shah and N.A. Rahim, "Effect of ethical climate on corporate financial performance in Pakistan: An application of confirmatory tetrad analysis , No.CTA-PLS) approach," *Journal of Studies in Social Sciences and Humanities*, Vol. 5, No.2, pp. 53-67, 2019.
- [30] S M. S. Anyiendah, P. A. Odundo and A. Kibui, "Aspects of the interactive approach that affect learners' achievement in reading comprehension in Vihiga County, Kenya: A focus on background knowledge," *American Journal of Social Sciences and Humanities*, Vol. 4, No. 2, pp. 269-287, 2019.
- [31] G. Lancaster and L. Massingham, *Product and innovation strategies*, in *Essentials of Marketing Management*. Routledge. pp. 92-135, 2017.
- [32] D. Arunachalam, N. Kumar and J.P. Kawalek, "Understanding big data analytics capabilities in supply chain management: Unravelling the issues, challenges and implications for practice," *Transportation Research Part E: Logistics and Transportation Review*, Vol. 114, pp. 416-436, 2018.
- [33] J.-W. Huang and Y.-H. Li, "Green innovation and performance: The view of organizational capability and social reciprocity," *Journal of Business Ethics*, Vol. 145, No.2, pp. 309-324, 2017.
- [34] S.-P. Chuang and S.-J. Huang, "The effect of environmental corporate social responsibility on environmental performance and business competitiveness: The mediation of green information technology capital," *Journal of Business Ethics*, Vol. 150, No.4, pp. 991-1009, 2018.
- [35] D. W. Ariani, "Good soldiers and good actors: Is there any differences? ," *International Journal of Asian Social Science*, Vol. 7, No. 1, pp. 31-44, 2017.