IT Capability and Business Data Analytics Affect Firm Performance through Market Orientation

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Abstract **- Information technology (IT) becomes more important for business operation. Data management and marketing capability also support the better firm performance. This research aims to study the utilization of IT capability and business data analytics though market orientation to improve firm performance. A survey conducts to collect data from the manufacturing industry in Thailand, and a total valid sample of 250 respondents. The finding of this study found that IT capability (ITC) positively effects on firm performance (FPM) when mediated by marketing orientation (MKO). ITC positively effects on MKO likewise MKO and FPM. While, ITC has no direct effects on FPM. BDA positively effects on MKO and FPM.**

Keywords **- IT Capability, Business Data Analytics, Market Orientation, Firm Performance, Manufacturing Industry**

I. INTRODUCTION

The digital business environment has played more important roles in Thailand. The government's policy enhances Thailand's competitiveness on the global level. Therefore, businesses need to adapt to the situation by enhancing efficiency and gaining competitive advantage and improve firm performance for business survival. Most of business sectors have more tools to operate their business successfully with efficiency and effectiveness. The rapidly changed business operation nowadays, there has been accepted that information technology (IT) has become more important factor for business. According to Mithas, et al. [1] state that the contributions of IT capability and firm performance which are IT provided data and information with accuracy, timeliness, reliability, and confidentiality to users, and performance, customer, and process management capability are the links between IT and firm performance. Lu and Ramamurthy [2] also support that IT capability is a firm's ability to acquire, deploy, combine, and reconfigure IT resources in supporting business strategies and work processes.

Data management is considered one of the prominent tools for business operation in the digital business environment. When good data managed, it created a competitive advantage and increase productivity. Ularu, et al. [3] claimed that data storing might not generate business value. Data analytics is a process of examining large data sets containing a variety of data types to help organizations analyze structured, semi-structured and unstructured data for valuable business information and insights [4]. Data analytics provide competitive advantage and firm performance [5]. However, some studies find that IT has positive effects on firm performance, while some find the negative effects, and also others find no effects [6, Dedrick, et al. [7-8].

While, IT management can improve the efficiency of working, the marketing management concepts can be more productive. According to Borges, et al. [9] suggest that IT strategies can positively influence market orientation and can enhance the firm market orientation behaviors. Narver and Slater [10] infer that market orientation (MO) consists of three behavior components which are customer orientation, competitor orientation, and inter functional coordination with two dimension criteria which are long term focus and profitability. Market orientation can be described as a set of behaviors and processes [11].

The resource-based view (RBV) perspective is the factor that help to improve firm performance and competitive advantage. This study focuses RBV as the fundamental theory in order to make this research more reliable. Bharadwaj [12] declares that RBV explicate the nature of a firm's IT capability and its relationship to firm performance. This theory examines the relationship between IT capability and market orientation influence firm performance. Melville, et al. [13] found that researchers have applied RBV to theoretically analyze for competitive advantage implications of information technology and other firm resources. RBV is a potential of firms to operate resource that are valuable, rare, difficult to imitate and non-substitutable by other resources [12, 14].

The main focus of this research is to study the effects of IT capability and business data analytics influenced firm performance through market orientation.

II. LITERATURE REVIEW

A. Information Technology Capability (ITC)

The resource-based view (RBV) started to appear in IS research in the mid-1990s [15]. Most of research has attempted to identify and define either a single IS resource or sets of IS resources. According to Ross, et al. [16] divide IS into three IT assets which together with IT processes those contribute to business value. These three IT assets are human assets such as technical skills, business understanding, problem-solving orientation, technology assets such as physical IT assets, technical platforms, databases, architectures, standards, and relationship assets such as partnerships with other divisions, client relationships, top management sponsorship, shared risk and responsibility. IT processes are defined as planning ability, cost effective operations and support, and fast delivery.

Wade and Hulland [15] define resources as assets and capabilities that are available and useful in detecting and responding to market opportunities or threats. Assets and capabilities also define as the set of resources available to the firm. As result, IT capability can be defined as firm's ability to acquire, deploy, combine, and reconfigure IT resources in support and enhancement of business strategies and work processes [17]. However, Lu and Ramamurthy [2] find that there are three IT capabilities which are IT infrastructure capability, IT business spanning capability, and IT proactive stance. Bharadwaj [12] define IT capability including IT infrastructure, human IT resources, and IT-enabled intangibles.

B. Business Data Analytics (BDA)

Business data analytics has been getting rapidly more popular than any other managerial paradigms in recent years [18]. Business analytics considered as the activities which explored and investigated the past and current business performance to get insight and drive business planning. Song, et al. [19] Cook and Nagy [20] stated the main phases on business analytics which were descriptive analytics, predictive analytics and prescriptive analytics. Descriptive analytics commonly used and most well understood type of analytics. The main objective of descriptive analytics step was to help researchers figure out person's current status [19]. It consisted of activity history analysis. Descriptive analytics was more data-driven than the other models. It also called business reporting which used the data to answer the question of what happened and/or what is happening? [18]. Predictive analytics slightly more advanced type of analytics and emphasized the use of information. Predictive analytics looked at the past performance in order to predict the future by examining

historical or summarized data, detecting, and then read these relationships to forecast [21]. Assunção, et al. [22] stated that predictive analytics attempted to predict the future by analyzing current and historical data. Prescriptive analytics used descriptive analytics to optimize for the best possible outcome given the original data and results of the models and simulations [20]. It was also normative, addressing the question of what should be. Assunção, et al. [22] supported that prescriptive solutions assisted analysts in decisions by determining actions and assessing their impact regarding business objectives, requirements and constraints.

C. Market Orientation (MKO)

Market orientation has been viewed as customer needs and firm generates, disseminates, and responds to market intelligence [23]. Borges, et al. [9] stated that a market oriented organization is one whose action are consistent with the concept of marketing. In addition, Gheysari, et al. [24] defined market orientation as a succession of behaviors based on information and a culture of customer and competitor orientates inter-functional co-ordination. Gheysari, et al. [24] also mentioned that the significant roles in determining the success of an organization are the buyer power and the rivalry among competitors this related to the five competitive forces model of Porter. Market orientation concepts also have been expanded to both concerns with regard to the customers, competitors and firm's environment. However, Green and Inman [25] claimed that customer focus is essential to the idea of market orientation rather than competitors.

There are two concepts of market orientation contributed by Narver and Slater, and Kohli and Jaworski. Narver and Slater [10] concluded that market orientation consists of three behavioral components which are customer orientation, competitor orientation, and inter-functional coordination with two decision criteria are long term focus and profitability. While, Kohli and Jaworski [11] defined market orientation as the organization-wide generation, dissemination, and responsiveness to market intelligence. In addition, Martin, et al. [26] claimed that market orientation is the fundamental aspect of an organization's culture that defines competitive value, norms, artifacts, and behaviors that collectively created the opportunity for competitive advantage to the firms.

D. Firm Performance (FPM)

Firm performance was a broad concept which could be identified as financial and non -financial some studies enhance understanding of firm performance as customer satisfaction and market performance [27]. Tseng and Liao [28] studied on the performance measurement reflect two main perspectives which are subjective and objective concepts. Golden [29] stated that subjective concept is a primarily concerned with the performance of a business relative to its competitors. The objective concept is based on absolute measures of performance [30]. In the research of Tseng and Liao [28] identified firm performance as market performance, finance performance, and customer service. In the research of Han, et al. [31] identified business performance as assessed on growth and profitability. Cambra-Fierro, et al. [32] also opted customer satisfaction, customer loyalty, well-known branding, market share and economic profit as performance measurements. Javalgi, et al. [33] stated that as the firm becomes increasingly market orientation the positive strategic outcomes of customer relationship management including satisfaction, loyalty, retention and ultimately enhanced customer lifetime value are the final results. The investigation on firm performance in this study is on profitability, market share, customer satisfaction, and customer loyalty.

III. HYPOTHESES DEVELOPMENT

Mithas, et al. [1] suggested that information management capability effects various measures of firm performance. They also supported that well developed IT infrastructure and IT investment are the factors for business excellence. Byrd and Davidson [34] also found that IT did lead to better firm performance as measured by ROI, ROE and market value. However, Jaturat [35] found on his research that IT investment had positively affected to

firm performance. MOUTHAAN [36] emphasized that data analytics improves product and service leading to advantage for customers and firm performance. Proposed hypotheses are:

H_1: ITC positively effects on FPM.

H_2: ITC positively effects on BDA.

H_3: BDA positively effects on FPM

According to Borges, et al. [9] found that IT capability has positively influenced on business performance with adequate market orientation. Lu and Ramamurthy [2] found that IT capability enables market capitalizing agility and operational adjustment agility. Proposed hypothesis is:

H_4: ITC positively effects on MKO.

H_5: BDA positively effect on MKO

Shoham, et al. [37] explored the relationship between market orientation and firm performance. They found a positive relationship for both factors. Javalgi, et al. [33] stated that market orientation has been linked to positive organizational performance. Kuntonbutr [38] found that the relationship between market orientation and business performance through innovations had positively affected. Proposed hypothesis is:

H_6: MKO has positively direct effects on FPM.

IV. RESEARCH METHODOLOGY

A. Population and Sampling

This research aimed to study on manufacturing industry in Thailand which were electronics, electrical, machinery, automotive, and consumer products manufacturing. The business firms were listed in the Department of Business Development, Ministry of Commerce of Thailand. A random sample of 1,300 organizations was selected. The mailing survey and online questionnaires were tools for data survey. The number of respondents was 250 organizations.

B. Latent Variable and Observe Variables

The survey conducted the thirteen variables on a seven-point Likert scale questions. The IT capabilities (ITC) latent variable comprised of IT infrastructure (IT1), human IT resource (IT2), and IT-enabled intangibles (IT3). The business data analytics (BDA) latent variable comprised of descriptive analytics (BD1), predictive analytics (BD2), and prescriptive analytics (BD3). The market orientation (MKO) latent variable comprised of customer orientation (MO1), competitor orientation (MO2), and inter-function coordination (MO3). The firm performance (FPM) latent variable comprised of profitability (FP1), market share (FP2), customer satisfaction (FP3), and customer loyalty (FP4).

C. Convergent Validity and Discriminant Validity

The convergent and discriminant validity have been tested in prior to the evaluation with SEM. The convergent validity was measured with confirm factor analysis. The model with convergent validity when the factor loading value was more than 0.6 and the average variance extracted (AVE) was more than 0.5 [39]. The factor loading values range from 0.63 to 0.99 while the AVE values from the study range from 0.649 to 0.725.

The assessment of discriminant validity is evaluated by comparing the AVE value with squared correlation between variables [40]. Fornell and Larcker [41] suggested that the values of squared root AVE should be more than squared correlation values as to be valid. Table I, showed the values of discriminant validity. The AVE values from each latent variable were more than the level of correlation involved.

TABLE I
THE SQUARED CORRELATIONS

	ITC	BDA	MKO	FPM
ITC	**0.84**			
BDA	0.77	**0.84**		
MKO	0.67	0.80	**0.84**	
FPM	0.57	0.78	0.80	**0.81**

Table II, showed the assessment of the model fit indicators. The results of the measurement model indicated the Normed Chi-Squared fit index derived from Chi-Square/degrees of freedom (χ^2/df) is 2.057, indicating a good model fit between the data and hypothetical model [42]. The Goodness of Fit Index (GFI) value was 0.936 and the Adjusted Goodness of Fit (AGFI) value was 0.892. The Value of Root Means Square Error of Approximation (RMSEA) was 0.065. The Normed Fit Index (NFI) was 0.958, and Comparative Fit Index (CFI) value was 0.978. All these values were acceptable for model [43].

TABLE II
MODEL FIT INDICATORS

Chi-square/ Degree of freedom (CMIN/df)	2.057
Goodness of Fit Index (GFI)	0.936
Adjusted Goodness of Fit Index (AGFI)	0.892
The Root Means Square Error of Approximation (RMSEA)	0.065
NFI	0.958
Comparative Fit Index (CFI)	0.978

V. RESEARCH RESULTS

This study conducted a structural equation model (SEM) to determine the test of the proposed hypotheses. To measure the presence of standardized direct effect, the hypotheses has been developed that the dependent variable which was ITC would have positive relationship with FPM (H_1), ITC positively affects to BDA (H_2), BDA positively affects to FPM (H_3), ITC positively affects to MKO (H_4), BDA positively affects to MKO (H_5), and MKO positively affects to FPM (H_6). The results indicated ITC has no relationship with FPM (H_1) at -0.083 (p>0.05) and MKO (H_4) at 0.001 (p>0.05). The H_2: ITC positively direct effects to BDA at 0.843 (p<0.05). The H_3: BDA positively direct effects to FPM at 0.234 (p<0.05). The H_5: BDA positively direct effects to MKO at 0.822 (p<0.05). The H_6: MKO positively direct effects to FPM at 0.500 (p<0.05). The fig. 1, shows the results of the research model.

However, Table III, showed the standardized indirect effect between the ITC and FPM (H_1). The result indicated that there was an indirect effect at 0.685. The standardized indirect effect between the ITC and MKO (H_4), the result indicated that there was an indirect effect at 0.699.

TABLE III
STANDARDIZED EFFECTS

	Standardized Direct Effect			Standardized Indirect Effect			Standardized Total Effect		
	ITC	BDA	MKO	ITC	BDA	MKO	ITC	BDA	MKO
BDA	0.787	-	-	-	-	-	0.787	-	-
MKO	0.000	0.888	-	0.699	-	-	0.699	0.888	-
FPM	-0.105	.316	.625	0.685	0.555	0.000	0.580	0.871	0.625

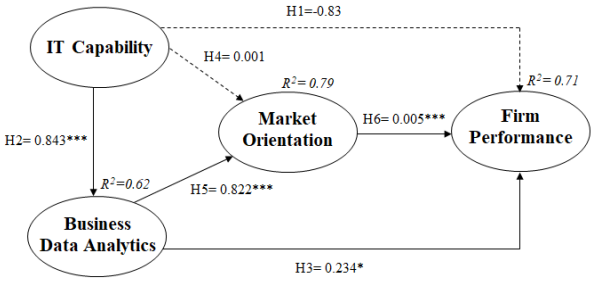

Fig. 1 Research Model Results

The model showed reasonable predictive ability as it explained 62 percent of the variance in BDA, 79 percent of the variance in MKO, 71 percent of the variance in FPM.

VI. CONCLUSION AND DISCUSSION

The finding of this study found that ITC has positively effects on FPM when mediated by MKO. ITC positively effects on MKO likewise MKO and FPM. While, ITC has no direct effects on FPM. BDA positively effects on MKO and FPM. The results supported the finding of Borges, et al. [9] which found that IT capability has positively influence business performance with adequate market orientation. Lu and Ramamurthy [2] also found that IT capability enables market capitalizing agility and operational adjustment agility. Kamioka, et al. [44] found the positive relationship between big data analytics and firm performance. Moreover, the results of the relationship between market orientation and firm performance conformed with the research results of Shoham, et al. [37], Javalgi, et al. [33], and Kuntonbutr

[38]. However, the result of ITC and FPM in this study was not supported the research of Mithas, et al. [1], Byrd and Davidson [34], and Jaturat [35].

According to the results, firm performance improves when IT capability comprise with business data analytics and market orientation. Businesses need to focus on the data analytics and marketing concepts along with the implementing IT plan. The information on customer needs, customer satisfaction and service quality should be monitored and reviewed to gain competitive advantage and better firm performance [45]. IT strategic utilization such as internet based technologies and e-commerce can positively influence market orientation by supporting the marketing activities [46-47]. Day [48] stated that technological leadership is an essential condition for success. For the firm to take advantage of this chance, the leadership needs to be part of market orientation. Min, et al. [46] also supported that internet technologies are able to transform a traditional market orientation into more efficient and effective market orientation. Borges, et al. [9] agreed that internet technology is necessary for gathering information on environmental changes, for sharing information and knowledge, and for developing market focused responses to support market orientation behaviors.

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(Arranged in the order of citation in the same fashion as the case of Footnotes.)

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