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Table of Contents i

Journal of Economics and Business Editorial Board iii

Urban Happiness from Mobility in Neighborhoods and Downtown: The Case of the Metropolitan Area of Aburra Valley 1
Ángel Emilio Muñoz Cardona, Lorena Martínez Soto, Mauricio Manrique Miranda

The Socio-Economic Ramifications of the Covid-19 Pandemic: The Case of Ghana 12
Richmond Sam Quarm, Rosemond Sam-Quarm, Richmond Sam-Quarm

IT Freelancing in Bangladesh: Assessment of Present Status and Future Needs 33
S. M. Shahedul Alam, Ahmed Rizvan Hasan, Tanmay Borman

Comparative Analysis of Financial Sustainability Using the Altman Z-Score, Springate, Zmijewski and Grover Models for Companies Listed at Indonesia Stock Exchange Sub-Sector Telecommunication Period 2014 – 2019 57
Samrony Eka Fauzi, Sudjono, Ahmad Badawi Saluy

TMT Characteristics and Organizational Performance in a Regulatory Setting in Kenya 79
Joseph O. Oketch, James M. Kilika, Godfrey M. Kinyua

Institutional Ownership, External Auditor Reputation, Financial Leverage, and Earnings Management 93
Ngakan Made Kutha, Marcellia Susan

Investment Decisions: The Results of Knowledge, Income, and Self-Control 100
Siska Atmaningrum, Dwi Sunu Kanto, Zainul Kisman

Conceptualizing Strategic Innovation in a Firm Context: A Theoretical Review and Research Agenda 113
Josephine K. Mulaa, James M. Kilika, Mary J. Namusonge

Effect of ICT on Women Entrepreneur Business Performance: Case of Malaysia 137
Filzah Md Isa, Nik Maheran Nik Muhammad, Azizah Ahmad, Shaista Noor

Barking Up the Wrong Tree: SMEs' Perception of Tax using the ZMET Method 147
Novita Puspasari, Eliada Herwiyanti, Margani Pinasti

The Influence of Leadership Style on Managerial Performance of Village Governments with Motivation as Mediation 157
Afrizal Tahar, Muhammad Akhid Abdillah

Journal of Economics and Business
ISSN 2615-3726 (Online)
ISSN 2621-5667 (Print)

Transformational Leadership and Organizational Success: Evidence from Tertiary Institutions 170
Okoli Ifeanyi E. Nuel, Nnabuife Ezimma K., Adani Nnenne Ifechi, Ugbo Ifeoma Emmanuella

The Effect of Perceived Value and Service Quality on Depositor Loyalty 183
Audi Putri Kamajaya, Agus Aribowo

An Empirical Analysis of Key Antecedents of Workforce Diversity on Job Performance in Nigeria 193
Helen Elena Jekelle

The Impact of OJK Regulation No. 48/POJK.03/2020 on the Quality of Credit and Risk Management of Banking Credit 204
Christanto Arief Wahyudi, Evi Aryati Arbay

Should Ghana Legalize the Commercial Use of Motor Bikes and Tricycles as Means of Public Transport? A Case Study of Five Selected Regions in Ghana 214
John Kwane Adu Jack, Emmanuel K. S. Amoah, Eric Hope, Frimpong Okyere

The Relationship Between Work Pressures and Audit Performance in Tunisia 240
Nesrine Akrimi

Analysis of the Effect of Business Intelligence on Competitive Advantage through Knowledge Sharing and Organizational Innovation in Export Companies 245
Titik Kusmantini, Tri Mardiana, Rendy Pramudita

Leadership Styles Dimensions and Organizational Commitment Nexus: Evidence from a Public Sector in Nigeria 255
Helen Elena Jekelle

Oil and Mortality 272
Bahram Sanginabadi

Influence of Marketing Strategies on the Performance of SMEs: Evidence from Abuja SMEs 294
Hindu Jibril Amin

Perceptions of Micro, Small and Medium Entrepreneurs on the Importance of Fair Presentation of Financial Statements with the Implementation of SAK EMKM as a Moderation Variable 308
Devid Putra Arda

Journal of Economics and Business
ISSN 2615-3726 (Online)
ISSN 2621-5667 (Print)

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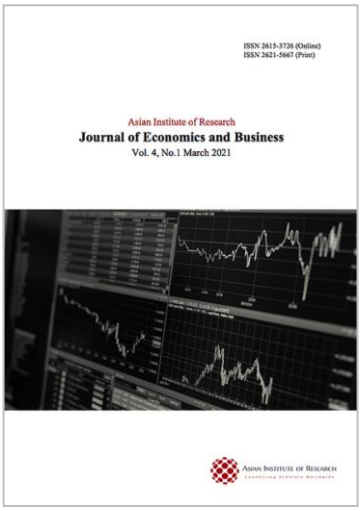

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Analysis of the Effect of Business Intelligence on Competitive Advantage through Knowledge Sharing and Organizational Innovation in Export Companies

Titik Kusmantini[1], Tri Mardiana[2], Rendy Pramudita[3]

[1,2] Lecturer, Faculty of Businees and Economic, UPN "Veteran" Yogyakarta
[3]Student at Management Study Program, UPN "Veteran" Yogyakarta

Correspondence Email: titik.kusmantini@upnyk.ac.id

Abstract
This study aims to analyze the effect of business intelligence on competitive advantage through knowledge sharing and organizational innovation in export companies in the Special Region of Yogyakarta. The list of companies was obtained from the Industry and Trade Office. The variables used in this research were business intelligence, competitive advantage, knowledge sharing, and organizational innovation. This study uses a sample of 83 companies, using puporsive sampling technique and data analysis techniques using Partial Least Square (PLS). The results of this study indicate that Business Intelligence has a positive effect on three other variables, namely knowledge sharing, organizational innovation, and competitive advantage, and that knowledge sharing and organizational innovation have a positive effect on competitive advantage. In addition, knowledge sharing and organizational innovation are able to mediate the effect of Business Intelligence on competitive advantage.

Keywords: Effect of Business Intelligence, Competitive Advantage, Knowledge Sharing, Organizational Innovation

INTRODUCTION

Globalization is marked by the countries' integration in the fields of culture, economy, resources, and information technology. Economic globalization encourages international and regional trade cooperation agreements that lead to the creation of a more integrated market and international trade that have an impact on each of the countries involved (Sari & Suhadak, 2017).

Sharma et al (2014) defines economic globalization as a process of integrating the national economy into a global economic system. This process is demonstrated by the increasing openness of a country's economy to international trade, which in turn will create economic relations that influence each other and shape the trade between the countries through the flow of traffic of goods and services. Consequently, government control will increasingly diminish because the globalization process is driven by global market forces, rather than policies or regulations issued by an individual government. International trade activities will affect the economic growth of a country because all countries compete in the same international market (Ritala and Ellonen, 2010).

Globalization has driven the competition which is increasingly unavoidable by countries in the world. Due to free trade, the flow of information, goods and services among countries continues to increase so that it has an impact on economic growth. Nowadays, all companies are trying to stay profitable and confront their competitors, but they face different internal and external challenges. Externally, they face opportunities and

threats posed by increasing domestic and global competition such as better-informed customers, higher expectations, and rapid technological advances. Internally, they are meeting more pressure: they have to reduce costs to increase efficiency and effectiveness through improving customer service and creating more customer value.

Most of today's business activities such as manufacturing facilities, cash flow, capital, and distribution networks involve some form of global interaction. This indicates that every company must be managed in such a way as to compete in a global environment (Cateora, 1990; Sharma et al., 2014). Thus, with regard to the role of competitive advantage in the success or survival of an organization or company, recognizing the factors that influence it is essential. The use of information technology that is integrated with business processes can be one of the strategies companies can implement in the midst of strong business competition. Business Intelligence can be a useful strategy because it can be used to analyze data that can later be used by companies to determine their policies.

In carrying out their daily work, all levels of an organization (from employees/subordinates to leaders/superiors) are always connected and or require access to data and information. Business Intelligence makes it easier for all levels of employees to access the data and information needed to help them make better decisions. According to Herschel and Jones (2005), Business Intelligence has a direct impact on knowledge improvement. An effective Business Intelligence system can enhance and promote knowledge and boost the mental model of decision makers. Business Intelligence can be considered as an effective tool used by employees to share knowledge within organizations. This system also helps organizations gain knowledge about competitors, customers, and new technologies that will drive the development of organizational innovation.

Research by Eidizadeh et al., (2017) found that business intelligence has a positive and significant effect on knowledge sharing, organizational innovation and competitive advantage. Business Intelligence has a positive and significant effect through knowledge sharing and organizational innovation, knowledge sharing has a positive and significant influence on competitive advantage, and organizational innovation has a positive and significant influence on competitive advantage. Therefore, the formulation of the problem in this research this study is to test whether business intelligence has a direct effect on competitive advantage and also whether knowledge sharing and organizational innovation has a direct effect on competitive advantage. This studi also to test an indirect effect on competitive advantage through the mediating variables of knowledge sharing and organizational innovation.

THEORY AND HYPOTHESIS

1. Effect of Business Intelligence on Knowledge Sharing

Business Intelligence is a business framework that includes processes, instruments, and technologies designed to transform data into information and information into knowledge which then adds value to the organization. With the knowledge gained, organization managers can make better decisions and carry out more efficient business activities with the help of practical plans (Sharma et al, 2014; Sharda et al., 2014).

According to Herschel and Jones (2005), Business Intelligence has a direct impact on knowledge improvement. Effective business intelligence systems can enhance and promote knowledge and boost decision-making models. Therefore, the first hypothesis states:

H1: Business Intelligence has a positive and significant effect on knowledge sharing.

2. Effect of Business Intelligence on organizational innovation

Business Intelligence helps companies store, analyze, and retrieve large amount of information (Herschel and Jones, 2005). Then, the information and knowledge obtained about new competitors, customers, and technologies can be used to create new product innovations or to improve processes and identify effective

administrative systems. In short, Business Intelligence enhances innovation in companies. Therefore, the second hypothesis states:

H2: Business Intelligence has a positive and significant effect on organizational innovation.

3. Effect of Business Intelligence on competitive advantage

An organization can outperform its competitors and achieve competitive advantage by realizing the existence and potential of competitors' marketing activities and developing the right strategies (Dyer and Singh, 1998). Business Intelligence is recommended as a useful tool for understanding competition by obtaining information about the competitive environment especially on market forces, public policies, new technology, and competitors. This information is valuable for predicting the future environment in which the company will operate (Akter et al, 2016) and business process based on business information can create competitive advantage (Aydiner et al, 2019).Therefore, the third hypothesis states:

H3: Business Intelligence has a positive and significant effect on competitive advantage.

4. Effect of knowledge sharing on competitive advantage

In the 21st century, organizations are transforming into new models based on knowledge and networks in response to the volatility, uncertainty, complexity and ambiguity of the competition environment (; Ritala and Ellonen, 2010; Jourdan et al., , 2008). In such an environment, knowledge-based assets are the foundation of success and competitiveness that lead to sustainable profits (Akter, et al., 2016). Dyer and Singh (1998) stated that knowledge sharing increases organizational competitiveness. Knowledge sharing allows sustainable competitive advantage (Ritala and Ellonen, 2010). Therefore, the fourth hypothesis states:

H4: Knowledge Sharing has a positive and significant effect on competitive advantage.

5. Effect of organizational innovation on competitive advantage

To survive in a rapidly changing and uncertain environment, organizations must be able to adapt to the increasing complexity and continuous change. In such situations, organizations with a high capacity to innovate will be able to respond to environmental challenges more quickly and to better exploit new products and market opportunities than non-innovative organizations (Jiménez - Jiménez and Sanz-Valle, 2011). According to Porter (1990), the main challenge for companies is to achieve competitive advantage through innovative achievements. Hill et al. (2015) argued that one of the sources for creating competitive advantage is innovation. Innovation can be considered as an important parameter of competitive advantage because it ensures long-term competitiveness (Jiménez et al., 2008). Therefore, the fifth hypothesis states:

H5: Organizational innovation has a positive and significant effect on competitive advantage.

6. Effect of Business Intelligence on competitive advantage mediated by knowledge sharing

Knowledge is viewed as the most important resource in a company (Ling et al, 2008). Effective use of knowledge will not only create competitive advantage, but also improve organizational performance (Zaied, 2012). Business Intelligence systems help organizations create, capture, and utilize the knowledge they need (Jourdan et al, 2008) and share it (Akter et al, 2016). As a consequence, knowledge sharing (Dyer and Singh, 1998) can facilitate Business Intelligence to increase organizational competitiveness. Therefore, the sixth hypothesis states:

H6: Business Intelligence has a positive and significant effect on competitive advantage mediated by knowledge sharing.

7. Effect of Business Intelligence on competitive advantage mediated by organizational innovation

Business Intelligence helps organizations acquire knowledge about competitors, customers, and new technologies and foster organizational innovation. Sandvic (2003) suggests that the more innovative a product is, the higher the value it gives to consumers and the level of differentiation it offers. Therefore, the greater the innovation capacity of an organization, the greater its competitive advantage. As a result, innovation (Hill et al., 2015) can promote Business Intelligence to increase organizational competitiveness. Therefore, the seventh hypothesis states:

H7: Business Intelligence has a positive and significant effect on competitive advantage mediated by organizational innovation.

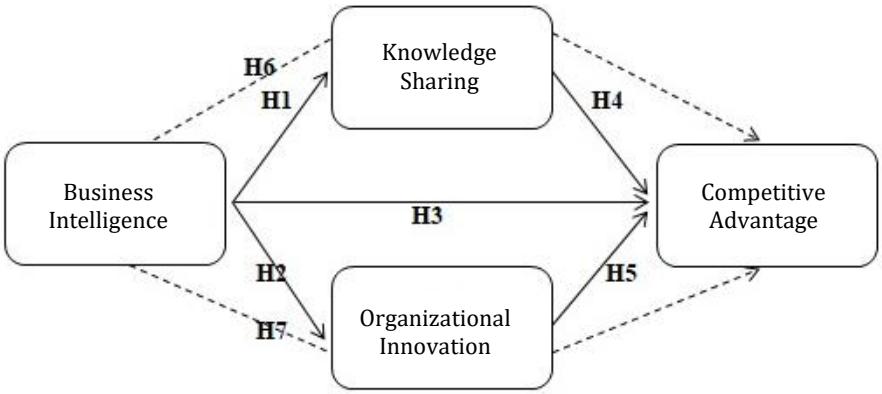

Figure 1 : Research Model

METHOD

This research is survey research, a systematic collection of information from respondents to understand and predict some aspects of the behavior of the population of interest. The population in this study were export companies registered in the Industry and Trade Office of the Yogyakarta Special Province. Respondents were selected through purposive sampling, a sampling technique in which sampling is limited to certain types of people who can provide the desired information, either because they are the only ones who have it or they meet several criteria determined by the study (Sekaran and Bougie, 2016). The criteria used in this research were companies already using computer technology (software & hardware) to collect data, process it, and store the information. Based on these criteria, the number of samples obtained was 83 companies.

To obtain data, questionnaire was used. Questionnaire is a data collection technique carried out by giving a set of questions or written statements to be answered by respondents (Sugiyono, 2012: 142). The results of the questionnaire were tested with validity and reliability tests. The validity test is used to measure whether the questionnaire is the appropriate measuring instrument. A questionnaire is deemed valid if the questions on the questionnaire are able to reveal something to be measured by the questionnaire. Testing the validity of this study used the validity that correlates the score of each item of the question with the total score, which is the sum of each item's score. If the significance value is $\alpha \leq 0.05$, a question item is considered valid (Ghozali, 2011). Meanwhile, the reliability test is used to determine the extent to which the measurement results remain consistent if the measurement is carried out more than once for the same indicator using the same measuring instrument. According to Ghozali (2011), if the Cronbach Alpha value is >0.60, the question items in the questionnaire are declared reliable, but if the Cronbach Alpha value is <0.60, the questions are deemed unreliable.

This study used Partial Least Square (PLS) analysis with the Smart PLS application. PLS is a variant-based structural equation modeling (SEM) analysis that can simultaneously test the measurement model as well as test the structural model (Jogiyanto and Abdillah, 2009). The measurement model is used to test the

validity and reliability, while the structural model the causality (hypothesis testing with predictive models). PLS can be used on small samples, with a minimum recommendation of between 30 and100 cases (Yamin and Kurniawan, 2009).

RESULT AND DISCUSSION

The first part of the model evaluation is to assess the results of the measurement model (outer model) by testing Convergent Validity, Discriminant Validity, and Unidimensionality.

1. Convergent Validity

The value of convergent validity is the value of loading factors on latent variables with their indicators with an expected value of >0.7. Figure 2 shows that the loading factor value of all items is >0.7. In addition to the loading factor value, convergent validity can also be seen from the Average Variance Extracted (AVE) value. In this study, the AVE value of each construct was above 0.5 and therefore no convergent validity problem was found in the model being tested.

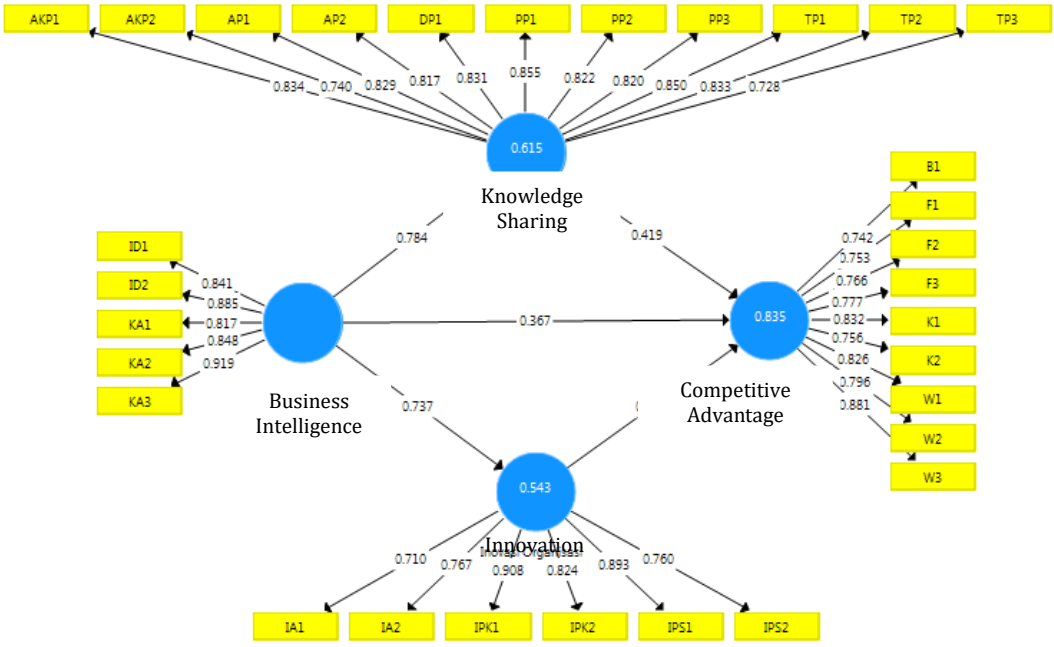

Figure 2 : Outer Model Testing Result

2. *Discriminant Validity*

As the problem of convergent validity was not found, the next step would be to test discriminant validity. This value is the value of the cross-loading factor which is useful to identify whether the construct has sufficient discriminant. This is tested by comparing the loading value of the intended construct with the loading value of other constructs, and the resulting value must be greater.

Table1. *Cross Loading Factor*

Indicator	Variables			
	Business Intelligence	Knowledge Sharing	Organizational Innovation	Competitive Advantage
ID1	**0.841**	0.617	0.650	0.694
ID2	**0.885**	0.757	0.707	0.793
KA1	**0.817**	0.599	0.568	0.697
KA2	**0.848**	0.720	0.652	0.750
KA3	**0.919**	0.672	0.587	0.691
AKP1	0.608	**0.834**	0.691	0.656
AKP2	0.685	**0.740**	0.697	0.615
DP1	0.581	**0.831**	0.630	0.658
TP1	0.716	**0.850**	0.708	0.838
TP2	0.551	**0.833**	0.589	0.677
TP3	0.557	**0.728**	0.591	0.691
PP1	0.598	**0.855**	0.595	0.690
PP2	0.564	**0.822**	0.618	0.629
PP3	0.619	**0.820**	0.632	0.676
AP1	0.742	**0.829**	0.739	0.783
AP2	0.744	**0.817**	0.671	0.799
IPK1	0.650	0.684	**0.908**	0.716
IPK2	0.615	0.678	**0.824**	0.663
IPS1	0.703	0.806	**0.893**	0.780
IPS2	0.487	0.514	**0.760**	0.585
IA1	0.565	0.573	**0.710**	0.579
IA2	0.547	0.621	**0.767**	0.584
K1	0.784	0.805	0.748	**0.832**
K2	0.638	0.574	0.569	**0.756**
F1	0.480	0.659	0.543	**0.753**
F2	0.632	0.652	0.558	**0.766**
F3	0.719	0.595	0.660	**0.777**
W1	0.673	0.674	0.612	**0.826**
W2	0.606	0.752	0.595	**0.796**
W3	0.734	0.758	0.772	**0.881**
B1	0.706	0.689	0.654	**0.742**

Source: Data Processing Results using PLS, 2019

The table above shows that each indicator in the research variables has the largest cross loading value on the variable it forms compared to the cross-loading value for other variables. Based on these results, it can be stated that the indicators used in this study have acceptable discriminant validity.

3. *Unidimensionality*

To ensure that there are no measurement problems, the final step in evaluating the outer model is to test the model unidimensionality. The unidimensionality test was carried out using indicators of composite reliability and Cronbach's Alpha. For these two indicators, the cut-off value point is 0.7.

Table 2. Composite Reliability and Cronbach's Alpha

Variables	***Composite Reliability***	**Cronbach's Alpha**
Business Intelligence	0.936	0.914
Knowledge Sharing	0.956	0.949
Organizational Innovation	0.921	0.896
Competitive Advantage	0.938	0.926

Source: primary data processing results, 2019

The table 2. shows that all constructs have composite reliability and Cronbach alpha of higher than 0.7, which means that there is no reliability or unidimensionality problem in the model.

The second part of model evaluation is to evaluate the results of the structural model (inner model) in three ways: R2, Q2, and Gof (Goodness of fit).

Table 3. R square

Variables	**R^2**
Knowledge Sharing	0.615
Organizational Innovation	0.543
Competitive Advantage	0.835

Source: primary data processing results, 2019

The goodness-of-fit assessment is known from the Q-Square value. The value of Q-Square has the same meaning as the coefficient of determination (R-Square) in regression analysis, where the higher the Q-Square, the more fit a model is with the data. Below are the results of the Q-Square calculation:

$$Q^2 = 1 - (1 - R1^2)(1 - R2^2)(1 - R3^2)$$
$$Q^2 = 1 - (1 - 0.615^2)(1 - 0.543^2)(1 - 0.835^2)$$

$$\boldsymbol{Q^2 = 0.867}$$

The Q-Square value of 0.867 shows the magnitude of the variance of the research data which can be explained by the research model reaching 86.7%, while the remaining 13.3% is explained by other factors outside this research model. Based on this result, the model in this study has an acceptable goodness-of-fit. Whether a hypothesis is accepted or rejected can be seen from the significance value between constructs, t-statistics, and p-values. In this way, measurement estimates and standard errors are no longer calculated with statistical assumptions, but are based on empirical observations. In the bootstrapping method in this study, the hypothesis is accepted if the significance value is t-value > 1.96 and/or the p-value is <0.05. Thus, Ha was accepted and Ho was rejected and vice versa.

Table4. Hypothesis Testing Results with Partial Least Square

	Original Samples	**T -Statistics**	**P-Values**
Business Intelligence → Knowledge Sharing	0.784	6.324	0.000
Business Intelligence → Organizational Innovation	0.737	5.764	0.000
Business Intelligence → Competitive Advantage	0.367	4.158	0.000
Knowledge Sharing → Competitive Advantage	0.419	3.700	0.000
Organizational Innovation → Competitive Advantage	0.200	2.236	0.026

Source: primary data processing results, 2019

Business intelligence had a positive influence on knowledge sharing, as substantiated by the original sample value of 0.784 (positive) with a t-value of 6.324 and a p-value of 0.000. This means that the higher the application of Business Intelligence- such as data integration across all functions and business partners and analytics capabilities-, the higher the level of knowledge sharing such as knowledge acquisition, knowledge documentation, knowledge transfer, knowledge creation, and knowledge application. The results of this study are in line with research conducted by Eidizadeh (2017) and Zieba, et al (2017) that the research focus on an export company in Iran. A positive value on the parameter coefficient means that the increase in business intelligence has an effect on the increase in knowledge sharing. So it can be concluded that business intelligence has a positive influence on knowledge sharing in export companies in the Special Region of Yogyakarta. Thus the first hypothesis is accepted

Business intelligence had a positive influence on organizational innovation, as demonstrated by the original sample value of 0.737 (positive) with a t-count value of 5.764 and p-value of 0.000. The results show that business intelligence has a positive effect on organizational innovation, which is in line with the findings of Eidizadeh (2017). It can be argued that business intelligence provides the necessary conditions for innovation in organizations through the provision of data, knowledge and information.

Business Intelligence had a positive influence on competitive advantage, as shown by the original sample value of 0.367 (positive) with a t-count value of 4.158 and p-value of 0.000. This means that the higher the application of Business Intelligence- such as data integration across all business functions and partners and analytics capabilities-, the higher the level of competitive advantage such as quality, flexibility, time, and cost. It means that business intellegence is able to transform data into information, and information is transformed into knowledge that is designed through various processes, tools, and technology that can add value to the export company. Using the knowledge gained from business intelligence, a manager can choose the best decision and operate his business activities more efficiently by devising a practical plan for his organization, resulting in increased competitive advantage for their export company. The results of this study are in line with research conducted by Eidizadeh (2017).

Knowledge sharing had a positive effect on competitive advantage, as proven by the original sample value of 0.419 (positive) with a t-count value of 3.700 and a p-value of 0.000. This means that the higher the application of knowledge sharing - such as knowledge acquisition, knowledge documentation, knowledge transfer, knowledge creation and knowledge application -, the higher the level of competitive advantage such as quality, flexibility, time, and cost (Eidizadeh, 2017; Li and Zhao, 2006)

Organizational innovation had a positive effect on competitive advantage, as supported by the original sample value of 0.200 (positive) with a t-count value of 2.236 and p-value of 0.026. This means that the higher the adoption of organizational innovations - such as product innovation, process innovation, and administrative innovation, the higher the level of competitive advantage such as quality, flexibility, time, and cost (Eidizadeh, 2017; Jiménez et al., 2008)

Table 5. Hypothesis Testing Results with Partial Least Square

	Original Samples	**T- Statistics**	**P-Values**
Business Intelligence → Knowledge Sharing → Competitive Advantage	0.329	3.220	0.001
Business Intelligence → Organizational Innovation → Competitive Advantage	0.147	2.232	0.026

Source: primary data processing results, 2019

From Tabel 5 has ilustration that the effects, both direct and indirect, show positive effects. Thus, it can be concluded that knowledge sharing mediates the relationship between business intelligence and competitive advantage in a complementary (partial mediation) manner. Business intelligence provides the necessary conditions for knowledge sharing and push innovation in organizations through the provision of data, knowledge and information, the higher the ability of an export company to innovate in the organization, it will increase competitive advantage, achieve high performance, and survive in the global economy (Eidizadeh, 2017; Ling et al, 2008).

CONCLUSION

This study concludes that for the export companies officially registered in the Special Region of Yogyakarta, Business Intelligence has a positive effect on three other variables, namely knowledge sharing, organizational innovation, and competitive advantage, and that knowledge sharing and organizational innovation have a positive effect on competitive advantage. In addition, knowledge sharing and organizational innovation are able to mediate the effect of Business Intelligence on competitive advantage in complementary (partial mediation).

RECOMMENDATION

1) This practical suggestion is addressed to the export companies which are the objects of this research. Based on the research results, the direct effect of Business Intelligence on competitive advantage has a smaller coefficient value than the effect of Business Intelligence on knowledge sharing and organizational innovation. Therefore, companies are expected to further improve the application of Business Intelligence directly. Increasing Business Intelligence can be done by developing a company business plan and determining business performance indexes. The development of the business plan is expected to increase competitive advantage. Meanwhile, with regards to the indirect effect, the role of organizational innovation in mediating the effect of Business Intelligence on competitive advantage has less value than the role of sharing knowledge in mediating the effect of Business Intelligence on competitive advantage. Therefore, the companies are expected to improve the quality of innovation which in turn will boost the effect of Business Intelligence on competitive advantage.
2) Future studies are expected to further evaluate some of the questions included in the questionnaire. It cannot be denied that misunderstanding in interpreting the statement items may have occurred because respondents may have different understanding of the same sentence. Therefore, respondents need to get assistance or a brief explanation of the variables used in the study.

3) The population in this study is relatively small, and therefore further research is expected to be able to expand the study population (using locations outside the Special Region of Yogyakarta).

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