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Innovation Capability as a Catalyst for Improved Service Quality and Work Productivity in Manufacturing

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Abstract *– This study investigates the influence of innovation capability and work productivity on service quality within a manufacturing industry in Tangerang, Indonesia. Utilizing a quantitative research design, data were collected through a structured questionnaire distributed to 115 permanent employees, selected via random sampling. The data were analyzed using Structural Equation Modeling (SEM) with the SmartPLS 3.0 software. Results indicate that both innovation capability and work productivity significantly and positively affect service quality. Furthermore, innovation capability also exerts a significant positive influence on work productivity. These findings underscore the pivotal role of fostering innovation capability and enhancing work productivity to improve service quality, thereby equipping companies to compete effectively in the era of Industry 4.0. This research contributes to managerial practices by providing a comprehensive model for optimizing service quality through workforce development strategies, emphasizing innovation and productivity as key drivers.*

Keywords*: innovation capability, work productivity, service quality, manufacturing industry, Industry 4.0*

I. INTRODUCTION

Information and communication technology was once fairly limited in its ability to serve people's day-to-day requirements; nevertheless, in recent years, it has become inseparable from or actually a component of people's day-to-day needs. It was only through printed media, such as magazines and newspapers, that it was possible to satisfy the customers' requirements for information. As time goes on, however, the requirements for information that are currently being met could be achieved through the use of electronic media, such as the internet. As a result of the influence of the technological revolution, which ultimately leads to the industrial revolution 4.0, the development of the manufacturing industry may proceed at a more rapid pace. According to Asbari, Wijayanti, and others' 2020 research. In order to comply with the requirements of the fourth industrial revolution, businesses in the manufacturing sector are required to prioritize innovation and work productivity as precursors to the quality of service they provide to clients. Industrial revolution 4.0 also changed the customer's pattern of expectation to be higher (Agistiawati et al., 2020; Asbari, Purwanto, et al., 2020; Basuki et al., 2020; Fikri et al., 2020; Hutagalung et al., 2020; Novitasari, Kumoro, et al., 2020; Novitasari, Yuwono, et al., 2020; Putra et al., 2020; Waruwu et al., 2020).

As a result, it is important for the manufacturing industry to continuously create internal technological innovation of the company that is not adopted by other companies. The innovation should be efficient and effective, which can be simple and inexpensive (efficient) but useful (effective) and continuative. There is no other way than through the improvement of worker's innovation capability in the company (Goestjahjanti et al., 2020; Silitonga et al., 2020; Sudiyono et al., 2020; Sutardi et al., 2020; Yuwono et al., 2020). A company with a large innovation capability is more successful in responding to its environment and developing new skills that support the continuous strategy of excellence (Rajapathirana & Hui, 2018a). Likewise, innovation could be used to obtain a high continuous competitive advantage (Bharadwaj et al., 1993). The imitability of innovation capability would be hindered by complexity and special assets because the complexity of unique assets devoted to protecting innovation from plagiarism and improving the value of products (Teece, 1981). This idea is supported by

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Bharadwaj et al. (1993) who claimed that the complexity of special assets has an indirect influence towards the continuous competitive advantage through innovation, which in this case is technological innovation.

In reality, every company that can compete and maintain their business have programs regarding quality, because a company would effectively remove their low-quality products by programs with good quality. So, the activity of controlling quality has the purpose to minimize low-quality products, maintain the products' quality for the finished products correspond to the product quality standards of the company, and avoid low-quality products to get into the hand of customers. To maintain the quality of products, the company should implement intensive and continuous control and supervision either for the quality of materials, process of production, or final products. In the program of product guarantee, the company will always carry out intensive quality control (QC) towards their products starting from the component of materials to the production process (Asbari et al., 2019; Ong et al., 2020; Purwanto, Asbari, et al., 2019a, 2019b; Purwanto, Asbari, Ong, et al., 2020; Purwanto, Asbari, Santoso, et al., 2020; Purwanto, Budi Santoso, et al., 2020; Purwanto, Mayesti Wijayanti, et al., 2019; Purwanto, Putri, et al., 2020). The effort of controlling the quality of products is an order to maintain and continuously improve the work productivity, both for the workers and organization.

The problem is that how far the influence of innovation capability and work productivity towards the worker's quality of service to the customers. These two variables – innovation capability and work productivity – are the important components to increase the continuous competitiveness of manufacturing industries. There are numbers of previous research that analyzed the influence of innovation capability and work productivity towards worker's quality of services to customers, but analysis that comprehensively analyses the influence of innovation capability and worker's work productivity as one model has not been found yet. Therefore, this research gap is considered as significant and crucial; to be analyzed more deeply so that in turn, comprehensive and impactful knowledge in receiving the policy of the leaders in the manufacturing industry to be successful in facing revolution industry 4.0 is obtained.

II. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

A. Service Quality

The era of globalization and the development of information technology, which has rapidly give many large impacts on economic activities. Fast changes happen and bring implications to domestic and even international economics. Competitions in the sector of the industry are getting tighter, so the demand for the management to face such changes takes place. Therefore, for the company to keep on growing, the company should improve its excellence in competition. Nowadays, quality is the major issue in the business world, many companies pay attention more to the quality of the products they produce. Quality is one of the operational company's targets and responsibilities carried by the industry. Specifically, in the sector of service, the company will consider the policy regarding the importance of quality. The higher the quality of service gets, the higher the customer's satisfaction.

Quality of service is a performance that could be offered from a particular person to the other. This performance can be an intangible action and also does not affect ownership of goods (Kotler & Lee, 2008). The main point is that a service is an action done by the seller to the customer to fulfill their needs and wants. This behavior has the purpose in the achievement of customer satisfaction itself. A particular service can be done when the customers choose any of the products they desired after they have done the transactions to buy the products. Good quality of service will bring a good impact as well to the company because they will gain customer loyalty and also profit. Quality of service in this research used five dimensions adapted by Parasuraman et al. (1988), which consist of: (1) accessibility in product ordering, (2) fast responsive in responding to consumer's needs, (3) responsibility in the quality of product, (4) accessibility in returning the products that do not satisfy the customer's needs, (5) easy access for the products to be found in the market.

B. Innovation Capability

Anning-Dorson (2016) claimed that innovation in service companies can be originated from many sources and service companies look for their innovation in their operations; from the marker (external environment) and customers (Anning-Dorson (2016)). Innovation is the practical implementation of an idea into a particular product or a new process. Innovation is a condition of certain goods and services even an idea that is considered as something new (Mansury & Love, 2008). Innovation capability is considered an important asset for the company

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to provide and maintain competitive excellence and the implementation of all strategies. This is arranged through the main process in a company (Lawson & Samson, 2001). The performance of innovation can be explained as the combination of asset and resource. Therefore, kinds of resources, assets, and skills are needed to push through success in the fast-changing environment(Rajapathirana & Hui, 2018a). According to Rajapathirana & Hui (2017), innovation capability is defined as (1) capacity of development of new products that fulfill the needs of the marker, (2) capability of implementation of an appropriate technological process to produce these new products, (3) capability in developing and adopting new products and technological process to fulfill the needs in the future, (4) and capability to respond in the technological activities that are done on purpose and unexpected possibilities created by the competitor. In this research, the definition of variable and dimension of the innovation capability variable is adapted by the research of Rajapathirana & Hui (2017), which consists of a culture of organization, knowledge, and inclusion of customers and workers.

C. Work Productivity

In either managing a project or managing operations and productions, they will have a strong relationship with the term of productivity. As for the indicator of productivity cannot be separated with input and output. Input in productivity means that it could be a utilized resource, such as capital, work labor, materials, and energy, whereas output could be the amount of product unit or even revenue. The measurement of productivity is usually stated by the ratio that compares between output and input used in the production process (output per input unit).

Productivity is a concept that visualizes the relationship between the result (amount of goods and/or service produced) and resource (amount of labor, capital, land, energy, etc.) to produce such goods (Greenberg, 1973). Meanwhile, (Van, 2009) claimed that productivity is simply a comparison through calculations between the number of products and the amount of every source used as a process is carried out. The source meant could be in a form of land, materials, machines, and tools, and work labor. In detail, (Mansury & Love, 2008) claimed that productivity can be defined as a concrete result (product) that is produced by an individual or a group in a certain unit of time and a certain working process. In this case, the higher the products that are produced in a short period, the higher the work productivity level, and vice versa. The following is some of the factors that influence productivity in an organization, which consist of: technical factor, production factor, a factor of personnel, financial factor, management factor, governmental factor, and location factor.

In general, according to Sinungan (2000), the measurement of productivity consists of four types, which are: firstly, quality of work that could be seen from the angle of accuracy and neatness in working, work acceleration, skill, and prowess of work. Secondly, work quantity that could be seen from the ability quantitatively in achieving target or work result for a new job. Thirdly, fulfilling the standards set by the company could be seen from the ability and reliability in doing their work. Moreover, the efficiency in working could also be seen from the time utilization in finishing the work set by the company (Greenberg, 1973; Sinungan, 2005). Measurement of work productivity is used as a medium to analyze and push production efficiency. Other benefits are to determine the target and uses, practically as a standard for worker's salary. To measure productivity, two kinds of working hours could be used, which are paid working hours and working hours that are used to work. In this research, the definition of variable and dimension of the innovation capability variable is adapted by the research of Greenberg (1973) consisting of quality of work, the quantity of work, standard fulfillment, and work efficiency.

D. The Influence of Innovation Capability on Work Productivity

Innovative behavior could bring a large contribution when competing with other companies because the innovative behavior of workers could give new ideas. Chang, Liu (2007) claimed that innovative behavior is something that has a large contribution to improving productivity. According to Kusumawati (2010), successful implementation of creative ideas owned by a company could apply behavior that is innovative for the workers who can improve the productivity of the company. Putri dan Budiastuti (2012) also claimed that innovative behavior has a positive influence on work productivity, where innovative behavior could be enhanced by pushing worker's creativity and innovation behavior. From the idea above, the hypothesis filed in this research is:

H1: Innovation capability has a significant influence on work productivity.

E. Influence of Innovation Capability on Quality of Service

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Innovation capability facilitates the company to implement an appropriate technological process in developing new products that fulfill the market's need and remove competition threats (Rajapathirana & Hui, 2018b). This is helpful to form and to manage kinds of company's skills to support the integration of ability and stimulus to successfully innovate. Excellent innovation capability tends to implement and develop a variety of new products and existing product portfolios (Dadfar et al., 2013). Rajapathirana & Hui (2017) explained that a company should improve their leadership, people, partnership, and organization's capability before implementing the initial innovation process and establishing new products. Some researchers conclude that innovation capability is the capacity of a company to expand new products through a combination of innovation behavior, strategic skills, and internal technological process (Bhat & Momaya, 2020; Vicente et al., 2015). The result of research proved that innovation capability influences the quality of service (Ngo & O'Cass, 2013; Roth & Jackson III, 1995). From the idea above, the hypothesis filed in this research is:

H2: Innovation capability has a significant influence on the quality of service.

F. The Influence of Work Productivity on Quality of Service

Quality of service does not appear by itself. Other than that, customer's satisfaction towards service given to them can be influenced by a few factors, which are worker's and organization's work productivity. The result of research proved that work productivity influences the quality of service (Ngo & O'Cass, 2013; Roth & Jackson III, 1995). From the idea above, the hypothesis filed in this research is:

H3: work productivity has a significant influence on the quality of service.

G. Research Conceptual Framework

According to Sekaran & Bougie (2003), a theoretical framework is a foundation on where the whole research project is based on. From the theoretical framework, the hypothesis could be arranged to determine whether the theory formulated is valid or not. Next, the research could be measured by the appropriate statistical analysis. Referring to theories and previous research, there are relationships found between the influence of variables as follows: innovation capability, work productivity, and quality of service. Therefore, the author has made the research model as shown below:

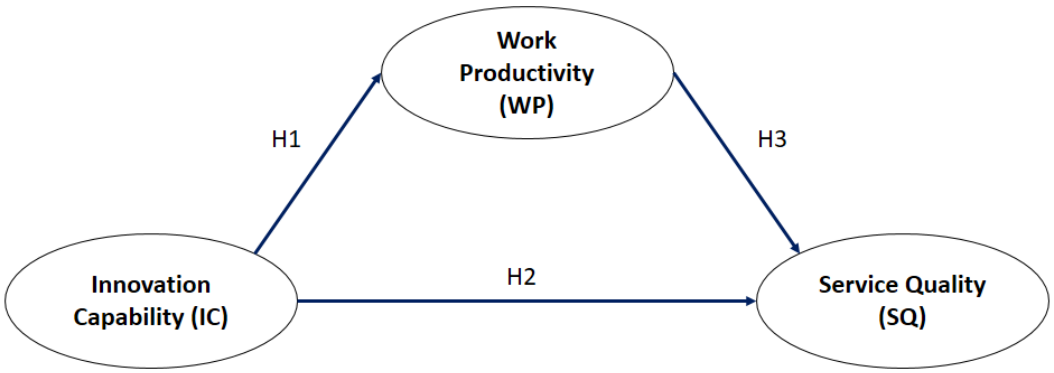

Figure 1. Research Model

III. METHODS

A. Definition of Operational Variable and Indicator

The method used in this research is the quantitative method. Data collection is done by spreading questionnaires to every worker in the manufacturing industry in Tangerang, Indonesia. Innovation capability is adapted by the

research of Rajapathirana & Hui (2018b)By using 3 items. Work productivity is adapted by the research of Greenberg (1973) dan Sinungan (2005) by using 10 items. Meanwhile, quality of service is adapted by the research of Parasuraman et al. (1988) by using 14 items. The questionnaire is closely designed, except for the questions/statements concerning the respondent's identity, which is a semi-opened questionnaire. Every closed questions/statement, five answer options are given, which consist of: strongly agree (SA) with 5 scores, agree (A) with 4 scores, Neutral (N) with 3 scores, disagree (DA) with 2 scores, and strongly disagree (SDA) with 1 score. The method in data processing is by using PLS and SmartPLS 3.0 software as the tool.

B. Population and Sample

The population in this research is the workers working in the manufacturing industry in Tangerang, Indonesia that consists of 141 workers. A questionnaire is given by a simple random sampling method. The questionnaire that was returned and valid as many as 115 samples (81.56% from the whole population)

IV. RESULTS AND DISCUSSION

A. Sample Description

Table 1. Descriptive Sample Information

Criteria		Total	%
Age (per September 2018)	≤ 30 years old	24	21%
	31 - 50 years old	85	74%
	≥ 51 years old	6	5%
Working Experience	1 - 5 years	82	71%
	6-10 years	22	19%
	> 10 years	11	10%
Last Education	≤ Secondary high	86	75%
	≥ Bachelor degree	29	25%

Source: The respondent profile table is derived from a summary of the questionnaire returned (authors, 2020)

B. Results for Validity Test and Research Indicator Reliability

Stages of measuring on testing model involve convergent validity test and discriminant validity. While the value of Cronbach's alpha and composite reliability is needed in testing for construction reliability. PLS analysis results could be used to test for research hypothesis if all indicators in the PLS model have met the requirements of convergent validity, discriminant validity, and reliability test.

1. Convergent Validity Test

A convergent validity test is done by seeing the value of the loading factor of each indicator towards the construct. In most references, with factor weighing from at least 0.5 is considered to have validity that is strong enough to explain the latent construct (Chin, 1998; Ghozali, 2014; Hair et al., 2010). In this research, the minimum limit of loading factor that is accepted is 0.7, with the condition of AVE score for every construct, which is > 0.5 (Ghozali, 2014). Based on the result from SmartPLS 3.0, after taking out the items that did not meet the requirements, all items in Figure 2 and Table 2 having the loading factor value above 0.7 are considered to be valid. Therefore, the convergent validity of this research model can all be seen in Figure 2 and Table 2. So, in this research, items from each of the variables and dimension are considered with notation as follows: items from the innovation capability variable consist of three items, which are IC1-IC3, items from the work productivity variable consist of four items, which are WP1-WP4. Items from the service quality variable consist of five items, which are SQ1-SQ5. The details are shown in Table 2.

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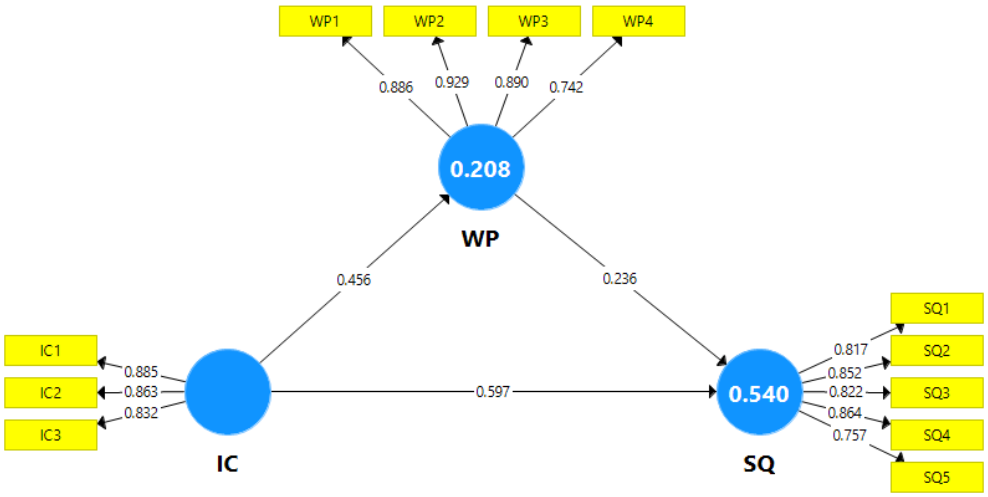

Figure 2. Research Model Fit

Table 2. Validated Items

Var.	Items	Items Description	Loadings	Cronbach's Alpha	Composite Reliability	AVE
Service Quality (SQ)	SQ1	The company gives access to product ordering	0.817	0.881	0.913	0.678
	SQ2	Workers are fast and responsive in responding to consumer's needs	0.852			
	SQ3	The company is responsible for the quality of products	0.822			
	SQ4	Accessibility in returning products that do not satisfy consumer's needs	0.864			
	SQ5	Products are easily found in the market and the sale center is easily contacted by customers	0.757			
Innovation Capability (IC)	IC1	I argue that the company has innovation in the culture of the organization	0.885	0.825	0.895	0.740
	IC2	I argue that a company receives knowledge from different sources	0.863			
	IC3	I argue that a company prioritize worker's and customer's inclusion	0.832			
Work Productivity (WP)	WP1	I have the skill and prowess in work to produce a good quality of goods	0.886	0.885	0.992	0.748
	WP2	I can achieve the project target	0.929			
	WP3	I implement the rules according to the company's standards	0.890			
	WP4	I have the ability in time utilization when working	0.742			

Source: The Table is derived from the output of the SmartPLS 3.0 (authors, 2020)

2. Discriminant Validity Test

Discriminant validity is done to ensure that every concept of each latent variable is in contrast with the other latent variables. A model has a good discriminant validity if the quadratic value of AVE in each exogenous construct (value on the diagonal) exceeds the correlation between the construct with the other construct (value below diagonal) (Ghozali, 2014). The result of discriminant validity research is done by the quadratic value of AVE, which means by seeing the Fornell-Larcker Criterion Value that is obtained the same way as shown in Table 4. The discriminant validity test result shown in Table 4 below indicates the whole construct having a square root

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value of AVE above correlation value with the other latent construct (through Fornell-Larcker Criterion), so it can be concluded that a model has met a discriminant validity.

Moreover, collinearity evaluation is done to discover whether there is collinearity in the model. To find out about collinearity, VIF estimation from every construct is required. If the VIF score is higher than 5, then the model will show collinearity (Hair et al., 2014). It is shown the same way as in Table 5, all VIF score that is less than 5 means that the model has no collinearity.

3. Construct Reliability Test

Construct reliability can be assessed from the value of Cronbach's alpha and composite reliability from each construct. The value of composite reliability and Cronbach's alpha is suggested to be more than 0.7 (Ghozali, 2014). If the value of composite reliability is above 0.7, then it is sufficient (Ghozali, 2014). Reliability test results in Table 3 above show that all construct has composite reliability value and Cronbach's alpha value higher than 0.7 (> 0.7). In conclusion, all construct has met the reliability that is required.

C. Hypothesis Examination

The hypothesis test in PLS is also denoted as an inner model test. This test covers a significance test that has a direct and indirect impact as well as how large is the measurement of the exogenous variable impact towards the endogenous variable. The influence test is done by using a t-statistic test in an analysis model called Partial Least Squared (PLS) with the help of SmartPLS 3.0 software. With the bootstrapping technique, R square value and significance test value can be obtained as shown in the table below:

Table 3. Discriminant Validity

Variables	IC	SQ	WP
Innovation Capability (IC)	**0.860**		
Service Quality (SQ)	0.704	**0.823**	
Work Productivity (WP)	0.456	0.508	**0.865**

Source: The Table is derived from the output of the SmartPLS 3.0 (authors, 2020)

Table 4. Collinearity Statistics (VIF)

Variables	IC	SQ	WP
Innovation Capability (IC)	-	1.262	1.000
Service Quality (SQ)	-	-	-
Work Productivity (WP)	-	1.262	-

Source: The Table is derived from the output of the SmartPLS 3.0 (authors, 2020)

Table 5. *R Square* Value

	R Square	R Square Adjusted
Service Quality (SQ)	0.540	0.538
Work Productivity (WP)	0.208	0.206

Source: The Table is derived from the output of the SmartPLS 3.0 (authors, 2020)

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Table 6. Hypotheses Testing

Hypotheses	Relationship	Beta	SE	T Statistics	P-Values	Decision
H1	IC → WP	0.456	0.037	12.444	0.000	Supported
H2	IC → SQ	0.597	0.046	12.882	0.000	Supported
H3	WP → SQ	0.236	0.044	5.396	0.000	Supported

Source: The Table is derived from the output of the SmartPLS 3.0 (authors, 2020)

According to Table 5 above, the *R Square* value of SQ is 0.540, which means that the variable of SQ could be explained by the variable of IC and WP in the percentage of 54%, while the remaining 46% is explained by other variables not discussed in this research. *R Square* value of WP is 0.208, this means that the variable of WP could be explained by the variable of IC in the percentage of 20.8%, while the remaining 79.2% is explained by other variables not discussed in this research. Meanwhile, Table 6 shows *t-statistics* and *p-values* that present the influence between variables mentioned above.

The result of analytical data shows that innovation capability has a significant positive influence on work productivity. This is proven by the *t-statistics* value of 12.444, which is larger than 1.96, and *p-values* of 0.000 which is smaller than 0.05. This concludes that H1 is accepted, due to significant influence. Therefore, it can be concluded that innovation capability has a significant positive influence on work productivity. Innovation capability has a significant positive influence on service quality. This is proven by the *t-statistics* value of 12.882, which is larger than 1.96, and *p-values* of 0.000 which is smaller than 0.05. This concludes that H2 is accepted, due to significant influence. Therefore, it can be concluded that innovation capability has a significant positive influence on service quality. Work productivity has a significant positive influence on service quality. This is proven by the *t-statistics* value of 5.396, which is larger than 1.96, and *p-values* of 0.000 which is smaller than 0.05. This concludes that H3 is accepted, due to significant influence. Therefore, it can be concluded that work productivity has a significant positive influence on service quality.

D. Discussion

Data analysis above concludes that innovation capability and worker's work productivity gives a significant positive influence on the quality of service. Likewise, innovation capability has a significant influence on work productivity. Quality of service is the most crucial part and is a differentiating factor between one company to the other. Excellence in competing for that is felt needs to be continuously developed, so the company could exist in the era of industrial revolution 4.0 that necessitates unique and significant excellence.

Good competing excellence in a business depends on the resource defense and unique skill owned by the company. Position of competing advantage that could survive is the key of long term superiority of business performance. Position of a strong advantage will create values that are highly perceived by the customers and could create relatively low cost and finally, push for the work differentiation achievement, that is supported by oriented skill in a market and company's resource. Competitive advantage is a dynamic process, so it has to be done continuously. Competitive advantage visualizes a certain company that can act better compared with other companies, although they run in the same industry (Hasan, 2008). The better the intellectual capital and innovation capability owned by the workers, the higher the competitive advantage (Jose & Gonzales, 2012). The ability to do innovation is highly significant to create competitive advantage (Larsen & Lewis, 2007), innovative skills could also improve competitive advantage (Parkman et al., 2012).

V. CONCLUSION AND SUGGESTION

A. Conclusion

From the data analysis done previously, it is proven that innovation capability and work productivity has a significant positive advantage towards worker's quality of service to the customer. Likewise, innovation capability

has a significant positive influence on work productivity. Another important thing from this research's conclusion is that items from each instrument used are valid in the number of relatively low items.

B. Suggestion

It is suggested for future studies to research by using items instrument resulted from CFA analysis for wider utilization, so it can test back the validity and reliability of the instrument. The development and expansion meant are, for example, research in another analytical unit, such as customer and supplier. Likewise, development research in other sectors could be done, such as the educational sector, social, and another public sectors. In the future study, it is suggested to have additional and involve another relevant variable, so it would make the research in the same theme to be more complete and comprehensive.

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