

# The Role of Service Quality Mediating the Effect of Investment of Technology and Human Resource Competence on Hospital Performance (Study at Private Hospitals in Bali)

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## ABSTRACT

This study aims to explain the effect of technology investment on hospital performance; the influence of investment of human resource competence on hospital performance; the influence of technology investment on service quality; the influence of investment of human resource competence on service quality; the influence of service quality on hospital performance; proves and explains the role of service quality mediating the influence of technology investment on hospital performance; as well as the role of service quality mediating the influence of human resource competence investment on hospital performance.

The study is conducted on 36 registered private hospitals at the Health Department of Bali Province in 2016. The samples are taken by census and using partial least square analysis techniques. It found that: (1) technology investment has no significant effect on hospital performance; (2) investment of human resources competence has no significant effect on hospital performance; (3) technology investment has significant positive effect on service quality; (4) investment of human resources competence is positively significant to service quality; (5) service quality has significant positive effect on hospital performance; (6) service quality is able to fully mediate the effect of technology investment on hospital performance; and (7) service quality has full mediation on the influence of human resource competence investment on the hospital performance.

Keywords: Technology Investment, Human Resources Competence, Service Quality, Hospital Performance.

## INTRODUCTION

Hospitals in Indonesia, especially private hospitals in Bali, are facing serious challenges in this global era. These challenges come from the growing number of private hospitals, technology developments and changes in the way of payments are shifting from out of pocket to how to pay packages. The change in payment is due to the fact that by 2019, the whole Indonesian people's health are guaranteed through the universal coverage system. Managers of private hospitals should be able to provide quality, safe and efficient patient care. This challenge forces private hospitals to compete in order to maintain their operational continuity.

Hospitals are complex organizations, as they are required to provide full-time inpatient, outpatient and personal emergency care services. The provision of health services in hospitals have very complex characteristics, because various types of health workers with their respective knowledge interact with each other. Complexity in hospital management come together with science and health technology that are developed very rapidly must be followed by health workers in order to provide quality services. Hospital managers are required to manage

resources in hospitals, especially human and technological resources that are unique resources that can compete in a sustainable manner, which conclusively can improve the performance of the hospital.

Previous research by Li, et al. (2000); Tarcan, et al. (2010); Sivabrovnvana, et al. (2005); Devaraj, et al. (2003) and Sincar, et al. (2000) found that technology investment has significant positive effect on performance. On the other hand, Banker and Kauffman (1988); Floyd and Woolridge (1990); Parente (2007); Soejono (2010); Hdeib (2011) and Zengul, et al. (2014) revealed that technology investment has no effect on hospital performance. This controversy of research findings is research gap and motivation of this research, by adding the quality of service as mediation between technology investments and hospital performance, with the expectation of technology investment which is accompanied by better service quality is able to improve hospital performance.

Another variable that affect performance is the competence of human resource. The research that found human resource competence has significant positive effect on performance by Zigan, et al. (2008); Chang, et al. (2009); Capkun and Mesner (2011); Odumeru and Ilesanmi (2013); Ngo, et al. (2014); Ataunur (2015) and Pattisiana, et al. (2016). On the other hand, Fu'ad (2016); Supiyanto (2015); Liu, et al. (2014); Dhermawan, et al. (2012) and Ardiana, et al. (2010) showed that human resource competence has no significant effect on performance. The controversy of this research findings is research gap and motivation of this research, also by connecting the quality of service as a mediation between human resource competence to hospital performance, with the assumption of investment of human resource competence along with better service quality can improve hospital performance.

This study is conducted at private hospitals in Bali, based on findings from Tarcan, et al. (2010), which revealed that private hospitals generally tend to have more space in selecting and managing resources. Private hospitals are not limited by government regulations to determine investment decisions in the use of technology and human resource management in maintain hospital management.

This study examined hospital performance variables, namely service quality, technology investment and investment of human resource competence. The performance of the hospital is explained by integrating resources base view theory (technology investment and human resource competence) service quality and hospital performance. This research used investment of technology and human resource competence, which is the triggered intangible asset of service quality. Quality of service in this research, besides mediate the influence of technology investment also mediate the effect of human resource competence investment to improve the hospital performance, which is the novelty of this research.

Based on the theory, business phenomenon and empirical study regarding the use of technology, human resource competence, service quality and hospital performance, the problem of this research is "how the influence of investment of technology and human resource competence (as investment decision of hospital) on hospital performance through quality of service."

## LITERATURE REVIEW

The theories underlying this research are resources base view theory, service quality theory, hospital performance theory and investment theory.

### Resources Base View Theory

Resources base view theory of Barney and Clark (2007) and Barney (1991) basically stated that organizations that are capable of utilizing unique resources will maintain a sustainable competitive advantage. Technology and human resource competencies in hospitals are unique resources, therefore they must be well managed to create sustainable competitive advantage which ultimately improves hospital performance. Barney and Clark (2007) and Barney (1991) explained that the company's resources can be retained into sustainable competitive advantage that must have four attributes: 1) the resource must be valuable, in the sense that company's resources must be able to add positive value for the company, 2) the resources must be rare between the current company and the potential for competition, 3) the resources must be imperfectly imitable or costly to imitate. Resources must be difficult to imitate by the competitors, 4) Resources cannot be replaced with other sources by competitors (non-substitution). Resources that meet these four attributes are: culture, trust, human resources and information technology.

### Hospital Performance

Performance is also defined as the work result or work performance (Wibowo, 2013). However, definition of performance has a broader meaning, not just the work, but including how the work process takes place. The performance needs to be measured by the organizations to know how their work results, so that their operations

can be maintained. Various ways of measuring organizational performance like Tippin and Sohi (2003), who measured organizational performance with profit rate, return on investment (ROI), customer maintenance level, and sales growth. Kirca, et al. (2005) determined performance with overall business performance, profit rate, sales and market share. Saraph, et al. (2001) evaluated business performance based on customer satisfaction with quality over three years period and performance quality.

Measurement of hospital performance in Indonesia is based on Decree of Ministry of Health Republic of Indonesia No. 129 on Hospital Minimum Service Standard (2008) and used as measurement of hospital performance in this research, are: 1) bed occupancy ratio (BOR), 2) length of stay (LOS), 3) gross death rate (GDR) and 4) return on assets (ROA). Bed occupancy ratio (BOR) is the percentage of bed usage in a given time unit. The standard of BOR is 75%-85%. Length of stay (LOS) is the average length of stay of a patient (Average Length of Stay/AvLOS), in other words, the average length of patient being treated. The standard of AvLOS score is 6-9 days. Gross death rate (GDR) is the proportion of all inpatients who passed away within a certain period of time, including newborns baby who then deceased. The standard of GDR score is less than five percent (<5%). Return on asset (ROA) is the percentage of profit after tax divided by total assets. The normal value of ROA is at least five percent.

### **Service Quality**

Quality is defined as good or bad level of something, so quality is a relative measure of goodness. Quality is something that customers decide. Quality is based on the customer or consumer actual experience of the product or service. Operationally, a quality product or service is a product or service that meets customer expectations (Tony-Wijaya, 2011). Parasuraman, et al. (1988) revealed that there are five basic dimensions of service quality as follows: 1) direct evidence (tangibles), includes physical facilities, equipments, employees and means of communications, 2) reliability, is the ability to provide promised services with promptly, accurately and satisfying, 3) responsiveness, is the desire of the staff to help the customers and provide services with responsiveness, 4) assurance, which includes knowledge, skill, courtesy and credible nature of staff, free from hazard, risk or hesitation, 5) empathy, consisting of ease in relationships, good communication, personal attention and understanding the needs of the customers. Furthermore, Sivabrovnvatana, et al. (2005) expressed perception measurement to measure service quality includes: 1) customer perception to dimension of reliability, which is short waiting time, 2) customer perception toward responsiveness dimension consist of comfortable and giving priority service, willingness to give service and responsiveness of customer feedback, 3) customer perception of assurance dimension consist of competent practice, effectiveness usage of resources, medical services from skilled doctors and reasonable price, 4) customer perception of empathy dimension consist of good internal communications and human relations, 5) customer perception of tangibles dimension consist of hygienic environment and state-of-the art technology.

### **Technology Investment**

Hansen and Mowen (2000) and Hilton (1991) explained that companies are often faced with the problem of opportunities to invest in assets that reflect long-term commitment. New production systems, new tools and new products development are the example of assets and projects that fit into this category. Technology investments in hospitals related to health technology are: all methods and tools used to prevent disease, detect disease, relieve suffering from illness, heal, minimize complications and restore health after illness. The usage of hospital technology requires competent resources, so that the use of technology can effectively and efficiently improve service quality, which ultimately will improve hospital performance (Act of the Republic of Indonesia No. 36 on Health, 2009).

The management of technology in hospitals is based on resources base view theory from Barney and Clark (2007) and Barney (1991), which basically explained that companies that can use technology (unique resources) to the maximum effort will create value added that can affect hospital performance. A study of the use of technology has been widely practiced, among others by Darminto (2007), who found that asset investment is very important for the survival of the company; Amechi and Long (2014) stated that companies with certain basic technological competencies may influence and improve employee performance; Zengul, et al. (2014) argued that hospitals in adopting new technologies expect the improvement of clinical performance and positive impact on financial performance; Collum (2013) said that the use of information technology of electronic medical record can improve the financial performance of the hospital. On the other hand, Banker and Kauffman (1988); Floyd and Woolridge (1990); Parente (2007); Soejono (2010) and Hdeib (2011) found that technology investment has no effect on hospital performance.

## Human Resource Competence Investment

Competence is mix of three important things, namely: attitude, knowledge and skills. Attitude is the main role holder of someone's success, the good intentions of someone who is packed with good and impressive behavior or manner. Knowledge is the results of the data, which are then analyzed by the person who raises the information. Further information is applied and produce something useful. Skill is a technique that causes a person to do something well and almost without flaw (Subanegara, 2005). Human resource competence is someone's skill that is demonstrated by the ability to work. Soft competency is the ability to manage job process, relationships between people, interaction with others consisting of knowledge, skills and work behavior. Hard competency is related to the occupied work such as marketing research and financial analysis. The success of an organization is determined by the quality of the people in it, so that the development of competency-based human resources will be able to give a good impact for the improvement of organizational performance (Rivai and Sagala, 2013).

Research on the influence of human resource competence on the performance have been already done a lot, among others research conducted by Zigan, et al. (2008), who found that intangible resources are very important and have a positive impact on improving hospital performance. Capkun and Mesner (2011) in their research revealed that specialization in service improves hospital performance. Basuki, et al. (2013) said that human resource competence is instrumental in improving the quality of service and affect the performance of the hospital. Azmi, et al. (2009) explained that there is a positive relationship between competence and service quality. Siddiqui and Kleiner (1998) argued that improving the competencies (skills and abilities) of employees through training and development can contribute to sustainable performance levels.

## HYPOTHESES

### The Influence of Technology Investment on Hospital Performance

Resource base view theory (RBVT) explains that companies that can manage the most unique resources, in example technology and human resource competencies will create value added for the company. This can affect the company's financial performance, company's growth and market value (Barney and Clark, 2007; Barney, 1991; Laksono-Trisnantoro (2005) and Umar, 2005).

Research of role of technology to performance are done by many researchers. Amechi and Long (2014) found that the use of technology positively and significantly affect the improvement of employee performance, such as payment settlement, service fees and other administrative works. Kamal and Kumar (2013) discovered that information technology is positively and significantly related to human resorce performance. Restuccia, et al. (2012) in their research revealed that investment of hospital information system has positive and significant effect on service quality and financial performance of hospital. Li, et al. (2000) and Sincar, et al. (2000) conducted research in the field of the use of technology concluded that the technology of health and information that are applied in hospital have positive and significant effect on hospital performance. Further research conducted by Devaraj, et al. (2003); Sivabrovornvana, et al. (2005) and Tarcan, et al. (2010) supports the findings of Li, et al. (2000), which explained that the most important factor positively affecting hospital performance is the use of technology (health and information).

Based on the theoretical study, empirical studies and concepts that have been described, then the researchers arranged the following hypothesis.

H<sub>1</sub> : Technology Investment Has Significant and Positive Influence on Hospital Performance.

### The Influence of Human Resource Competence Investment on Hospital Performance

Makadok (2001) and Nasution, et al. (2011) stated that the competence of human resource is included in the resources base value theory in which human resource is one of the unique resources that will create value added for the company. Kash and Rycoft (2000); Nassimbeni (2003); Barney and Clark (2007) and Chiou, et al. (2011) found that the added value created by the company will ultimately affects the financial performance of the company, growth of business and market value. Laksono-Trsinantoro (2005) and Rivai and Sagala (2013) explained that the company without adequate competent human resources cannot use technology effectively and efficiently, so the quality of poor service will be a problem in the performance.

The relationship between performance and personality characteristics such as competence, education and work experience have been studied by several researchers. Zigan, et al. (2008) and Capkun and Messner (2011) in their research found that specialization in employment improves the quality of service. Basuki, et al. (2013) concluded that the competence of human resource has significant positive effect on hospital performance.

Based on the theoretical study, empirical studies and concepts that have been described, then the researchers arranged the following hypothesis.

H<sub>2</sub> : Human Resource Competence Has Significant and Positive Influence on Hospital Performance.

### **The Influence of Technology Investment on Service Quality**

Technology developed by hospitals through investment is an important means in hospitals, because it can improve the quality of service. Improving the quality of service with the use of technology can be seen from the process of diagnosis which is more quick and accurate and faster administration process (Laksono-Trisnantoro, 2005 and Sabarguna, 2008).

Resource base view theory from Barney and Clark (2007) and Barney (1991) explained that companies that can use unique resources will be able to create sustainable performance. Technology investment is a unique resource for hospitals that is expected to increase the quality of service and financial performance of hospitals.

Research related to the influence of technology usage on hospital service quality are done by several researchers. Li, et al. (2000) found that technology of health and information have significant positive effect on service quality and hospital performance. Research from Li, et al. (2000) is supported by studies analyzed by Tarcan et al. (2010); Restuccia, et al. (2012); Angst, et al. (2012); Hdeib (2011); Cullough, et al. (2010); Sivabrovornvana, et al. (2005); Devaraj, et al. (2003) who concluded that the use of technology has significant positive effect to the quality of service. Dong (2015) stated that technology investment is positively and significantly related to service quality. William, et al. (2015) revealed that information technology that varies when integrated has positive and significant impact on the improvement of service quality.

Based on the theoretical study, empirical studies and concepts that have been described, then the researchers arranged the following hypothesis.

H<sub>3</sub> : Technology Investment Has Significant and Positive Influence on Service Quality.

### **The Influence of Human Resource Competence Investment on Service Quality**

Barney and Clark (2007) and Barney (1991) argued that human resources of the company are defined as the overall knowledge, experience, skills and commitment, their relationships with each other and outside the company. Investment of human resource competence is a unique resource for hospital which is expected to increase service quality and hospital performance.

Laksono-Trisnantoro (2005) stated that the results of the process of mastering medical technology are doctors who have high ability and relatively few in number. This high ability in the mastering medical technology is one effort that can improve the quality of service in the hospital. Medical employees, paramedics and other employees are important components of the hospital to be empowered. The quality of the health care process will only increase if hospital employees are committed and trained in their work. Rivai and Sagala (2013) explained that the success of an organization is determined by the quality of the people in it, so that the development of competency-based human resources will be able to give good impact for improving service quality and organizational performance.

Research on the influence of human resource competence on service quality has been done by several researchers. Batt and Moynihan (2006) found that the competence of human resources has significant positive effect on service quality and call center performance. Zigan, et al. (2008); Capkun and Messner (2011); Basuki, et al. (2013); and Rebecca (2015) revealed that knowledge of human resources is positively and significantly affected the quality of hospital services.

Based on the theoretical study, empirical studies and concepts that have been described, then the researchers arranged the following hypothesis.

H<sub>4</sub> : Human Resource Competence Has Significant and Positive Influence on Service Quality.

### **The Influence of Service Quality on Hospital Performance**

Quality of service is very important for hospitals, because the improvement of service quality can provide patient satisfaction, so that loyalty increases and in the end can improve hospital income (Muninjaya, 2012 and Laksono-Trisnantoro, 2005). Batt and Moynihan (2006) who conducted a study of the effect of service quality on the performance of call centers in New York found that service quality has significant positive effect on call center performance. Dong (2015) revealed that there is significant positive effect between service quality and hospital performance. Dong's finding is supported by Alexander, et al. (2006); Weiner, et al. (2006); Alexander,

et al. (2006); Weiner, et al. (2006); Naveh, et al. (2005); Sivabrovnvana, et al. (2005); Devaraj, et al. (2003) and Li, et al. (2000) that the improvement of service quality can improve hospital performance.

Based on the theoretical study, empirical studies and concepts that have been described, then the researchers arranged the following hypothesis.

H<sub>5</sub> : Service Quality Has Significant and Positive Influence on Hospital Performance.

#### **The Role of Service Quality to Mediate the Effect of Technology Investment on Hospital Performance**

Health technology is a great investment for hospitals, where the use of technology is expected to improve the quality of service and then supposed to improve the performance of the hospital. Health and information technology will increase the quality of service by accelerating the process of disease diagnosis, accelerate the response of administrative time such as registration, payment and so forth. Therefore, the patients are satisfied and loyal, which eventually increase hospital revenue (Muninjaya, 2012 and Laksono-Trisnantoro, 2005).

Research on the effect of technology and service quality on hospital performance is done by Li, et al. (2000), who found that the use of technology has significant and positive effect on service quality, while the use of technology has significant and positive effect on the performance of the hospital. Tarcan, et al. (2010) examined opinion assessments of hospital directors in Ankara, who found that the use of technology (health and information) has significant and positive impact on the quality and performance of the hospitals. Li, et al. (2000) and Tarcan, et al. (2010) also found that service quality significantly mediating the effect of technology on hospital performance. William, et al. (2015); Sivabrovnvana, et al. (2005); Devaraj, et al. (2003) supports research findings conducted by Li, et al. (2000) and Tarcan, et al. (2010) regarding the use of technology in the hospital, which has significant positive effect on service quality. Collum (2013) found that the use of electronic medical records can improve hospital performance.

Based on the theoretical study, empirical studies and concepts that have been described, then the researchers arranged the following hypothesis.

H<sub>6</sub> : Service Quality Significantly Mediating the Influence of Technology Investment on Hospital Performance.

#### **The Role of Service Quality to Mediate the Effect of Human Resource Competence Investment on Hospital Performance**

Investment in the competence of human resources in hospitals in accordance with the classification of hospitals that determine the ability of hospitals to provide quality services, in line with Regulation of Ministry of Health Republic of Indonesia No. 340 of 2010 on the classification of hospitals. Rivai and Sagala (2013) stated that the success of an organization is determined from the quality of the people in it, so that the development of competency-based human resources will be able to give good influence for the development of organizational performance.

Batt and Moynihan (2006) managed a study on the influence of human resource competence and service quality to call center performance in New York, which found that human resource competence has positive and significant effect on service quality and call center performance. The quality of service mediates significantly the influence of human resource competence on the performance of call centers. Siddiqui and Kleiner (1998) in their research found that improving human resource competence through training and development can contribute to sustainable performance levels. Azmi, et al. (2009) discovered that there is positive relationship between human resource competence with service quality. Furthermore, Zigan, et al. (2008) asserted that intangible resources are very important and have a positive impact on improving hospital performance.

Based on the theoretical study, empirical studies and concepts that have been described, then the researchers arranged the following hypothesis.

H<sub>7</sub> : Service Quality Significantly Mediating the Influence of Human Resource Competence Investment on Hospital Performance.

#### **RESEARCH METHODS**

The designs of this study are as follows: 1) based on the characteristics of the problem, this study is classified into causal research, 2) from the time approach aspect is cross sectional, 3) using survey method and 4) data collected gradually, i.e. the initial survey followed by filling questionnaire by respondents. This study uses primary data that is taken directly through respondents by using questionnaires for the variables of technology

investment, human resource competence investment and service quality, while hospital performance utilizes secondary data that is taken from hospital reports.

Variables of this research are four, namely investment of technology and human resource competence, service quality and hospital performance. The operational definitions of each variable are as follows.

- 1) Technology investment refers to private hospital health technology investment in Bali covering health technology as well as information technology. Technology investment in this research is reflected by three indicators, namely: (1) availability of laboratory equipment such as radiology equipment, electrocardiography (EKG); (2) availability of hospital information system and (3) availability of hospital management information system.
- 2) Investment in human resource competence is an investment in the competence of human resources of private hospitals in Bali covering capacity, knowledge, skill and professional attitude that must be learned. Investment in human resource competence is reflected by indicators such as: (1) expertise of doctors who work in hospitals; (2) certificate of nurse who work in hospital and (3) specification of administration officer who work in hospital.
- 3) Service quality is private hospital service in Bali that is able to meet customer expectations. Quality of service is reflected by indicators such as: (1) patient room equipment; (2) check room equipment; (3) hospital environment; (4) the level of employee service; (5) suitability of service with the promised; (6) communication services in accordance with the needs of patients; (7) provide services when needed; (8) the willingness to help the patient; (9) the speed of responding to the patient's request; (10) reliable hospital capability; (11) hospital support for performing work in conformity with applicable procedures; (12) hospital experience in providing services; (13) the ability of the hospital to respond to patient complaints; (14) the ability of the hospital to provide information in line with its duties and (15) the ability of the hospital to encourage patients in deal with their problems.
- 4) The performance of hospital is the level of accomplishment or achievement of private hospitals in Bali over a period of time. The performance indicators of the hospital in this study are formed by four indicators consisting of:

- a) BOR (Bed Occupancy Ratio) is the percentage of bed usage in one unit of certain time.

$$BOR = \frac{\text{Number of Days of Hospitalization}}{\text{Number of Beds} \times \text{Number of Days in Certain Period}} \times 100\%$$

- b) Length of Stay (LOS) is the average length of stay of a patient (Average Length of Stay / AvLOS), which is the average length of patient being treated.

$$AvLOS = \frac{\text{Length of Treatment}}{\text{Number of Outgoing Patients in Healthy and Deceased}}$$

- c) Gross Death Rate (GDR) ( $Y_{2.3}$ ) as the proportion of all inpatients who deceased within a certain period of time, including newborns who subsequently passed away. The GDR standard score is less than five percent (<5%).
- d) Return on Assets (ROA) ( $Y_{2.5}$ ) as the percentage of profit after tax divided by total assets. The normal value of ROA is at least five percent. The value of ROA below five percent indicates poor hospital performance which is resulted in hospital inefficiency in running its operations and/or unable to develop hospital services.

The analytical technique is quantitative analysis, that is multivariate analysis using Structural Equation Modeling (SEM), variance based approach with PLS (Partial Least Square), which has a purpose to predict.

## ANALYSIS AND RESULTS

### Characteristics of Respondents

Respondents in this study are all private hospitals in Bali Province with the analysis units are hospital director and manager / division head / head of field and doctor in charge of service which equal to 108. Respondents are dominated by male gender, it can be seen from respondent with male sex, as follow: 1) director (77.8%), 2) manager (52.8%) and 3) doctor in charge of service (91.7%). Age of respondents over 50 years is 58.3% for all units of analysis. Viewed from the duration of work, the respondents are dominated by working time span between 5-10 years, that are doctor in charge of service (58,3%), head of field / manager (55,6%) and director (52,8%).

### Inferential Analysis

Based on the results of SmartPLS Program version 3 can be seen in Figure 1.

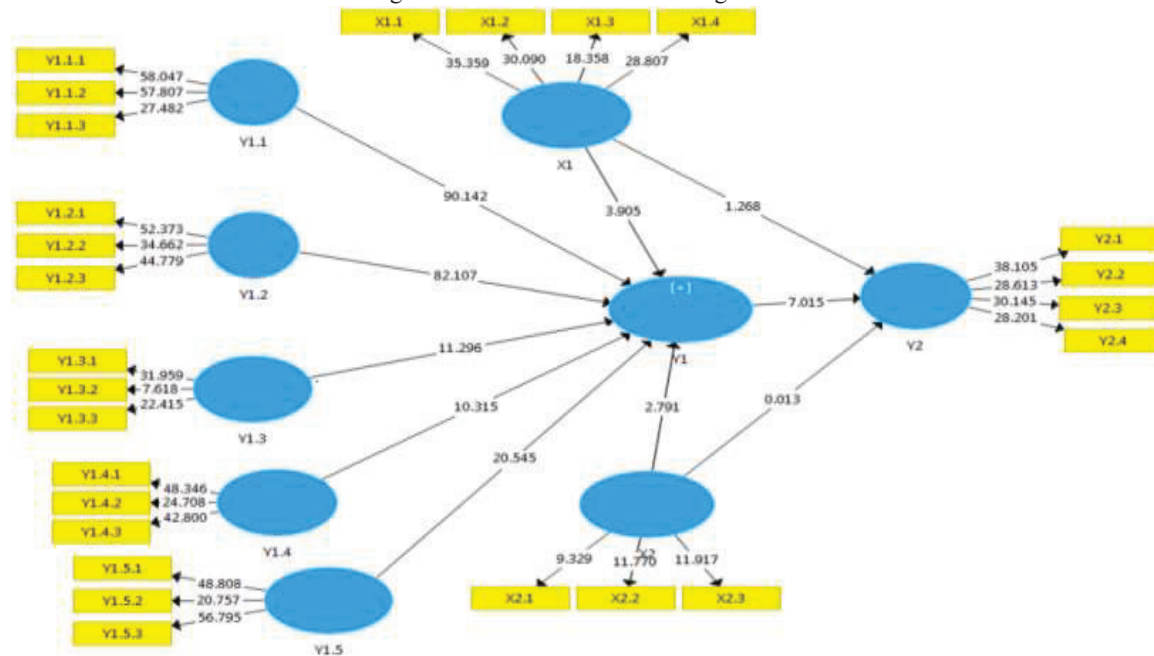


Figure 1. Result of Research Model Analysis

Based on the result of the research model analysis (Figure 1), it can be recapitulated research results such as Table 1 below.

Table 1. Statistical Significance Test of Direct Influence among Variables Research

No.	Direct Relationship	Original Sample	Standard Deviation	t-Statistics	P Values	Results
1	Technology Investment (X <sub>1</sub> ) → Hospital Performance (Y <sub>2</sub> )	-0,128	0,101	1,268	0,103	Not Significant
2	Human resource competence investment (X <sub>2</sub> ) → Hospital Performance (Y <sub>2</sub> )	0,002	0,118	0,013	0,495	Not Significant
3	Technology Investment (X <sub>1</sub> ) → Service Quality (Y <sub>1</sub> )	0,502	0,129	3,905	0,000	Significant
4	Human resource competence investment (X <sub>2</sub> ) → Service Quality (Y <sub>1</sub> )	0,440	0,158	2,791	0,003	Significant
5	Service Quality (Y <sub>1</sub> ) → Hospital Performance (Y <sub>2</sub> )	0,879	0,125	7,015	0,000	Significant

### The Influence of Technology Investment on Hospital Performance

The results of this analysis show that technology investment has no significant effect on hospital performance, it can be discovered from P-Value equal to 0,103 which is bigger than level  $\alpha = 5\%$ , while value of t-statistic is 0,103 ( $< 1,96$ ). These suggest that technology investment consisting of clinical and information technologies that are conducted by private hospitals in Bali are not able to improve hospital performance. This condition can be generated by other factors that influence outside of technology investment, such as: (1) the



existence of cooperation system between private hospitals in fulfilling the need for supporting treatment; (2) the measurement of hospital performance is done by cross-sectional, whereas the effect of investment is long term. The findings of this study are in line with DesRoches, et al. (2010) in hospitals in the USA, who found that the effect of technology on hospital performance is low, caused by the need for time for organizational changes and processes to achieve useful use of technology. Zengul, et al. (2014) discovered that the increasing use of technology is not able to improve hospital performance, due to the limitations of research methodology, such as cross-sectional survey data and limited to one region. (3) Limitations in standardizing definition, conceptualization and measuring health technology investment indicators used in private hospitals, so that there is a value of technology investment indicator which is below average and (4) weaknesses in the research of methodology, especially in sample determination, where the sample in this study is relatively few private hospitals.

The results of this analysis support the results of research conducted by Parente, et al. (2007), who stated that due to budgetary pressures and also related to firm size, where in large companies investments are made to maximize profits, but in small organizations are made to increase the volume. Bandi (2006) found that organizational performance is not influenced by investments in information technology. This is due to the uncertainty of the environment has significant relationship to the use of communication technology.

Moreover, the findings of this study are consistent with the findings of Clemons and Row (1991a) and Powel and Dent-Micallef (1997), which suggest that firms cannot expect information technology to produce sustainable advantage. This is because most of the information technology is available to all companies, including competitors, buyers, suppliers and potential newcomers.

#### **The Influence of Human Resource Competence Investment on Hospital Performance**

Investment of human resource competence is found to have insignificant effect on hospital performance, it can be seen from P-Value equal to 0,495 which is bigger than level  $\alpha = 5\%$ , while value of t-statistic is 0,013 ( $< 1,96$ ). These show that human resource investment conducted by private hospitals in Bali is not able to improve the performance. This problem can be caused by other factors that influence outside of human resources competence investment, that are: (1) utilization of the competence of other hospital specialist doctors to fulfill the need of service in private hospital (Laksono-Trisnantoro, 2005); (2) there are other influential variables besides human resource competence such as remuneration system, career system, job satisfaction and organizational commitment; (3) there are limitations in standardizing definition, conceptualization and measuring investment indicators of human resource competence, so there is a value of investment indicator of human resource competence that is below average; (4) the effect of hospital performance measurement is conducted by cross-sectional; (5) weaknesses in the research methodology, especially in determining the sample and unit of analysis in this study, which is relatively few private hospitals.

The results of this analysis support the findings of research that are conducted by Fu'ad (2016); Liu, et al. (2014); Dhermawan (2012) and Ahmadi (2008) who found that the competence of human resource does not affect the performance of the organization. There are other influential factors besides competence, namely compensation, commitment to performance, motivation and work environment.

#### **The Influence of Technology Investment on Service Quality**

The results of the analysis indicate that technology investment has significant positive influence on service quality. This can be seen from P-Value equal to 0,0005 which is smaller than level of  $\alpha = 5\%$ , while value of t-statistic is 3,905 ( $> 1,96$ ). These reveal that technology investment that is conducted by private hospitals in Bali can improve the quality of service. The results of this analysis are in line with the conclusions of previous research that are managed by Li, et al. (2000); Tarcan, et al. (2010); Restuccia, et al. (2012); Angst, et al. (2012); Hdeib (2011); Cullough, et al. (2010); Sivabrovornvana, et al. (2005) and Devaraj, et al. (2003).

#### **The Influence of Human Resource Competence Investment on Service Quality**

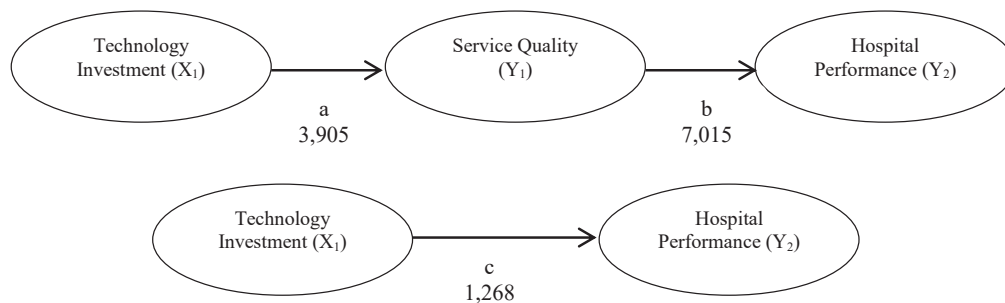
The results of this analysis suggest that investment of human resource competence has significant and positive impact on service quality. This can be noticed from the P-Value which is smaller than level of  $\alpha = 5\%$ , while value of t-statistic is 2,791 ( $> 1,96$ ). These determine that investment of human resource competence by private hospitals in Bali is able to increase the quality of service. The results of this analysis support the results of previous studies that are conducted by Zigan, et al. (2008); Capkun and Messner (2011); Nasution, et al. (2011) and Makadok (2001).

### The Influence of Service Quality on Hospital Performance

The results of the analysis explain that service quality has significant and positive influence on hospital performance. This can be seen from P-Value 0,000 which is smaller than level of  $\alpha = 5\%$ , while t-statistic value is 7,015 ( $> 1,96$ ). These confirm that the quality of service at private hospitals in Bali is capable to develop the performance. The results of this analysis are in accordance with the results of research that are accomplish by Dong (2015); Alexander, et al. (2006); Weiner, et al. (2006); Naveh, et al. (2005); Sivabrovornvana, et al. (2005) and Devaraj, et al. (2003).

### The Role of Service Quality to Mediate the Effect of Technology Investment on Hospital Performance

The role of service quality mediating the influence of technology investment on hospital performance is analyzed by indirect effect of technology investment to hospital performance through service quality.



**Figure 2. The Indirect Effect of Technology Investment to Hospital Performance through Service Quality**

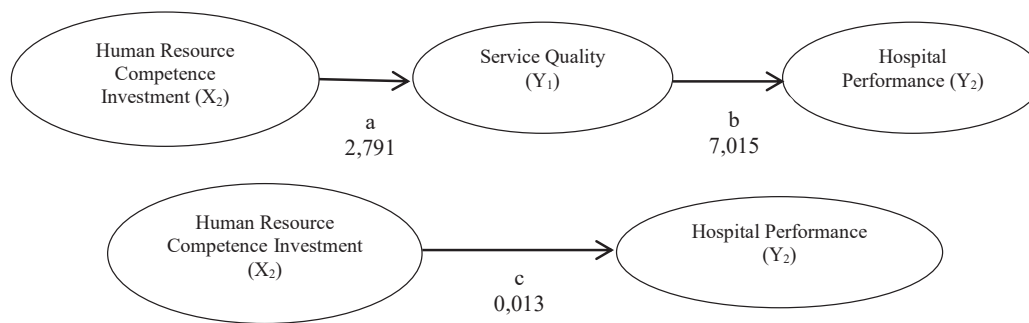
Figure 2 shows that the influence of technology investment on service quality is significant with t-statistics of 3,905 ( $> 1,96$ ). Furthermore, the influence of service quality on hospital performance is significant with t-statistic of 7,015 ( $> 1,96$ ). The direct effect of technology investment on hospital performance is not significant with t-statistic of 1,268 ( $< 1,96$ ).

Based on the criteria of Hair, et al. (2010), if a and b are significant, but c is not significant, it can be said that the mediation is full mediation, where the value of a (3,095), b (7,015) and c (1,268). Therefore, the quality of service in this case represent as full mediation in the influence of technology investment on hospital performance.

The results of this study are in accordance with the results of previous studies, where the quality of service act as mediation in the influence of technology investment to hospital performance, such as Li, et al. (2000), who examined the hospitals in America, found that the use of technology positively and significantly affect service quality and service quality positively and significantly influence the performance of the hospital. Tarcan, et al. (2010) examined opinion judgment at the hospital directors in Ankara, who revealed that the use of technology directly has significant and positive impact on quality and indirectly on hospital performance. The findings are also able to confirm resources base view theory from Barney and Clark (2007) and Barney (1991). Theories of Barney and Clark (2007) and Barney (1991) basically describe companies that can use technology (unique resources) to the maximum levels will create value added that can affect the performance of the hospital.

### The Role of Service Quality to Mediate the Effect of Human Resource Competence Investment on Hospital Performance

The role of service quality mediates the influence of human resource competence investment on hospital performance, which is analyzed by indirect influence of human resource competence investment on hospital performance through service quality.



**Figure 3. The Indirect Effect of Human Resource Competence to Hospital Performance through Service Quality**

Figure 3 indicates that t-statistic value of human resource competence investment influence on service quality is significant with value of 2,2791 ( $> 1,96$ ). In addition, the effect of service quality on hospital performance is significant with t-statistic value of 7,015 ( $> 1,96$ ). The direct influence of human resource competence investment on hospital performance is not significant with t-statistic value of 0,013 ( $< 1,96$ ).

If a and b are significant, but c is not significant, then it can be said that the mediation is full mediation (Hair et al., 2010). This can be seen from the value of a (2,791), b (7,015) and c (0,013). Thus, the quality of service in this case acts as full mediation in the influence of technology investment on hospital performance.

The results of this study are in line with the results of previous studies, where the quality of service is mediating the influence of human resource competence investment to hospital performance as conducted by Batt and Moynihan (2006), who explained the effect of human resource competence and service quality to performance of call centers in New York. It is found that the competence of human resource has significant positive effect on service quality and call center performance. Quality of service mediates significantly the impact of human resource competence to call center performance. Zigan, et al. (2008) and Capkun and Messner (2011) concluded that specialization in service improves service quality that finally develops hospital performance. Basuki, et al. (2013) explained that knowledge of human resource significantly affects the quality of service and hospital performance. Yulianti (2015) revealed that the competence of human resource significantly and positively affects the company performance through good service quality. Rebecca (2015) justified that human resource competence has significant and positive influence on the quality and performance of public service.

## CONCLUSIONS

Based on the results of hypotheses testing and research findings, it can be formulated the following conclusions:

- 1) Service quality plays dual mediation roles, which fully mediates the effect of technology investment on hospital performance and also fully mediates the influence of human resource competence investment on hospital performance.
- 2) Technology investment in private hospitals in Bali Province has no significant effect on hospital performance. This suggests that technology investment is not able to improve the performance of private hospitals in Bali. This is due to other factors outside technology investments that have effect, such as systems of cooperation with other hospitals or companies that provide patient examination support equipment as well as limitations in standardizing the definition, conceptualization and measuring indicators of health technology investments that are used in private hospitals.
- 3) Investment in human resource competence has no significant effect on hospital performance. This shows that investment in human resource competence is not able to improve the performance of private hospitals in Bali. This is caused by other factors that influence beyond human resource competence investment, such as remuneration and hospital career system, along with utilization of specialist doctors from government hospital and/or other private hospitals to provide services in the private hospital.
- 4) The investment of technology and human resources competence have significant positive impact on service quality. This means that the investment of technology and human resource competence can enhance the quality of private hospital service in Bali Province.

- 5) Service quality has significant positive effect on hospital performance. This indicates that service quality can raise up the quality of private hospital performance in Bali.

## RECOMMENDATIONS

Based on the results and conclusions of this research, it can be put forward some suggestions for further research, namely: 1) findings of this study, specifically the relationship between technology investment and hospital performance is not significant. Subsequent research are possible to manage to re-examine the effect of technology investment on hospital performance by incorporating other indicators that may still be an indicator or additional indicators of the technology investment constructs; 2) The researchers then can analyze other constructs to test the role of mediation of service quality on hospital performance, for example using variable of culture or trust.

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