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MULTICASE STUDY OF TECHNICIAN CAREERS IN MANUFACTURING INDUSTRY

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ARTICLE INFO	ABSTRACT
	The development of industrial world every year changes very rapidly. The demand for workforce competence in the industry is increasing. Competence is the ability to do work effectively. The aim of this study is to identify careers in the position of Technician. This study uses a qualitative approach, by using interviews, documentation, and observation. The results of research regarding the work of Technician positions in the industry, include: checking production machines, coordinating and supervising, repairing production machines, and manufacturing spare parts for production machines. There are several competencies in the scope of work that a technician must have, regarding: Measuring Instruments, Technical Drawings, General Machining, and Special Requirements. Incentives obtained are based on grade, and holiday incentives. The salary range earned by the technician position is above the UMK of the area where the industry is located.

INTRODUCTION

The development of the industrial world every year changes very rapidly. DiBenedetto (2018) mentions that from 1760 to 1840 the first industrial revolution, continued by the second industrial revolution in the nineteenth and twentieth centuries, then in 1990 the revolution changed again to the third, until now it is the fourth industrial revolution. From the development of the industrial revolution, the competence of the workforce (skills, knowledge, and attitudes) must continue to be improved, this is a preparation material for entering the labor market (Mulder, 2019). The demands of the manufacturing industry require employees or workforce to have standardized and professional competencies (BNSP, 2017)**.**

Rangriz & Soltanieh (2015) competence is the ability (capability or ability) had by an individual to carry out certain tasks or projects effectively. Competence is related to Human Resources (HR) which is defined as an individual ability in the form of knowledge, skills, performance, and behavior characteristics that are used as a form of responsibility in a job role pekerjaan (Sani et al., 2016). Mukhopadhyay (2019) states that competence is the ability and willingness that exists in a workforce in the form of knowledge that is used to complete several work tasks. According to Mulder (2019) competence is the inherent potential of an individual

workforce in the form of the ability to complete tasks and increase career paths in a job. The career path of the workforce in Indonesia refers to the Indonesian National Qualifications Framework (KKNI). Susilo et al., (2018) states that the Indonesian National Qualifications Framework (KKNI) is a competency level that juxtaposes, equalizes, and integrates the fields of formal, non-formal, and informal education in the context of recognizing work competencies. Career path is defined as a series of positions that must be passed by each individual employee in achieving a certain level of position (Questibrilia, 2019).

Identification of the development of competencies related to industry must continue to be carried out, because competence in Vocational High School refers to the current regime or era (Billett, 2020). Identifying and grouping competencies is an activity to maximize the competencies possessed by the workforce (McGrath, 2020). By this case, the manufacturing industry is allowed to determine the competency standards of the workforce according to their respective needs (Bonvin, 2019). Because jobs in the manufacturing industry for Vocational High School graduates are graduates who are able to reach the Technician career ladder (Farkhan, 2020). Vocational High School graduates who have work experience and work competency certification, are able to reach 4th level with the position of Technician/Analyst (Sleekr, 2020). By this case, the research focuses on Career Analysis of Technicians in the Manufacturing Industry, with the aim of describing and analyzing competencies in the scope of work, career paths, incentives, and salary standards. PT. Insastama Kediri and PT. Arthawena Sakti Gemilang Malang was chosen as the research location, which is a manufacturing industry in the field of metal fabrication.

RESEARCH METHOD

This research examines and analyzes the Career Analysis of Technician Positions in the Manufacturing Industry. The research method is used a qualitative approach. The researcher views the approach approach as the concept of his research in accordance with the facts in the field in real and earnest. The qualitative approach is seen by practical researchers to reveal in-depth events of an event or a policy that is in the manufacturing industry. In general, qualitative research is used to get real data that researchers use to describe events or phenomena that already exist in the manufacturing industry. This approach was chosen to explore information, production activities, production practices, and industrial culture. The researcher started asking questions with the topic of the scope of work carried out by the Technician position, the career path in the Technician position, the incentives obtained, and the standard salary received by the Technician position. The design and research methods are expected to be able to describe in depth related to the Career of Technician Positions in the Manufacturing Industry.

A. Figures and Tables Location and Source of Research Data

The research location is at PT. Insastama Kediri and PT. Arthawena Sakti Gemilang Malang. In detail, the addresses of the research locations are: (1) PT. Instatama Kediri Alam Gadungan Satak No.7 Kec. Puncu Pare Kediri; and (2) PT. Arthawena Sakti Gemilang Malang Jl. Raya Kertanegara No. 85, Ngambon, Girimoyo, Kec. Karang Ploso, Malang, East Java. This industry is a large industry in the field of metal fabrication manufacturing, so it is very feasible to be used as a research site.

The source of data is from the Career of Technician Positions in the Manufacturing Industry, obtained from the process of verbal observation or actions in interview activities, and the rest of the data obtained through observation and documentation activities. The selection of research subjects was based on the variables in the study, with the aim of extracting supporting information and data that could be used as reinforcement of the research results. By this case, the selection of informants does not focus on the number of research subjects themselves, but on how much informants provide information as reinforcing data from research data. Informants in the research are described in table 1.

Table 1. Informan in the research

No.	Location	Informan	
1.	PT. Insastama Kediri	a.	HRD/HR
		b.	Head Workshop Departement
		c.	Operator Production
		d.	Technician
		e.	Staff Quality Control
2.	PT. Arthawena Sakti Gemilang Malang	a.	HRD/HR
		b.	Head Production Departement
		c.	Operator Production
		d.	Senior Technician
		e.	Junior Technician

B. Research Data Collection

Methods of data collection using observation (observation), interviews (interviews), and content analysis (content analysis). Guidelines for data collection in the form of indicators or question points that will be asked to informants. The question points include: "What is the scope of work carried out in the Technician position?"; "What are the requirements to become a worker with the position of Technician?"; "What is the career path in the Technician position"; "Are there any incentives for the Technician position? what is the nominal amount of the incentive?"; "How is the recitation system in the Technician position? how much did you get?"

C. Research Data Analysis

Qualitative data analysis is the process of arranging the sequence of data, organizing it in a pattern, category and description of a basis. The interaction in the analysis of research data is described in Figure 1, as follows:
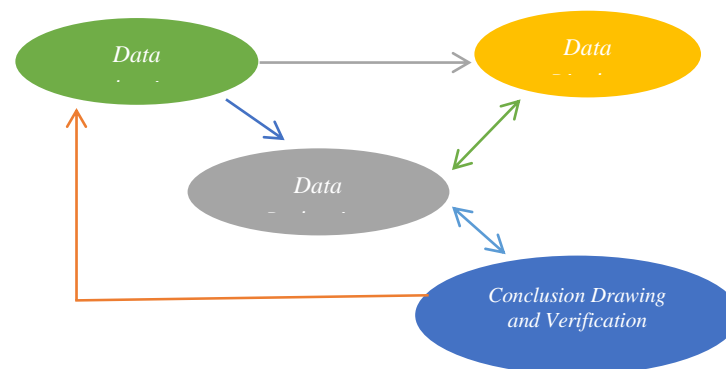
Source: Modified from Ulfatin (2015)

Figure 1. Interactive cycle of research data analysis process

Figure 1 shows that the interactive nature of data collection using data analysis. In data collection, it is placed as a component which is an integral part of analysis activities. The results of data collection need to be reduced data with another meaning of reduction activities are coded and presented in tabular form. The three flows are integrated into one interconnected process, both before data collection and after data collection.

After the data is collected, the researcher checks the validity of the data using data triangulation, which then compares the results of the research from the two research places which are used to find research propositions from the two places. From the results of the research proposition, the researcher will discuss further by using a literature review or literature that is relevant to the research.

RESULTS AND DISCUSSION

A. Work in Technician Position

The scope of work carried out by technicians in industry starts from briefing activities which include: (1) knowledge and application of Industrial K3, (2) job assignments, and (3) work targets. The scope of work is described in table 2.

Table 2. Scope of technician jobs

No.	Jobs	Work done
1.	Production machine checking (using a checklist)	a. Checking the lubrication of production machines b. Checking the production machine nets c. Ensuring the production machine does not experience trouble
2.	Coordinate and supervise Production Operators	a. Coordinate Production Operators b. Directing Production Operators in the operation of production machines c. Conduct training for new Production Operators
3.	Production machine repair and maintenance	a. Doing machine repair b. Perform weekly, monthly and yearly machine maintenance
4.	Manufacture of production machine spare parts	a. Manufacture of production machine spare parts b. Production machinery procurement c. Manufacture of machine tool spare parts d. Conventional machine tool operation e. Operation of CNC turning and milling machines

In the scope of work, the Technician position is broadly divided into 4 works, which include: (1) checking production machines (using a checklist), (2) coordinating and supervising Production Operators, (3) Production machine repair and maintenance, and (4) manufacture of production machine spare parts. The scope of work is more dominant in production support work, where the work of a technician is always related to the production process, production machines, and production machine operators.

The Marine Research and Observation Center (2020) states that the role of the engine technician is to carry out engine repairs, take responsibility for work, and control damaged engine parts. Sleekr (2020) states that the job description of a technician includes: (1) maintain and repair the machine in a ready-to-work condition, (2) detect and analyze faults on the machine, (3) diagnose the use of digital tools, (4) maintain periodically (lubrication and replacement of spear parts), (5) explain to the related operator with the operation of the machine, (6) providing recommendations and directions in the use of the machine, and (7) ensuring the machine is in a safe condition.

B. Identification of Competencies in the Scope of Technician Works

There are several competencies in Technician positions that are needed in the manufacturing industry. These competencies are used as a reference in the work carried out by the Technician position, and are described in table 3.

Table 3. Identification of competencies in the scope of work for technician positions

No.	Competence in the Scope of Work	Work done
1.	Measuring instrument	a. Use of caliper with various types b. The use of a micrometer, micrometer outside diameter, inside diameter, and depth c. The use of threaded, metric and whitewort combs used for the manufacture of machine spare parts threads.
2.	Engineering drawings	a. Understanding of ISO technical drawings (size indicators, tolerances, drawing lines, shapes, descriptions of N1-N12 drawing work, and cross sections) b. Analyzing technical drawings used for work steps in the use of spare parts for production machines c. Drawing techniques using CAD
3.	General Machining	a. Lathe machining operation b. Milling machining operation c. Grinding machining operation d. CNC machining operations e. Welding machining operation
4.	Special Competencies	a. Have a good attitude at work (discipline, enthusiasm, and agility) b. Have work experience both in the form of Industrial Work Practices and industrial internships and proven by a certificate of experience c. Smart (mastery in knowledge and skills in the Mechanical Engineering department) d. Vocational High School graduate majoring in Mechanical Engineering

Identification of competencies in the scope of work for the Technician's position is an activity that aims to sort or categorize competencies in the work carried out by the Technician position. These competencies include measuring instruments, technical drawings, general machining and special competencies. The description of the competence of the Technician position in Table 2, is used by the manufacturing industry for career advancement and recruitment of technicians.

Competence related to Human Resources (HR) is defined as an ability possessed by individuals in the form of knowledge, skills, performance, and behavioral characteristics that are used as a form of responsibility in a job role (Sani et al., 2016). From the expert opinion, it can be formulated that competence is a form of ability possessed by each individual person (workforce) in the form of knowledge, skills, performance, and behavioral characteristics that are used in completing task activities on the job effectively. Furthermore, Kipper et al., (2021) competence involves the human capacity for a work demand that involves cognitive and affective abilities.

Employment in the manufacturing industry uses precision measuring tools that can be seen directly from the measurement results (direct measurement is a measurement that compares the size of the workpiece with a reference quantity or scale) (Leach & Ferrucci, 2020). Mulyadi et al., (2020) confirmed that calipers and micrometers are used in various industries, starting from work design, manufacturing, to quality assurance work for a product. This is in line with the results of research conducted in the industry, regarding the competence of Measuring Instruments for Technician positions including: (1) caliper; (2) micrometer; and (3) threaded, metric, and whitewort.

Technical Drawing is a communication tool for work related to machine tools, then work using technical drawings is very relevant to the needs of the manufacturing industry in Central Java (Arifin & Ristadi, 2017)**.** This is in line with the results of research conducted in the industry, regarding the competence of Technical Drawing including: (1) reading ISO technical drawings, and (2) analyzing Technician drawings used for steps.

Machining process is a process that aims to make a production product, in order to get the workpiece in accordance with the plan. Conventional machining processes in the 4.0 manufacturing industry are used as a support process for the production process, the conventional work in question is turning, drilling, and grinding (Kim et al., 2018). This is in line with the results of research conducted in the industry regarding general machining competencies that emphasize the operation of production machinery (lathe, milling, grinding, CNC, and welding).

Farkhan (2020) states that if a Vocational High School graduate has work experience and job competency certification, he is able to reach the 4th level with the position of Technician/Analyst. Kipper et al., (2021) state that the competencies or abilities in industry 4.0 are as follows: (1) competency skills which include: leadership, having vision, self-organization, giving and receiving input, pro-activity, creative, able to solve problems, interdisciplinary, teamwork, collaborative, initiative, communication, innovation, and adaptability; and (2) knowledge competence which includes: development of information technology, algorithms, automation, data analysis, general machining system theory and its development.

The results of research conducted in the industry, regarding the special requirements used in the position of Technician are taken from the position of Production Operator who has more competence (proven by a competency report card) and obtains a recommendation from his superior. Darmawang (2017) which states that competence can be interpreted as an underlying characteristic of a person related to carrying out a job with effective performance.

B. Career Path in Technician Position

Career path is the level of work in performance achievement. Regarding the career paths obtained in the Technician position from 2 cases of the manufacturing industry (PT. Insastama Kediri, and PT. Arthawena Sakti Gemilang Malang) there are similarities as follows: (1) the career path in the position of Technician graduates of Vocational High School ranks above higher than Production Operators, (2) there is a grade or level of assessment carried out on the competency report card to advance to the career level of the superior (Figures 2, and 3) the grade increase is based on competence or mastery in repairing production machines and is able to reduce the percentage of accumulated damage that occurs. The Technician career path is dominated by Vocational High School graduates who have more experience than the Production Operator position. Furthermore, the career path is described in Figure 2, starting from a production operator who has experience in grade A, then becomes a worker with a technician position (junior technician, senior technician). The difference between Junior Technician and Senior Technician is competence, experience, and employment status.
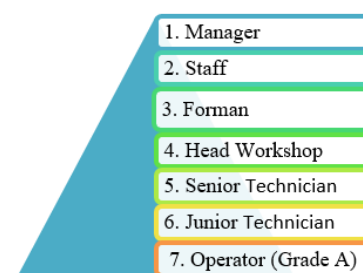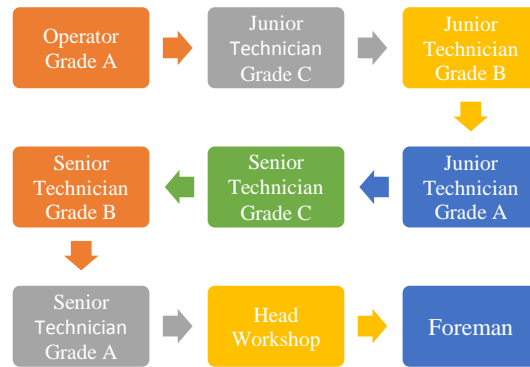

Figure 2. Industry career levels

Figure 3. Career paths in technician positions

In Figures 2 and 3, it is explained that the career path level in the Technician position starts at the 7th career level with the position of Production Operator (Grade A). Furthermore, a technician goes up to the 6th career level with the position of Junior Technician, with competency grades A, B, and C. Career advancement based on the ability of each individual Workforce which is assessed every 6 months in Talent Management activities. The next career advancement is Senior Technician, with Grades A, B, and C. Head of Section and Foreman is the last career path in the position of Technician with Vocational High School graduates. If a workforce graduates from Vocational High School in a Staff position, then he must carry out educational development at the Diploma 3 and Bachelor Degree level.

C. Incentives for Technician Positions

Incentives are a form of appreciation given to employees for their achievements. Incentives can be interpreted as material and non-material compensation provided by workforce or employees for performance that exceeds predetermined standards (Kusumayati, 2020). According to Vaisburd et al., (2016) incentives in the form of additional salaries provided by the workforce, with the aim of encouraging workers to work more effectively from the work and responsibilities that have been carried out. Incentives for workforce are based on competency assessments in the form of workforce ranking tables, where each position rank corresponds to the salary level (Plenkina & Osinovskaya, 2018). By this explanation, it can be established that incentives are another form of wages given by workers based on the performance that has been assessed, as a form of appreciation with the aim of encouraging workers to be more enthusiastic and responsible for their work.

The aim of providing workforce incentives as a work bond, motivation for the workforce, satisfaction with the work done, performance stability, and discipline at work (Kusumayati, 2020). This is in accordance with the results of research conducted at PT. Insastama Kediri, PT. PAL Indonesia Surabaya, and PT. Arthawena Sakti Gemilang Malang, regarding the incentives obtained at the Technician position include: (1) incentives are obtained based on grade in the career path and proven on the competency report, and (2) holiday incentive is obtained at the amount of one time main salary. Incentives are given to workforce based on the performance that has been done (Kusumayati, 2020).

D. Salary standard for Technician Position

Salary is a form of compensation paid by the company or industry for the work done (Mar, 2020). Salary is a reward, and compensation received by the workforce in the form of money in lieu of contributions from the work that has been done (Kusumayati, 2020). Salary is a form of wages or continuous feedback from the industry given to workers to fulfill agreed work agreements (Chaudhry et al., 2017). Employee salaries are related to the work that has been done, so that each employee gets a different salary (Widyanata et al., 2019). In connection which has been explained, it can be concluded that salary is a form of continuous reward,

wages, money, or feedback as a substitute for contributions from work that has been produced in accordance with a predetermined work agreement.

Salary is one of the factors that affect employee performance in a company, in other words, if an employee gets a more decent salary, it will have an impact on improving performance more effectively (Liem & Sutanto, 2019). The aim of the recitation given by the company to the workforce is to hold and motivate the workforce for effective performance (Simatupang & Kartikasari, 2017). Furthermore, the performance of the workforce is in the form of ability and motivation while doing a job (Liem & Sutanto, 2019). The same thing was said by Balza & Vladimir (2018) which mentions salary is a factor that affects the performance of employees. It can be informed that the aim of the assessment conducted by the company on employees is to suppress, hold, and motivate more effective performance.

In terms of salaries, Vocational High School graduates in the manufacturing industry have a higher salary range than general school graduates, this is because vocational education has confidence in the quality of work and experience in the manufacturing industry (Choi, 2020). The comparison is explained again by (Hanushek et al., 2017) which states that from various industrial sectors or the world of work prefer Vocational High School graduates to general school graduates. By this explanation, it can be formulated that the vulnerable salary obtained by Vocational High School graduates in the manufacturing industry is higher than general school graduates. It can be said that the manufacturing industry sees the quality of work (performance) rather than the academics possessed by the workforce.

According to Vaisburd et al., (2016) state that the increase in tariffs or salaries for workforce is based on the accumulation of reported regional income, in other words, the UMK earned by workforce in each region is different. This case is in accordance with the results of research conducted at PT. Insastama Kediri, and PT. Arthawena Sakti Gemilang Malang, the standard of salary obtained in the position of Technician adjusts to the UMK of the area where the industry is located. The salary range earned by technician positions is above the UMK in the area where the industry is located, with a range of 2,500,000 to 3,500,000 for East Java Province. Furthermore, the career of technician positions in the manufacturing industry is described in Figure 4, starting with a problem of damage and increasing the age of production machines.

The work, duties, and responsibilities of the Technician position are related to machine repair, machine maintenance, and procurement of machine spare parts that are supported by competence in each work. Furthermore, from a career as a Technician, starting from a Production Operator and new workforce who meet the qualification requirements. The material incentives obtained by the Technician position have a different nominal for each individual workforce. The salary obtained by the technician position has a nominal that adjusts the UMK of the area where the industry is located.
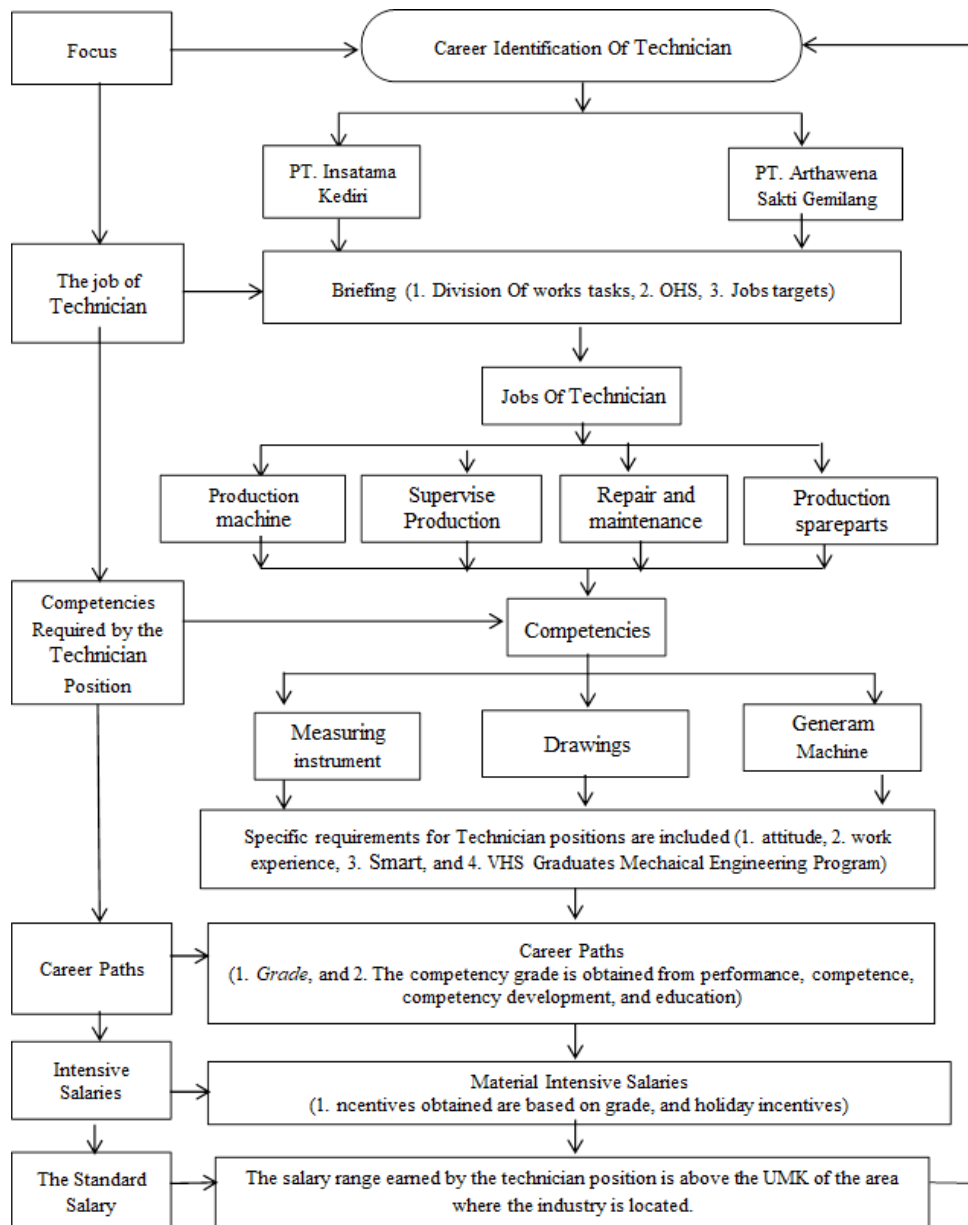
Figure 4. Chart of technician positions in industry

CONCLUSIONS

Based on the results of the discussion, the research results can be concluded, regarding the work of technicians in industry, including: checking production machines (using a checklist), coordinating and supervising Production Operators, repairing and maintaining production machines, and making production machine spare parts. There are several competencies in the scope of work that must be possessed by a technician, regarding: Measuring Tools, Technical Drawings, General Machining, and special requirements. The competency needs are based on job analysis and the needs of the Technician position in the Industry.

Furthermore, regarding the career path of a Technician, starting by the position of Operator grade A which then goes up to a Technician with Junior Technician and Senior Technician levels. Incentives obtained are based on grade in the career path, and holiday incentives. The salary range earned by technician positions is above the UMK in the area where the industry is located, with a range of 2,500,000 to 3,500,000 for East Java Province.

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