CLASSIFICATION OF ACTIVE SELLING DETERMINATION FOR BOOK PRODUCTS USING C4.5 ALGORITHM (CASE STUDY: PT.KOMPAS GRAMEDIA NON GAM DIVISION)

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ABSTRACT

Along with the growth of business in the era of globalization and advances in the field of information technology that quickly provide a considerable influence in the field of industry and services. It also brings a big change in the level of competition between companies, so the perpetrators of the company must always create a variety of techniques to keep growing and in demand to be able to take the right decision in increasing sales. Therefore, a classification system of determining the active selling of book products using Algorithm C4.5 is established. From the results of 2 testing results obtained that the book product active selling has a little percentage of the non-active selling.

Keywords: Classification, Active selling, Algorithm C4.5.

1. INTRODUCTION

Along with the growth of business in the era of globalization and advances in the field of information technology that quickly provide a considerable influence both in the field of industry and services. It also brings a big change in the level of competition between companies, so that the perpetrators of the company must always create a variety of techniques to continue to grow so that in demand to be able to take the right decision in increasing sales. To be able to do so, the company needs a lot of information sources to be in further analysis. The purpose is design and build systems to classify active selling products and giving the result value obtained from the calculation with algorithm C4.5 from criteria that have been specified.

There are some literature review in between Jefry. (2013), Implementation Algorithm C4.5 In Application To Predict Number Of Students Repeating Subjects In STIMIK AMIKOM Yogyakarta, STIMIK Amikom Yogyakarta, Yogyakarta, Page 1-14 and Swastina, Liliana (2013), Application of Algorithm C4.5 For Student Determination, STIMIK Indonesia, Banjarmasin, Page 93 – 98.

2. METHODOLOGY

2.1 System Planning

2.1.1 Flowchart

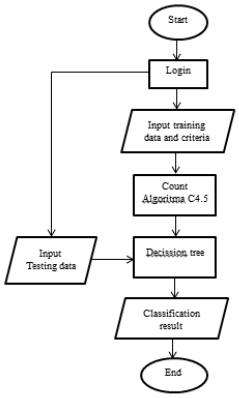

Figure 2.1 Flowchart Process Algorithm C4.5

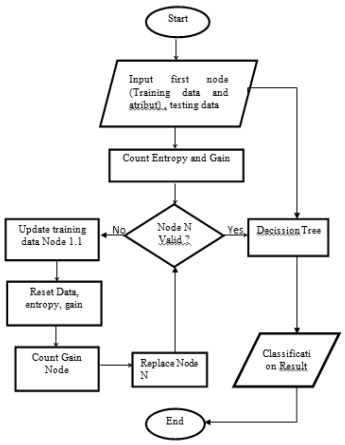

Figure 2.1 *Flowchart Process Algorithm C4.5*

For the design of the application system in accordance with the system flowchart Figure 2.1 and flowchart program Figure 2.2, then for example calculation Algorithm C4.5 Classification determining the active selling for the product book sample data table 2.1 is as follows:
Here is the training product data book used:

Table 2.1 Training Data

Publisher	Years of publish	Type	Price	Tax	Sale
Very salable	Medium	Scientific	Cheap	Cheap	Few
Very salable	Medium	Scientific	Cheap	Cheap	Few
Very salable	Very long	Non fiction	Cheap	Expensive	Many
Less Saleable	Medium	Fiction	Cheap	Cheap	Few
Less Saleable	Medium	Scientific	Cheap	Cheap	Few
Medium	Very long	Non fiction	Cheap	Expensive	Many
Medium	Old	Non fiction	Cheap	Expensive	Many

Very salable	Old	Non fiction	Cheap	Expensive	Many
Very salable	Medium	Fiction	Cheap	Cheap	Few
Less Saleable	Medium	Fiction	Cheap	Cheap	Few
Very salable	Old	Non fiction	Medium	Expensive	Few
Very salable	New	Non fiction	Medium	Expensive	Few
Very salable	Very new	Non fiction	Cheap	Expensive	Few
Less Saleable	Medium	Fiction	Cheap	Cheap	Medium
Very salable	New	Non fiction	Medium	Expensive	Few

1. Calculating the value of entropy and gain

$$Entropi\ (S) = (-\left(\frac{110}{200}\right)\log 2\left(\frac{110}{200}\right)) + \left(-\left(\frac{90}{200}\right).\log 2\left(\frac{90}{200}\right)\right) =$$
$$= \frac{-\left(\frac{110}{200}\right)\ln\left(\frac{110}{200}\right)) + \left(-\frac{90}{200}\right)ln\left(\frac{90}{200}\right)}{ln2} = -0.9930$$

There : ln2 = 0.693

Table 3.1 Results of Data Calculation Training

Total cases	Sum (Yes)	Sum (no)	Sum Of Entropy
200	110	90	0.9930

Table 4.9 Attribute Analysis, Value, Number of Value Events, Entropy and Gain

Node	Attribut	Value	Sum (Value)	Sum (Yes)	Sum (No)	Entropy	Gain
1	Publishers	Very salable	29	0	29	0.0000	
		Medium	30	30	0	0.0000	
		Less salable	141	80	61	0.9871	
							0.2971
	Years of Publish	Very Long	15	15	0	0.0000	
		Old	20	20	0	0.0000	
		Medium	20	0	20	0.0000	
		New	112	75	37	0.9155	
		Very New	33	0	33	0.0000	
							0.4803
	Type	Fiction	114	60	54	0.9982	
		Non Fiction	50	50	0	0.0000	
		Scentific	36	0	36	0.0000	
							0.4240
	Price	Cheap	158	85	73	0.9960	
		Medium	25	25	0	0.0000	
		Expensive	17	0	17	0.0000	
							0.2061
	Tax	Cheap	27	0	27	0.0000	
		Expensive	173	110	63	0.9463	
							0.1744
	Sale	Few	117	70	47	0.9721	
		Medium	43	0	43	0.0000	
		Many	40	40	0	0.0000	
							0.4243

Because the largest gain value is the attribute of the Year of Publish. Then Year of Publication becomes the root node (root node). Then in the Very Long Issue Year it has 15 cases and all of them have No answer (Sum (Total) / Sum (No) = 15/15 = 1), Year of the Length has 20 cases and all have no answer (Sum (Total) / Sum (No) = 20/20 = 1), Publish Year Medium has 20 cases and all have answers Yes (Sum (Total) / Sum (Yes) = 20/20 = 1), Year Very New has 33 cases and all have Answer Yes (Sum (Total) / Sum (Yes) = 33/33 = 1). Thus the Year Is Very Old, Old, Medium and Very New to be leaf or leaf.

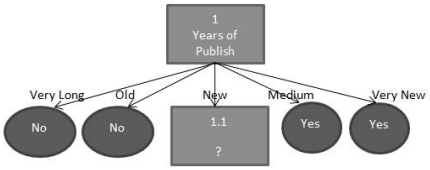

Figure 3.3 Decision Tree Node 1

Based on the formation of the decision tree node 1 (root node), Node 1.1 will be analyzed further. For simplicity, Table 4.7 is filtered by retrieving data that has Year Rising = New then do iterated like node 1 until each leaf / leaf has all classes.

3. RESULTS

3.1 System View

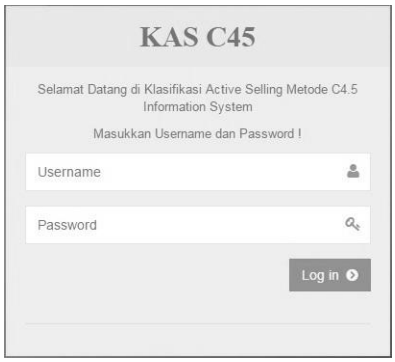

Figure 4.1 Login

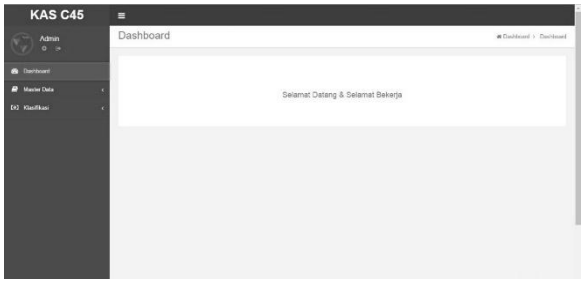

Figure 4.2 Dashboard

Figure 4.3 Criteria

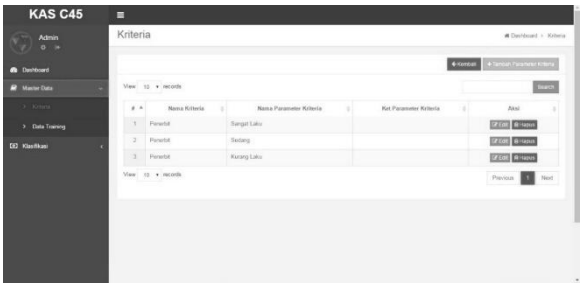

Figure 4.4 Parameter Criteria

Figure 4.4 Form Classification C4.5

3.2 System Testing

Testing the system will be done two times the testing process of testing A and B that have different data composition by using different criteria parameters according to the class of the decision tree and data testing the same. The amount of data testing used in the testing process there are A there are 300 data and test B there are 150 data

Table 5.1 Test Result A

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No	Test	Active Selling	Not Active Selling
1	First	52	-
2	Second	-	248

In the table above can be seen the acquisition of percentage of testing criteria of different parameters as follows:

From testing A with 300 test data obtained the value of active selling 52 data and there are 248 data instead of active selling, then:

Active Selling = $\frac{The\ amount\ of\ test\ result\ data}{Amount\ of\ data\ performed} = \frac{52}{300} = 0.17 * 100 = 17\%$

Not Active Selling = $\frac{The\ amount\ of\ test\ result\ data}{Amount\ of\ data\ performed} = \frac{24\ 8}{300} = 0.83 * 100 = 83\%$

Meanwhile, to know the level of accuracy and error in the test A, from the data 300 test data obtained predicted value of 216 data output in accordance with the actual data output and there are 84 data whose output is not in accordance with the actual data output.

$$\text{Accuration} = \frac{Amount\ of\ data\ predicted\ is\ correct}{Amount\ predicted} = \frac{21\ 6}{300} = 0.72 * 100 = 72\%$$

$$\text{Error} = \frac{Amount\ of\ data\ predicted\ is\ wrong}{Amount\ predicted} = \frac{8\ 4}{300} = 0.28 * 100 = 28\%$$

From the calculation can be concluded that the system has an accuracy of 72% and error rate of 28%.

3.3 Discussion of Test Results

From the calculation can be seen that the test A percentage of active selling 17% and non 83% active selling and on test B the percentage of active selling 11% and non 89% active selling. Comparison of classification results can be seen in the graph below.

Figure 6.5 Comparison graph

From the comparison chart can be concluded that after done 2 times the test phase with the composition of different test data then the active book product selling less than the book product instead of active selling.

4. CONCLUSION

4.1 Conclusion

The conclusion that can be from this research that is;

1. The system of determining the active selling of book products has been successfully implemented by using Algorithm C4.5 with the calculation of accuracy and trial.
2. From the test results conducted two times using different criteria parameters, it can be seen that in the test A book product active selling obtained percentage of 17% and non-active selling book products obtained 83% percentage and on test B book product active selling earn percentage 11% And non-active selling book products earn 89% percentage.
3. From the calculation of accuracy and error on the test A accuracy of 72% and error 28% while in the B test accuracy of 79% and error 22%
4. Determination of parameters greatly affects the final result.

4.2 Suggestions

From research that has been done writer, there are some suggestion which can be given by writer for further research is as follows:

1. The system is in the provision of random parameter criteria, it is expected in subsequent research parameters of the criteria to be optimized so that the data will be evenly classified against the group.
2. The addition of system features to make it easier for the admin or user in using the system.

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MAZE SOLVING RETURN TRIP FOR MOBILE ROBOT USING DEEP FIRST SEARCH METHODE

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ABSTRACT

This paper is the result of research on wheeled robot strategy in completing task by using deep first search (DFS) method for return trip. This DFS method serves to map the path through which the robot and process it as a return trip route. By this method the robot is able to recognize the intersection, obstacle, and field door conditions. So that the robot can know the way that has traveled through the robot from the point of departure (home) to the room (R1-R4) where the target is located. The results obtained are robots capable of completing tasks in less than 60 seconds.

Keywords: *mobile robot*, *Deep First Search*, *return trip*

1. INTRODUCTION

A mobile robot declared a successful return trip after performing the task if the time taken in a return trip quickly. So that needed a change strategy for return trip. The robot strategy to perform a return trip is to map the shortest path from the start point to the point of finding the target and process the data as a route for the return trip. The robot must know the start / home start position and recognize every right turn that has been passed if the robot uses the right-hand wall scan. That way the robot can determine the shortest path for the return trip after successfully performing the task.

Deep First Search is one of the methods used to find a way out of a labyrinth. With this method the micromouse robot can explore the labyrinth and find the shortest path to the finish. In searching for a way out of a labyrinth where the formed field can be represented in binary form and in each plot there are a maximum of 4 possibilities: top, right, bottom and left.

Deep First Search method can be applied to the robot as a robot solution to be able to perform a return trip. In Deep First Search Method the route formation is done by storing each condition encountered by the robot and removing unnecessary conditions. The two processes are repeated over and over until the target is met. Once the target is met then the route will be formed and the route will be reversed so that the shortest route from the target point to start. Deep First Search method is suitable for microcontroller because it does not require large memory.

2. METHODOLOGY

2.1. Deep First Search (DFS) Method

DFS is one of the methods used to find a way out of a labyrinth. With this method the micromouse robot can explore the labyrinth and find the shortest path to the finish. In searching for a way out of a labyrinth where the formed field can be represented in binary form and in each plot there are a maximum of 4 possibilities: top, right, bottom and left.

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will be formed and the route will be reversed so that the shortest route from the target point to start. Deep First Search method is suitable for microcontroller because it does not require large memory.

2.1. Deep First Search (DFS)

The DFS method will depict the robot track from home to target based on the intersection that the robot has passed into a tree. The target or finish point of the DFS search tree is the white line of the room with fire. Robot will process the data of the search tree to be reversed and used as a reference for the return trip. The field used in this study is shown in Figure 1.

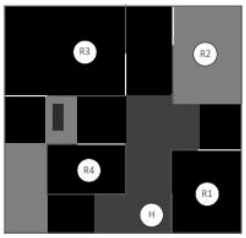

Figure 1. Field used

The field has four rooms named as R1, R2, R3, R4 and has a start position located at point H along with a dog obstacle located along the corridor with a rectangular image. From the field above, the robot travel scheme of four rooms can be described in accordance with Figure 2 below.

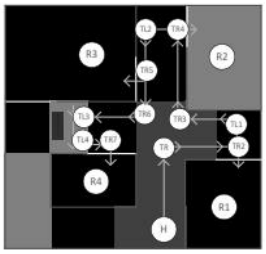

Figure 2 robot travel scheme

Flowchart of main program of the wheel robot and DFS program is represented on figure 3 and figure 4, respectively.

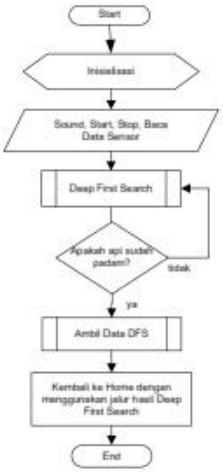

Figure 3. Main Program of wheel robot

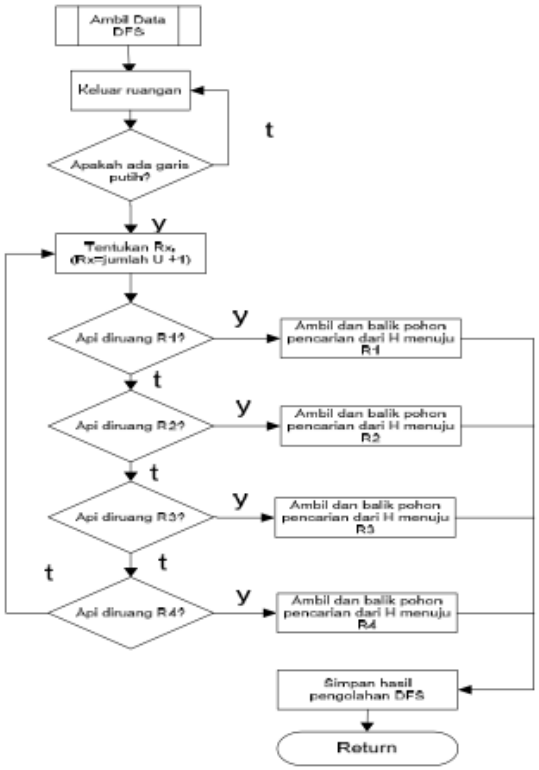

Figure 4 Sub Program of the DFS

After the start button is pressed, the robot executes the DFS process until the robot finds the white line of the room which is in it there is target. If the white line is found then the robot will enter the room and perform the task. And the robot will update the data after the execution of the task is completed. The updated data initializes that the robot must exit the room and compile the DFS result data from the home point into the room. Data from the search tree results will be used to exit the room and make a return trip.

2.2. DFS From Point H To Room R1

DFS is used in room R1 where the target is placed. For a robot travel scheme image from point H to point R1, the robot journey can be seen in the search tree diagram in figure 5.

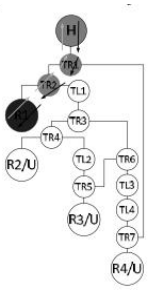

Figure 5 Tree Diagram Search target in R1

2.3 Deep First Search From Point H to Room R2

DFS is used in room R2 in which the target is fired. For a robot travel scheme image from point H to point R2, the robot journey can be seen in the search tree in figure 6

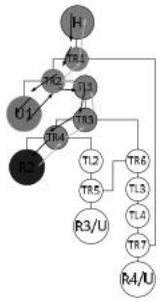

Figure 6 Tree Diagram Search target in R2

2.4 Deep First Search From Point H to Room R3

DFS is used in room R3 in which the target is fired. For a robot travel scheme image from point H to point R3, the robot journey can be seen in the search tree in figure 7.

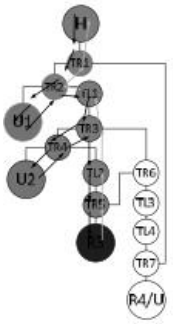

Figure 7 Tree Diagram Search target in R3

2.5 Deep First Search From Point H To Room R4

DFS is used in room R4 in which the target is fired. For a robot travel scheme image from point H to point R4, the robot journey can be seen in the search tree in figure 8.

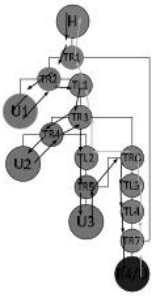

Figure 8 Tree Diagram Search target in R4

3. RESULTS

3.1. Deep First Search Method Room R1

In this experiment the robot is placed at point H and the target in room 1. Here is a table of DFS experiments on room R1.

Table 1 Result of return trip experiment data from room R1 to Home point

Exp.	*Return trip* time (second)	*Return trip* success	Exp.	*Return trip* time (second)	*Return trip* success
1	9	Yes	6	9	Yes
2	9	Yes	7	10.5	Yes
3	8.5	Yes	8	10.5	Yes
4	10	Yes	9	9	Yes
5	11	Yes	10	9	Yes

In this test robots have virtually no difference between the DFS method and the back home method using left-sided scans.

3.2 Testing Method Deep First Search Space 2

In this second test the robot is placed at point H and the target for DFS is the return trip from room 2. The experiment is done many times as many as ten times trial. Here is a table of DFS experimental results in room R2 for the return trip from R2 to the starting point of the robot H.

Table 2 Result of return trip experiment data from room R2 to Home point

Exp.	*Return trip* time (second)	*Return trip* success	Exp.	*Return trip* time (second)	*Return trip* success
1	17	Yes	6	20	Yes
2	20	Yes	7	20	Yes
3	22	Yes	8	20	Yes
4	19	Yes	9	18.5	Yes
5	22	Yes	10	19	Yes

From the data Table 2 can be seen that the robot managed to return trip without entering the existing room. There is a significant time difference between the DFS method and the robot method which rely solely on the right or left wall scan alone in the return trip.

3.3 Tests of Deep First Search Methods of Space 3

The robot is placed at point H and the DFS target is the return trip from the room 3. In this experiment the robot is placed in a rather oblique facing direction (the direction of the wind). The following is a DFS trial data table for return trip in room R3.

Table 3 Result of return trip experiment data from room R4 to Home point

Exp.	*Return trip* time (second)	*Return trip* success	Exp.	*Return trip* time (second)	*Return trip* success
1	24	Yes	6	22	Yes
2	21	Yes	7	23.5	Yes
3	25	Yes	8	22	Yes
4	110	No	9	23	Yes
5	90	No	10	23	Yes

From the data Table 3 robots can make a return trip without entering the room around but in some experiments robot failed to make a return trip because of errors in the ultrasonic sensor, and also because there was an error on the sensor readings. While in the last experiment the robot managed to make a return trip.

3.4 Testing Method Deep First Search Space 4

Testing in this room is the last room. Number of experiments performed ten times. The robot is placed at the same starting point at point H and the DFS target is the return trip from room 4 to point H. Here is a table of five DFS experiments on the R4 robot.

Table 4 Result of return trip experiment data from room R4 to Home point

Exp.	*Return trip* time (second)	*Return trip* success	Exp.	*Return trip* time (second)	*Return trip* success
1	7	Yes	6	7	Yes
2	7	Yes	7	8	Yes
3	8	Yes	8	8	Yes
4	6	Yes	9	8	Yes
5	7	Yes	10	7	Yes

From the data Table 4 robots can make a return trip Quickly towards point H.

4. CONCLUSION

Deep First Search provides some advantages that make it a good choice for many maze solving problems that have some similarities when the Benefits include:

1. Requires relatively small memory, because only the nodes in the active path are stored in memory.
2. Deep First Search can find a solution without having to test more in the space state, it is needed in completing the return trip task.
3. The experimental results, the mean time required for the return trip of space 1 is 9.55 seconds, from space 2 is 19.75, from space 3 is 22.94, and from space 4 is 7.3 seconds

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THE IMPLEMENTATION OF COMPETENCY CERTIFICATION EXPERTISE AND SKILLS OF CONSTRUCTION LABORS IN SURABAYA CITY

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ABSTRACT

Labors carrying out construction work must have skills certificates and job skills. However, these requirements cannot be fulfilled maximally by certifying stakeholders. This study aims to examine in depth the performance of the stakeholders involved in the implementation and benefits of certification expertise and skills of construction labors in the city of Surabaya. Data collection using questionnaires distributed to 60 contractors and professional associations. Analysis of data using qualitative and quantitative methods. The results concluded that the information, requirements and implementation of certification in Surabaya is good enough. Some things that must be considered are: or major qualification skills and the timing of verification and validation process at professional association level is too long. The cost of certification is too expensive and there is no uniformity of cost from the professional association of the organizers. The owner of certification expertise and skills of construction labors is guaranteed to be easy enough to get a job and gain career levy according to skill, easy enough to earn higher salary and gain skills but not guaranteed regular salary increase. The existence of certification expertise and skills of construction labors for contractors has not been fully utilized for the following requirements: establishing new companies, participating in tenders and implementing government or private projects. Professional associations already have and use the guidelines and standard operating procedures in accordance with applicable government regulations and have been certifying with service is quite satisfactory.

Keywords: certification, skill, expertise, contractor, Surabaya city.

1. INTRODUCTION

1.1 Background Issues

The number of construction service companies in Indonesia currently has reached about 141,000 companies, with a total construction workforce of about 6.5 million. The quantity of construction labor has not been matched by a sufficient number of qualities of professional competence [2]. Various efforts have been made both by the government through the Ministry of Public Works, the National Construction Services Development Board (NCSDB) and Professional Associations through training and various coaching. One of the efforts to improve the quality of the skill and skill of the construction laborers is by the quality assurance system in the form of construction labors certification (Regulation of Minister of Public Works of Republic of Indonesia No. 07 / PRT / M / 2010) [3]. But these efforts have not produced significant results until now.

Under the Law of the Republic of Indonesia Number 2 of 2017 on Construction Services [1] and Government Regulation of Republic Indonesia Number 70 of 2012, every construction labors is required to have a certification expertise and skills of construction labors [4]. Based on the previous study, the data shows that the distribution of construction work group consists of experts about 8%, skilled group of about 30% and the rest is a group of manual laborers. If the current construction workforce amounts to about 6.5 million, then about 3 million people must have a certificate. In fact, performance of the certification of experts and skilled personnel is still apprehensive. To date there are only 107,562 certified construction labors (about 6.46%). The number consists of 29,417 people who have a expertise certification of construction labors, and 78,145 people who have a skills certification of construction labors (NCSBDN, 2014) [5].

Based on the description, the resources and the ability of construction services business, especially in the case of human resources is still very low both in terms of quality and quantity. Therefore it is necessary synergistic programs for the stakeholders involved to accelerate the implementation of certification expertise and skills of

construction labors. This research seeks to reveal the performance of the stakeholders involved in the certification expertise and skills of construction labors in Surabaya City.

1.2 Previous Research

Table 1 describes some previous studies, among others, by Pratiwi and Wibowo (2010) [6]; Widiasanti (2013) [7] and Jelanatik et al. (2014) [8]. The table describes the research approach, population and research respondents, measured variables and analytical tools used.

Table 1. Previous Research

Title	Performance Evaluation of Stakeholders in Construction labors Skills Development With Performance Prism Method	Review of the Effectiveness of Certification Mechanism of Construction Experts Through NCSDB Labors Certification Unit	Analysis of Factors Affecting Construction Labors to Have Certification Expertise and Skills of Construction Labors at Contractor in Bandung
Researchers	Pratiwi dan Wibowo [6]	Widiasanti [7]	Jelantik, Alit, Salain & Nadiasa [8]
Year	2010	2013	2014
Research Approach	Strategies, Processes and Capabilities	Research Descriptive	Qualitative Research (case study)
Population	Ministry of Public Works, Manpower & Transmigration and NCSDB	Authorities in the implementation of certification expertise and skills of construction labors at Contractor	Some small, medium & large qualification contractors
Variable measured	Stakeholders Performance	Certification Mechanism of Construction Experts	Factors to have certification expertise and skills of construction labors at Contractor
Analyzation	Performance Prism Analysis	Description Analysis	Factor Analysis

Source: Various references

1.3 Problem Formulation

Based on the background description of the problems described above, then the formulation of the problem in this study are:

1) How far the results of the certification expertise and skills of construction labors at Contractor for construction in Surabaya City?
2) To what extent is the added value gained for certification expertise and skills of construction labors at Contractor in Surabaya?

1.4 Purpose and Objectives

Based on the description of the problem background and the problem formulation described above, the purpose and objectives of this study are:

1) To examine and analyze in depth of the certification expertise and skills of construction labors at Contractor for construction in Surabaya City.
2) To examine and analyze the added value obtained of the certification expertise and skills of construction laborers at Contractor for in Surabaya City.

1.5 Research Benefits

Based on the description of the background of the problem, the formulation of the problem and the purpose and objectives described above, then the expected benefits of the results of this study are:

1) For the Surabaya City Government: is to provide informative contribution related to problems and barriers to the implementation of the certification expertise and skills of construction labors at Contractor in Surabaya City.

2) For the parties directly involved in the implementation of the certification expertise and skills of construction labors at Contractor as input and evaluation for further implementation.

1.6 Scope and Limitations of Research

This research was conducted in Surabaya City by involving the parties involved directly or indirectly in the implementation of the certification expertise and skills of construction labors in the city of Surabaya. The parties involved are among others; Contractors of minor, medium and large qualifications (subcualication : K1, K2, K3, K4, M1, M2, B1 and B2) [9], professional association of contractors, located and operating in Surabaya City and other parties involved [10] .

2. RESEARCH METHOD

2.1 Research approach

This research uses a research approach with a qualitative paradigm, because it observes social phenomena that occur in the environment of construction services. Qualitative research is a research that emphasizes the understanding of the problems in social life based on factual conditions or natural settings are holistic, complex and detailed. This research also has a category of action research because it will produce a policy that will be submitted to decision makers [11].

2.2 Population, sample and respondent

The population in this research is construction service company (contractor), professional association and construction service construction team in Surabaya City. Sampling is done because the population is unlimited, so sampling technique is required. In this research use purposive sampling and random sampling. Purposive sampling to determine the sample of existing professional associations in Surabaya, while random sampling is used for sampling of construction service companies who have taken care of the certification expertise and skills of construction labors. Respondents of the study were determined by purposive as many as 100 companies, consisting of 65 contractor companies and 35 professional association companies

2.3. Instruments and research data

The research instrument is questionnaire. The research variables and indicators are set out in accordance with relevant government laws and regulations as well as the provisions of procedures for certification from the National Construction Service Development Board (NCSDB). Questionnaires were distributed through three stages: first stage was distributed 100 questionnaires and 38 answers back. The second stage was reprinted as many as 50 questionnaires and returned 17 answers. The third stage was reprinted as many as 25 questionnaires and returned 10 answers. The number of answers to the questionnaires returned by the contracting company is 65 answers, while the worth to be analyzed from the collected amount is 60 company answers.

2.4 Research variables and indicators

The research variables consist of 5 variables and 35 indicators. The research variables include; (A). The performance of the certification expertise and skills of construction labors (consisting of 16 indicators, (B) The owners of the certification expertise and skills of construction labors (consisting of 5 indicators), (C) The benefits of of the certification expertise and skills of construction labors for construction companies (consisting of 5 indicators) and (D) Benefits of the certification expertise and skills of construction labors for professional associations of construction companies (consisting of 9 indicators)

2.5 Data Analysis

Data analysis was performed using mean and mean deviation standard calculated from data of each group of respondents' answers, using formula [12]:

$$\overline{X} = \frac{\sum fi.Xi}{\sum fi} \ldots\ldots (1) \text{ and } \quad \overline{Y} = \frac{\sum fi.Yi}{\sum fi} \ldots\ldots (2), \qquad \overline{\overline{X}} = \frac{\sum fj.\overline{X}j}{\sum fj} \ldots\ldots (3), \text{ dan } \quad \overline{\overline{Y}} = \frac{\sum fj.\overline{Y}j}{\sum fj} \ldots\ldots (4) \ ,$$

Where :

$\overline{X}$ = mean of respondent's answer

$\overline{Y}$ = mean of standard deviation of respondents' answers

fi = number of respondents

$\overline{\overline{X}}$ = the mean of the respondent's mean

$\overline{\overline{Y}}$ = the mean of the mean standard deviation of the answer Respondents

fj = number of respondents' questions

The average result of the respondent's answer is then maped into 4 criteria in the form of four quadrant of Cartesius Diagram based on the mean value data and the mean standard deviation of answers of each responder group as follows :

1. Quadrant I : $\overline{X} \geqq \overline{\overline{X}}$ and $\overline{Y} \leq \overline{\overline{Y}}$: (very good)
2. Quadrant II : $\overline{X} \geqq \overline{\overline{X}}$ and $\overline{Y} > \overline{\overline{Y}}$: (good)
3. Quadrant III : $\overline{X} < \overline{\overline{X}}$ and $\overline{Y} \leq \overline{\overline{Y}}$: (bad)
4. Quadrant IV : $\overline{X} < \overline{\overline{X}}$ and $\overline{Y} > \overline{\overline{Y}}$: (very bad)

Each of the four quadrants in the Cartesian Diagram is a representation of the results of the study that need to be discussed further.

3. RESULT AND DISCUSSION

3.1 Respondent data

The study respondents consist of 25 contractor companies and 35 professional association companies. The contractor shall consist of small qualifications (sub-qualifications K1, K2, K3 and K4), intermediate qualifications (M1 and M2 sub-qualifications) and substantial qualifications (sub-qualifications B1 and B2) with the composition of the sub-qualification amounts as shown in Figure 1. Where the names of professional association data is shown in Figure 2.

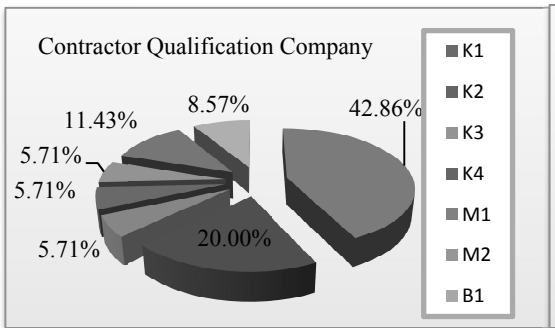

Figure 1 Contractor Company Qualification

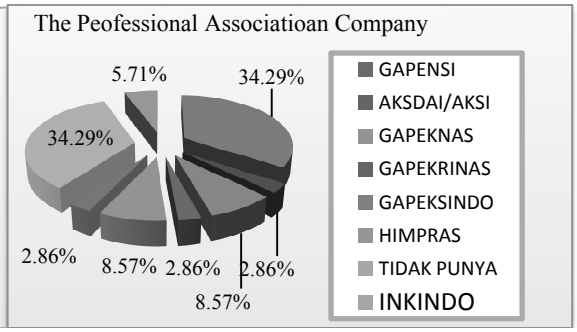

Figure 2.Company of Professional Associations

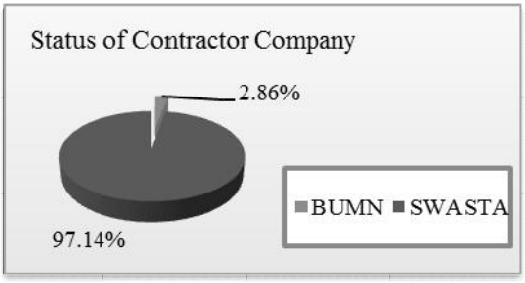

Figure 3. Status of Contractor Company

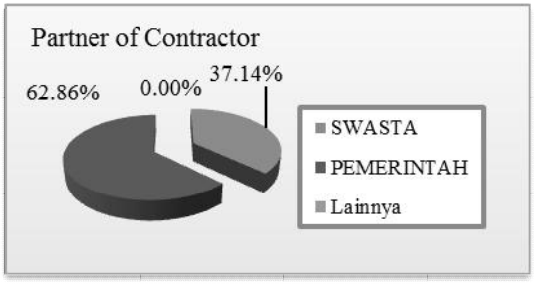

Figure 4. Partner of Contractor

Figure 3 shows company data consisting of BUMN contractor (2.86%) and private contractor (97.14%). Figure 4 shows the company's data on private projects and government projects.

3.2 Profile of respondents

Respondent profile data consist of: gender, age, last education and experience. Respondent profile data are shown in Figure 5 to Figure 8

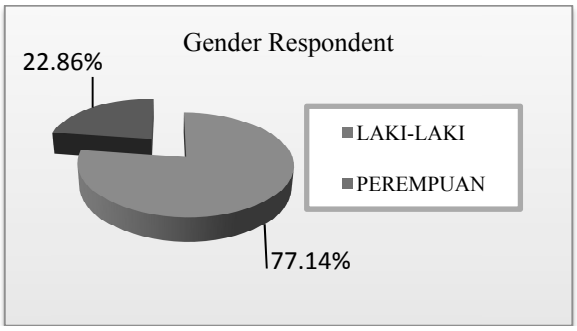

Figure 5 Gender Respondents

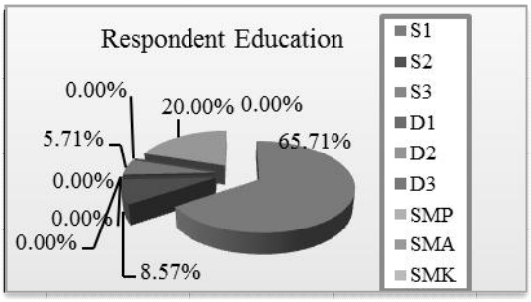

Figure 6. Respondent Education

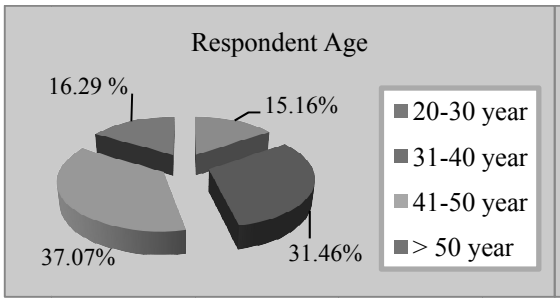

Figure 7. Respondents Age

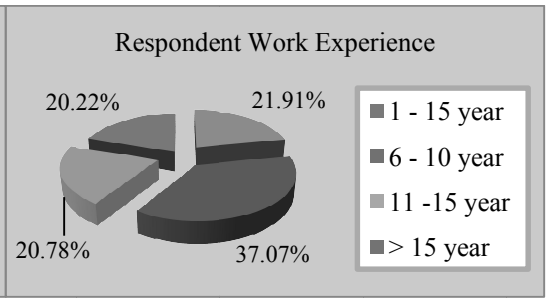

Figure 8. Respondent Work Experience

3.3 Research Results

Table 2 shows the result of mean analysis and standard deviation analysis of each variable and its indicator from the respondent of the contractor company. Each mean and standard deviation of the indicator are then calculated average of mean = 3,475 and average of standard deviation mean = 0,958. Each quadrant has the following criteria:

1) Quadrant I: Mean ≥ 3,475, and Standard Deviation ≤ 0.958. Indicators that enter quadrant I have the category that the implementation of the certification expertise and skills of construction labors has been running well and must be maintained.
2) Quadrant II: Mean ≥ 3,475, and Standard Deviation > 0.958. Indicators that enter the first cadrant have the category that the implementation of the certification expertise and skills of construction labors has been running well enough, but still biased to be improved for better.
3) Quadrant III: Mean < 3,475, and Standard Deviation ≤ 0.958. Indicators that enter the third cadrant have the category that the implementation of the certification expertise and skills of construction labors less well, so it is necessary to get attention and improvement.
4) Quadrant IV: Mean < 3.475, and Standard Deviation> 0.958. Indicators entering IV cadrant have the category that the implementation of the certification expertise and skills of construction labors is not going well and should get serious attention to be better. Research result

Table 2. Average Mean and Standard Deviation

Code	Variable and Indicators	Result		N	QW
		Mean	SD		
A	**Organizing Performance**				
A1	Information on certification	3.686	0.900	60	1
A2	The socialization of certification	3.600	0.946	60	1
A3	Implementation of certification	3.686	0.796	60	1
A4	The cost of certification	3.743	0.950	60	1
A5	Fees for the cost of certification	3.743	0.886	60	1
A6	Compliance of certification fee rate	3.229	1.239	60	3
A7	Certification management requirements	3.486	0.887	60	1

Table 2. Average Mean and Standard Deviation

Code	Variable and Indicators	Result		N	QW
		Mean	SD		
A8	Certification procedures	3.286	0.860	60	4
A9	Certification implementation schedule	3.314	0.867	60	4
A10	Processing time at Association level	3.086	1.121	60	3
A11	Processing time at NCSBDN	3.029	1.150	60	3
A12	Validity period	3.571	0.948	60	4
A13	Requirements for government project tender	3.029	1.014	60	3
A14	Requirements for private project tenders	3.200	0.994	60	3
A15	Requirements for implementation of government projects	3.657	0.802	60	1
A16	Requirements for the implementation of private projects	3.343	1.027	60	3
B	**Benefits of certificates for labor**				
B1	Job guarantees according to expertise and skill	3.571	0.948	60	1
B2	Higher salary guarantees	3.629	1.031	60	2
B3	Guaranteed salary will rise	3.400	1.117	60	3
B4	Guarantee of increased expertise and skill	3.486	1.040	60	2
B5	Guaranteed career enhancement	3.829	0.857	60	1
C	**Benefits of certificates for the company**				
C1	Terms of establishment of new company	3.343	0.968	60	3
C2	Company registration requirements	3.629	0.942	60	1
C3	Rented for tender	3.143	1.004	60	3
C4	Be sold out to participate in the tender	2.629	1.190	60	3
C5	Purchased to other companies	2.543	1.094	60	3
D	**Performance of the Association of Organizational**				
D1	Has written guidelines	3.657	0.958	60	1
D2	Has a written SOP	4.086	0.853	60	1
D3	Working as per the guidelines	3.800	0.868	60	1
D4	Working according to SOP	3.857	0.810	60	1
D5	Has a cost of certification fee written	3.543	0.950	60	1
D6	The cost of certification is in accordance with the written rates	3.686	0.993	60	2
D7	Performance Service implementation	3.714	0.825	60	1
D8	Performance certification according to regulations	3.657	0.765	60	1
D9	Implementation of certification and renewal is done at any time	3.743	0.919	60	1
	Average	3.475	0.958		

Source: Primary Data Analysis Result

After that, then each indicator variable can be mapped into four quadrants namely: quadrant I up to the awareness IV as shown in Figure 9.and described as follows:

1) Quadrant Group I is an excellent research group and needs to be maintained
2) Quadrant Group II is a group of research results are good and need to be improved in order to become better,
3) Quadrant Group III is a group of unfavorable research results and needs to get attention to be improved in order to become better,
4) Quadrant Group IV is a group of unfavorable research results and desperately need to get to be improved in order to become better

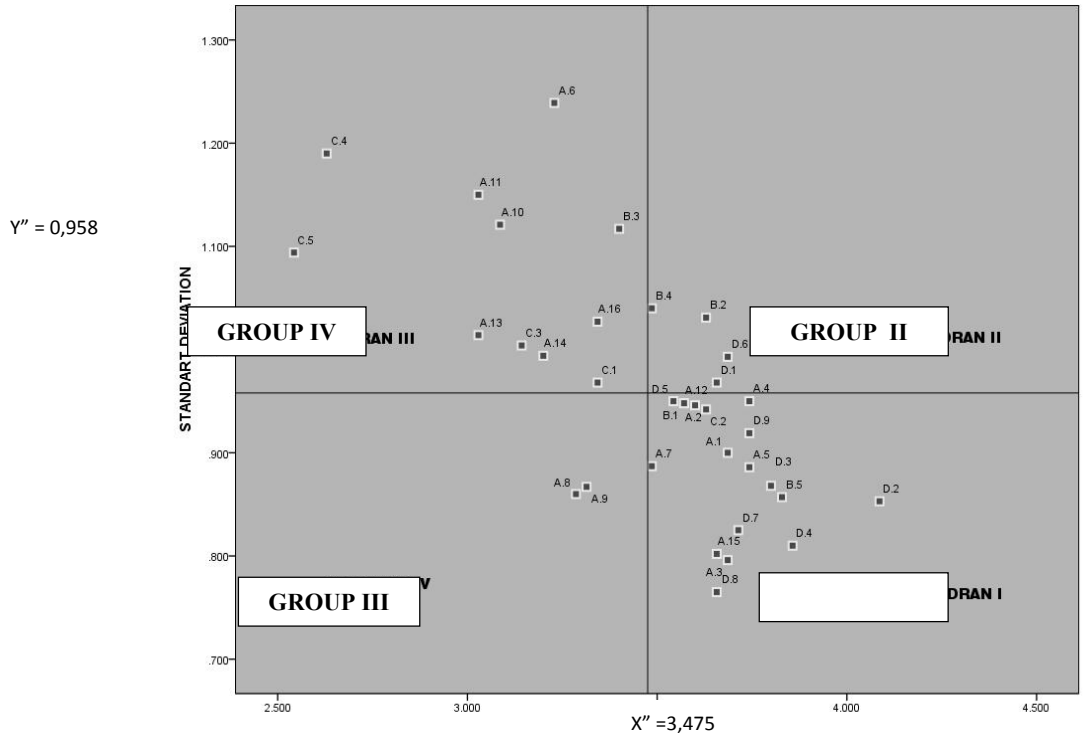

Figure 9. Mapping of Research Results

4. CONCLUSIONS AND SUGGESTIONS

4.1 Conclusions

Based on the analysis of data, results and research findings that have been discussed in the previous chapter, this study concludes the following matters:

1) The results of the implementation of the certification expertise and skills of construction labors conducted in Surabaya City generally has been running quite well especially in terms of: information, requirements and implementation of the implementation of the certification expertise and skills of construction labors. But there are still some things that are not working with: the requirements of management and certification is difficult enough especially for the certification of madya or major qualification skills and the timing of verification and validation process at professional association level and registration process at NCSDB level too long
2) The value added or benefits gained for construction laborers who have obtained the certification expertise and skills of construction labors in Surabaya City are; guaranteed to be easy enough to get a job and gain career levers according to expertise or skill, easy enough to earn higher salaries and gain expertise or skill, but not guaranteed regular salary increases
3) The added value or benefit of the certification expertise and skills of construction labors for the contractor company in Surabaya City is that the certification expertise and skills of construction labors has not been fully used for the requirements of: establishing a new company, participating in tenders and implementing government or private projects. Similarly, the certification expertise and skills of construction labors may be borrowed or traded between contractor companies for the following requirements: establishing a new company, participating in tenders and implementing government or private projects.
4) Professional associations of contractors already have written manual and standard operating procedures (SOP) in accordance with prevailing laws and regulations and have been conducting certification of the certification expertise and skills of construction labors in accordance with the guidelines or SOP owned and service satisfactory. The implementation of the certification expertise and skills of construction labors shall be conducted at any time at a non-compliance cost, very expensive and there is no uniform tariff of fees among certification providers (professional associations).

4.2 Suggestions

Based on the results of the conclusions outlined above, it is recommended that the following things:

1) To contractor company and construction professional company in Surabaya City, it is suggested to: utilize the certification expertise and skills of construction labors as a means to improve the quality of company's competence by involving all expertise and skills personnel to perform the certification expertise and skills of construction labors.
2) To the Surabaya City Government and the East Java provincial government it is advisable to intervene through NCSBD and the Regional Construction Service Provider so that the certification expertise and skills of construction labors can be carried out at a uniform cost, relatively cheaper, no illegal fees and with faster processing, especially for small and medium qualified contractors with limited funds

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