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Development of knowledge management system for determining organizational culture in micro, small and medium enterprises using organizational culture assessment instrument

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Abstract. Organizations must improve their competitiveness due to global competition and free market. Organizational culture and continuous improvement are one of the main factors used not only to face the competitiveness in the free market but also to improve organizational performance and vision and mission achievement. Moreover, the organizational culture also has an important element for determining the direction of Micro, Small and Medium Enterprises (MSMEs). However, many MSMEs currently do not pay attention to their organizational culture so that difficulties emerge in determining the right direction and policy. To solve the problems, this research aimed to determine the companies' organizational culture by using organizational culture assessment instrument (OCAI) based on knowledge management system (KMS) in order to provide recommendations. In the developing the system, the researchers conducted surveys to several MSMEs and invite experts and practitioners to conduct the process of knowledge capture and literature study and to achieve the best organizational culture recommendations on MSMEs. This research produced a software used for determining the organizational culture based on KMS and OCAI principles. The developed software was tested to several companies and MSMEs to obtain results with a very high level of accuracy in providing recommendations.

Keywords. Organizational Culture, Knowledge Management System, MSMEs, OCAI.

1. Introduction

The use of information technology in companies is indicated by the use of software. Software used in companies is in the form of electronic business, electronic commerce, electronic budgeting, and electronic marketing [1]. The use of software is not only used for business activities but also for organizational culture. The organizational culture is one of the variables closely related to a corporate or an organizational performance improvement [2].

The organizational culture is very important because each organization or company has its own different organizational culture from the other organizations [3]. Moreover, the organizational culture is closely related to the knowledge management system because it is a part of the technologies and mechanisms used to support the knowledge management in the organizational culture [4]. Besides, the knowledge management is the combination of planning, organizing, motivating, and controlling


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people, processes, and systems in the organization used to ensure that the knowledge-related assets improve [5]. In addition, the knowledge management involves the data and information systems used to codify, categorize, and transfer asset [6]. The organizational culture can also influence the success of the TQM implementation and organizational performance. Therefore, knowing the organizational culture is important for the company [7] because the organizational culture is recognized as an important determinant of the quality management success and organizational performance [8,9].

Each company has different leaderships and organizational cultures which influence particular organizational cultures [10]. According to Cameroon and Quinn 2011, there are four types of the organizational culture embedded in the company e.g., clan culture, adhocracy culture, market culture, and hierarchy culture [3]. Problem statement of this research is a lack of the information about the current organizational condition e.g., the condition for MSMEs, a gap among leaderships, middle manager and employee condition, and limited communication between the work culture and organizational culture from managers to each division and section. To solve these problems, a tool as a policy maker must be made and is used to make decisions in implementing the organizations. From the background of this study, the researchers are interested in developing the knowledge management system (KMS) used for determining organizational culture on micro, small medium enterprise (MSMEs) by using the organizational culture assessment instrument (OCAI) as a measurement model.

2. Research Method

2.1. Knowledge Mapping

Organizational culture in MSMEs was very important for managers so that this research was conducted through organizational culture assessment instrument (OCAI) model which was used to determine the culture. The result of this instrument was in the form of a competing value which influenced organizational culture profile. Knowledge mapping played an important role as a recommendation for the types of organizational culture so that the system was able to categorize and recommend the best organizational culture for the company. Stages on the knowledge mapping were adopted from the knowledge management system life cycle [11] illustrated in Figure 1.

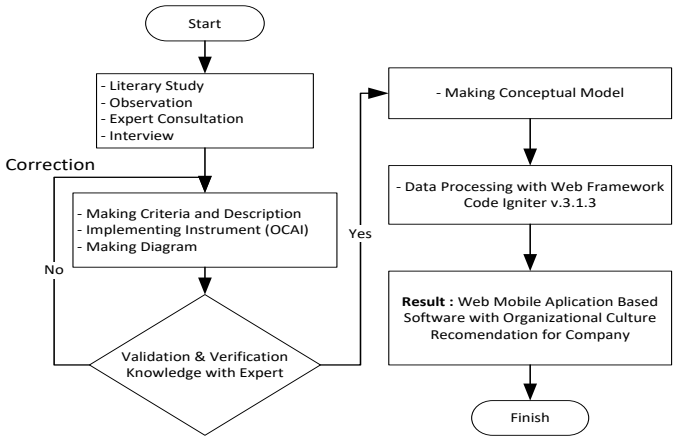


Figure 1. Knowledge Mapping Flowchart

2.2. Research Instrument

The instrument of this research was organizational culture assessment instrument [3] consisting of 6 dimensions: dominant characteristics, organizational leaderships, management of employees, organizational glues, strategic emphasis, and criteria of success. Each organizational culture dimension had 4 questions leading to the alternative cultural profiles (clan culture, adhocracy culture, market culture, and hierarchy culture). Respondents were asked to provide an assessment of each alternative answer. OCAI instrument had 2 assessment columns (now and preferred columns). Now column

explained an assessment on the current cultural conditions but preferred column represented the expected culture conditions. Figure 2 showed the competing values of organizational culture [3].

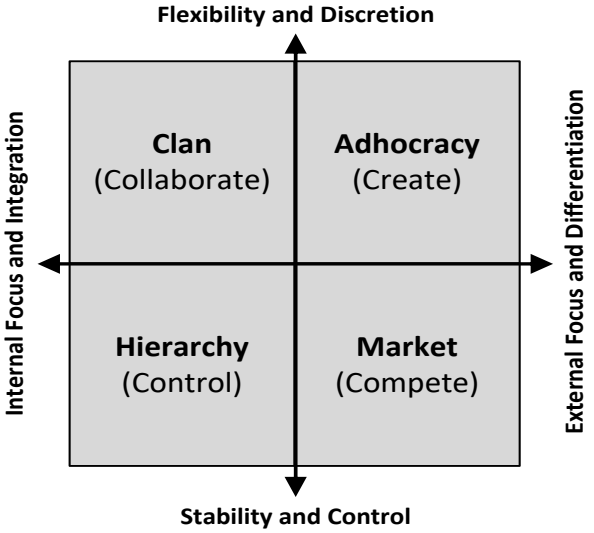


Figure 2. Competing Values Framework of An Organizational Culture

2.3. Instrument Assessment Scale

This research used quantitative data so that data analysis was done by using quantitative approach (inferential statistics). The questionnaire used a likert scale from 1-7. Score 7 was given at Very Strongly Agree (VSA), score 6 was given on Strongly Agree (SA), score 5 was given on Agree (A), score 4 was given on Simply Agree (SA), score 3 was given on Less Agree (LA), score 2 was given on Disagree (DS), and score 1 was given on Strongly Disagree (SDS).

2.4. Determining Algorithm of Organizational Culture

According to [3], OCAI calculation was that respondents were asked to fill out the questionnaire in 6 dimensions from which each dimension had 100 as a maximal score so that respondents were not confused in filling the questionnaire. Filling the questionnaire with direct numbers (0-100) made respondents difficult to determine how many numbers should be filled to determine 100 in each of OCAI dimensions. Therefore, this research developed likert scale conversion algorithm from scale 1-7 and converted this number to scale 100 on each OCAI dimension. The algorithms developed for determining the organizational culture were as follows:

- Respondents filled scores on OCAI questionnaire with 1 – 7 as scales
- Converting each score into 100 on each OCAI dimension with formula (1).

$$X_{ij\,new} = \frac{X_{ij\,old}}{\sum X_{ij\,old}} x100\% \quad (1)$$

where i indicates OCAI dimension (1 – 6) and j indicates questions on each OCAI dimension (1 – 4)

- Summing up each dimension and finding the mean score in columns A, B, C, and D in *now* and *preferred* columns for each record of respondents.
  Summing up each dimension in columns A, B, C and D using formula (2)

$$t_{kr} = \sum_{i=1}^{6} X_{ji\,\text{new}} \quad (2)$$

Finding the mean score of each dimension in columns A, B, C and D using formula (3).

$$\overline{X}_{kr} = \frac{t_{kr}}{i} \tag{3}$$

where k indicates organizational culture (1 – 4) and r shows number of respondents

- Summing up all mean score of respondents, clan, adhocracy, market, and hierarchy and dividing them by a number of respondents in each of the *now* and *preferred* columns using formula (4).

$$T_{kr} = \sum_{r=1}^{R} \frac{\overline{X}_{kr}}{R} \tag{4}$$

Where R shows total of respondents.

After summing up all mean score of respondents, the organizational culture profile was created in the percentage using formula (5).

$$BO_k = \frac{T_{kr}}{\sum_{k=1}^{j} T_{kr}} \tag{5}$$

where BO is Organizational Culture.

- Classifying 4 largest organizational culture profiles to the smallest organizational culture profiles and obtaining the greatest organizational culture using formula (6).

$$T_k = \text{arsort}(\, BO_k \,) \tag{6}$$

Culture profile changes in order (BO1, BO2, BO3, BO4) from largest to smallest.

After culture profile was being in order, the first largest organizational culture was compared with the second largest. If they were included in the range of ≤ 5% of the first culture, 2 pieces of dominant organizational culture (BO1 & BO2) was obtained; if they were more than ≥ 5% of the largest culture, the dominant organizational culture was only 1 (BO1).

- Creating an organizational culture profile diagram.
- Providing the best recommendations based on knowledge capture and organizational culture profile data.

2.5. Algoritm Calculation

Respondents filled out questionnaires on a scale 1-7 with Strongly Disagree (STS) to Very Strongly Agree (SSS) shown in Table 1.

Table 1. OCAI Instrument Score in Scale 7

No	**Dimension** $X_{ij\,\text{old}}$									
	1				**2**				**...**	**6**
	A	B	C	D	A	B	C	D		
r1	$X_{ij\,\text{old}}$	...	...	...	...	...	...	...	...	...
r2	...	...	...	...	...	...	...	...	...	...
r n..	...	...	...	...	...	...	...	...	...	...

Converting scale 7 questionnaire data into scale 100 using equation (1).

Table 2. Scale 7 Conversion to Scale 100

No	Dimension $X_{ij\,\text{new}}$									
	1				**2**				**...**	**6**
	A	B	C	D	A	B	C	D		
r1	$X_{ij\,\text{new}}$	...	...	...	...	...	...	...	...	...
r2	...	...	...	...	...	...	...	...	...	...
r n..	...	...	...	...	...	...	...	...	...	...

Summing up the columns a = clan, b = adhocracy, c = market, d = hierarchy, using equation (2) and finding the mean score using equation (3).

Table 3. Score of Organizational Culture per Respondents

No	**Clan**	t_{kr}	$\overline{X}_{kr}$	**Adhocracy**	t_{kr}	$\overline{X}_{kr}$	...	4
r1	$X_{ji1}+X_{ji2}+...X_{ji6}$	t_{kr}	$\overline{X}_{kr}$	$X_{ji1}+X_{ji2}+...X_{ji6}$	t_{kr}	$\overline{X}_{kr}$		
r2	$X_{ji1}+X_{ji2}+...X_{ji6}$	t_{kr}	$\overline{X}_{kr}$	$X_{ji1}+X_{ji2}+...X_{ji6}$	t_{kr}	$\overline{X}_{kr}$		
r n..	$X_{ji1}+X_{ji2}+...X_{ji6}$	t_{kr}	$\overline{X}_{kr}$	$X_{ji1}+X_{ji2}+...X_{ji6}$	t_{kr}	$\overline{X}_{kr}$		

Summing up the total score of respondents, clan, adhocracy, market, and hierarchy; and dividing them by the number of respondents using equation (4). And use equation (5) to make precentage of organizational cultue profile.

Table 4. Organizational Culture Profile

Clan	Adhocracy	Market	Hierarchy
$T_{clan}=\sum_{r=1}^{R}\frac{\overline{X}_{kr}}{R}$	$T_{adhocracy}=\sum_{r=1}^{R}\frac{\overline{X}_{kr}}{R}$	$T_{market}=\sum_{r=1}^{R}\frac{\overline{X}_{kr}}{R}$	$T_{hierarchy}=\sum_{r=1}^{R}\frac{\overline{X}_{kr}}{R}$

After organizational culture profile score was obtained, finding the dominant organization culture by classifying the organizational culture profile use equation (6).

Table 5. Finding the largest organizational culture

No	Organizational Culture (*Now*)	Organizational Culture (Preferred)
1st	$BO_{dominant1}$	$BO_{dominant1}$
2nd	$BO_{dominant2}$	$BO_{dominant2}$
3rd	$BO_{dominant3}$	$BO_{dominant3}$
4rd	$BO_{dominant4}$	$BO_{dominant4}$

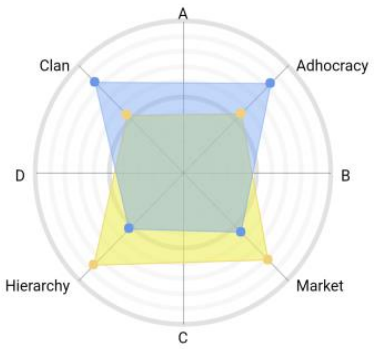


Figure 3. Competing Value Framework Of AnOrganizational Culture Profile Diagram

According to the organizational culture profile, the best recommendation was showed through the organizational culture profile data which were appropriate with the knowledge capture data.

2.6. Knowledge Capture

Knowledge capture was useful to capture the knowledge from experts, practitioners, and organizational culture profile form. The development of this system was carried out by surveys and interviews with experts and practitioners used to conduct the knowledge capture on good recommendations on each type of organizational culture profile. This knowledge was a recommendation on the MSMEs organizational profile.

2.7. Use-case Diagram

The design of a use-case diagram system for determining organizational culture was done in the process of software development. The design of this system consisted of several actors who played a role in the system, illustrated in Figure 4.

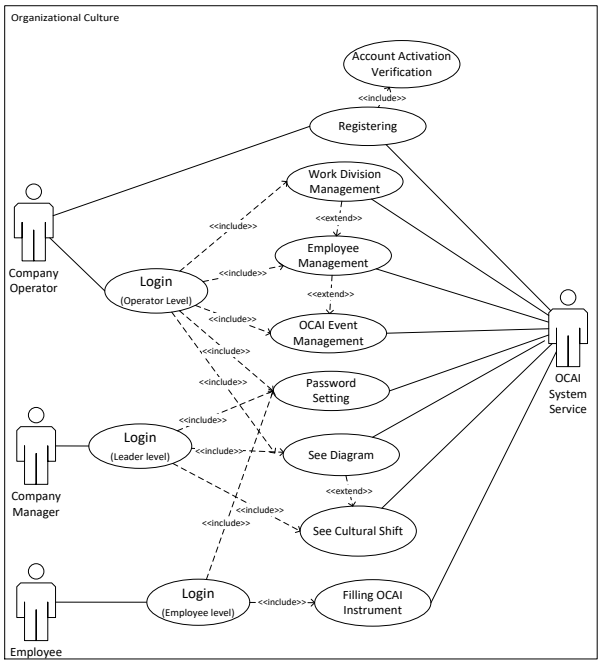


Figure 4. Use-Case Diagram of Determining Organizational Culture System

Operator has several tasks covering Sign up, verify account, and manage data. Manager has several tasks include gets report description of OCAI diagram, organizational culture profile, and recommendation, and Employee filling OCAI Instrument.

3. Research Findings And Discussion

This study produced useful software to assist managers in determining good organizational culture in MSMEs. The following paragraphs described the appearance of the organizational culture software.

3.1. Menu Page and Quistionnare

The menu page was a link provided for the user to access the system based on the user level. Questionnaire was a page for employees to fill out the OCAI questionnaire. This questionnaire was an instrument that played a role in getting a profile of organizational culture (Figure 5).

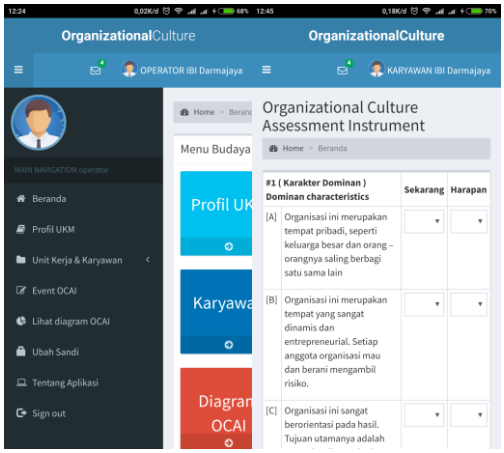


Figure 5. Menu Page andQuestionnaire

3.2. OCAI Diagram Page and Details

OCAI diagram page was a page describing the organizational culture profile in the form of a diagram. There were types of organizational culture e.g., clan, adhocracy, market, and hierarchy. The detail page was the result of the organizational culture calculation so that the dominant organizational culture number was showed in Figure 6.

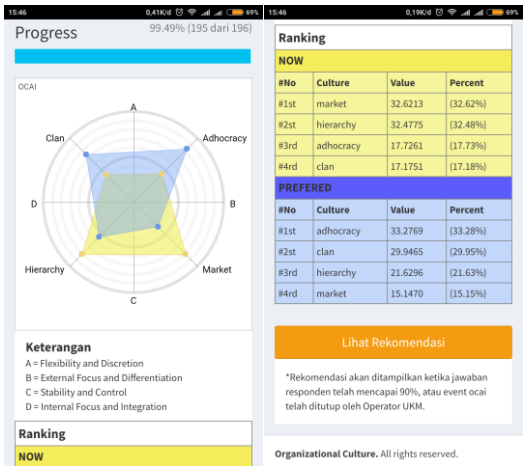


Figure 6. OCAI Diagram Page and Details

3.3. Organizational Culture Recommendation Page

Recommendation page was a useful page to show the best organizational culture recommendation to MSMEs. Recommendations were obtained through the process of knowledge capture and its result was adjusted to the nearest score on the profile of organizational culture (Figure 7).

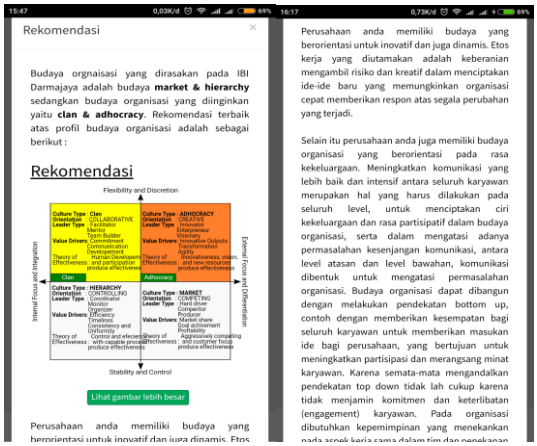


Figure 7. The Best Organizational Culture Recommendation Page in MSMEs

4. Conclusion

The development of algorithms for determining organizational culture was by Likert scale 1-7. It allows respondents to fill out OCAI questionnaires. Moreover, respondents do not have to count the number of figures up to 100 in each OCAI dimensions. This software is useful for the managers to know the organizational culture condition, to get the best recommendations on the organization, and to follow up the company based on organizational culture diagrams, recommendations, and profiles. Knowledge capture provides the organizational culture decision recommendation which is appropriate with OCAI's organizational culture profile picture. Organizational culture can be determined by using knowledge management system (KMS) combined with organizational culture assessment instrument (OCAI). Organizational culture software can be used to find out the profile of organizational culture and provide appropriate recommendations to MSMEs.

5. Significance Of The Research

In this research, the basis of knowledge as the database is still incomplete so that it is expected that further researches can increase or develop more varied capture knowledge for some cultural conditions in order to maximize the recommendation organizational culture, and to find correlation between organizational culture and organizational performance.

This study has important practical and academic implications. Prior to the implementation of TQM, managers must determine the dominant organizational culture in their company. Management needs to assess the culture using Organizational Culture software in order to develop step to implement TQM.

References

[1] Marius, P., & Anggoro, S. Profil Pengguna Internet Indonesia 2014. APJII, Jakarta. 2015.
[2] Megawati, & Nashri, M F. Evaluasi Budaya Organisasi Dalam Penerapan Teknologi Informasi Menggunakan Organizational Culture Assessment Instrument (Ocai) Pada PT. Perkebunan Nusantara V Pekanbaru. Jurnal Ilmiah Rekayasa Dan Manajemen Sistem Informasi, 2015. 1(1), pp 17-30.
[3] Cameron, K S., & Quinn R E. Diagnosing and Changing Organizational Culture: Based on The CompetingValues Framework-3/E. 2011.

[4] Fernandez IB, Sabherwal R. Knowledge Management: System and Processes. England: M.E. Sharpe. 2010.
[5] García-Holgado, Alicia, et al. "Analysis and improvement of knowledge management processes in organizations using the Business Process Model Notation." Annual Conference of the Global Innovation and Knowledge Academy. Springer, Cham, 2015.
[6] Murphy, Glen, and Sonia Salomone. Using social media to facilitate knowledge transfer in complex engineering environments: a primer for educators. European Journal of Engineering Education 38.1 (2013): 70-84.
[7] Aziz, RZ Abdul, and Hiroshi Morita. National culture, organizational culture, total quality management implementation, and performance: an empirical investigation. International Journal of Productivity and Quality Management, 2016. 19(2), pp 139-159.
[8] Prajogo, D.I. and McDermott, C.M. (2005) 'The relationship between total quality management practices and organizational culture', International Journal of Operations and Production Management, Vol. 25, No. 11, pp.1101–1122.
[9] Prajogo, D.I. and McDermott, C.M. (2011) 'The relationship between multidimensional organizational culture and performance', International Journal of Operations and Production Management, Vol. 31, No. 7, pp.712–735.
[10] Alvesson, M., & Sveningsson, S. Changing organizational culture: Cultural change work in progress. Routledge. 2015.
[11] Awad, E.M dan Ghaziri, H.M. Knowledge Management. Person Education Inc., New Jersey. 2010.