

Validity of Critical Factors Scale for SMEs Readiness in Implementing Quality Management System

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Keywords: Validity, Reliability, Critical Factors, ISO 9001, SMEs

Abstract: To be able to survive amid intense organizational competition, Small Medium Entrepreneurs (SMEs) require strategies to improve the quality of products/services offered. Quality improvement is clearly needed so that companies have high competitiveness. Good product/services can be produced by good internal processes. ISO 9001 Quality Management System is a framework that has been used extensively by SMEs to ensure the quality of the process. But not a few SMEs have successfully implemented and obtained QMS certification. Many factors influence the process of implementing ISO 9001 QMS, especially in the context of SMEs that have many limitations. This study aims to test the validity and reliability of scale for implementing ISO 9001's Critical Factors in SMEs level. The method used is a quantitative survey of four SMEs that have successfully implemented and obtained ISO 9001 certification. Data from the survey were analysed using the Aiken approach to show the level of validity and reliability. The results showed that of the 20 items tested, only 19 items were met the criteria. Item of Employee Acceptance was eliminated from scale because the implementation of ISO 9001 is mandatory for all stakeholders so the factors could be ignored.

1 INTRODUCTION

To be able to survive in the midst of tight organizational competition, every organization needs a strategy to improve the quality of products / services offered. Quality improvement is clearly needed so that companies have high competitiveness. Good product / services can be produced by good internal processes. ISO 9001 Quality Management System is a framework that has been used widely by various organizations to improve performance and competitiveness.

Quality Management System (QMS) as a framework certainly requires large resources and a number of procedures that must be implemented correctly so that the running process in the organization is carried out consistently according to agreed standards, where the objectives to be achieved are the quality and productivity of the organization (Maranhao, 2005) Based on the above understanding, QMS does not only focus on organizational structures that describe the duties and responsibilities of personnel, but also explains how and what each personnel must do to achieve

organizational goals. This is closely related to process management in organizations (Moura, 2003). In other words, process management is important to optimize all available resources and QMS helps organizations to manage business processes that run better (Psomas, 2010). The process is standardized so that there is harmony between process objectives and customer needs (Conti, 2004; Miguel, 2001). The success of an organization is not related to the choice of certain standards but rather to how the standard implementation process is carried out properly so that it can finally obtain recognition in the form of certification. Among the existing standards, QMS ISO 9001 has been adopted globally and recognized by various organizations in the world. The QMS ISO 9001 is designed based on a process model that can be applied to various business or organizational models. The ISO 9001 standard is written in general (not technical) language so that it can be understood by various parties (Pearch & Kitka, 2010) This can be shown by the growth of ISO 9001 QMS penetration every year where the system is adopted with motivation that is improving efficiency, competitiveness, satisfaction customers (Psomas,

2010; Magd, 2008). In the early years, ISO 9001 QMS was widely applied to industrial scale, but currently almost all sectors have implemented this standard including the SMEs sector (Boiral, 2003). Figure 1 below illustrates the growth of ISO 9001 QMS penetration in recent years as follows:

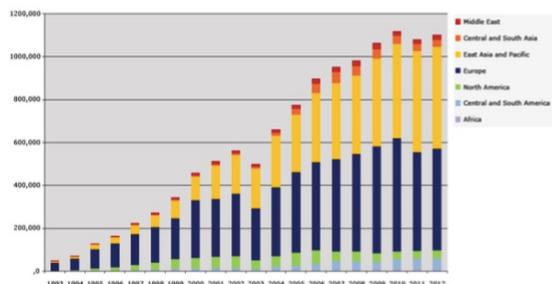


Figure 1: Growth of ISO 9001 Penetration (ISO, 2014)

The implementation of ISO 9001 QMS correctly can provide benefits exceeding the costs incurred because QMS can improve performance and build sustainable competitive advantage (Lin & Jang, 2008; Augustyn & Pheby, 2000). The advantage of implementing QMS according to some literature is increasing awareness of the importance of quality and customer satisfaction, reducing costs and customer complaints, standardizing work procedures and improving communication and increasing market share (Cebeci & Beskese, 2002; Dwyer, 2002; Herasm 2002; Arauz & Suzuki, 2004). However, it should be noted that the implementation of QMS in an organization will not produce optimal results if not done correctly (Psomas, 2010). Undeniably, many organizations are implementing ISO 9001 QMS just to get certification so that the quality of the process is ignored (Claver & Molina, 2003). Certification is often the demand of customers or organizations that must be fulfilled as one of the business requirements. As a result, many organizations prioritize certification and override product / service quality improvements that should be the focus of the organization. Although this certification is actually much criticized, because this is not a riskless job.

In fact, many SMEs have difficulties in implementing QMS 9001 to obtain certification (Gustafsson, 2001; Trust, 2006; Yuwono, 2012). Many obstacles faced by SMEs range from limited resources, expertise and skills to rejection from internal stakeholders (Nwankwo, 2000; Hudson, 2001; Garengo, 2007). In order to ensure the deployment of an ISO 9001 effective QMS, it is intended to identify and validate some critical

factors to ensure the successful implementation of ISO 9001 QMS. Researchers have already found twenty (20) Critical Factors from literature-based and in this research, The validity of all factors has been certified in QMS ISO 9001.

2 METHODS

Validity in research is a very important problem because it involves the accuracy of the measuring instrument used. It can be interpreted that an improper instrument will have implications for the validity of the results of the research itself. Validity determines the extent to which a measuring instrument actually describes what is being measured. In practice, psychometrics experts have developed various ways, techniques and methods to improve the validity of items on instruments, one of which is through content validity which is the first step in assessing the suitability of the scale items used. This evaluated the significance of critical factors of ISO 9001 implementation for SMEs context is proposed through its content validity. Content validity reflects the representation and relevance of a set of items used to measure a concept that is carried out through a rational analysis of the content of the test through an expert panel assessment. Content validity refers to the accuracy of measurements based on instrument content to ensure that the scale items used have fulfilled the entire contents of the concept or the suitability of the items.

Content validity is the validity estimated through testing of the feasibility or relevance of the test content through rational analysis by a competent panel or through expert judgment. Content validity ensures that measurements include a sufficient and representative set of items that reveal the concept. The more the item scale reflects all the concepts measured, the greater the validity of the contents. In other words, content validity is a function of how well the dimensions and elements of a concept have been described (Sekaran, 2006). Content validity is done to ascertain whether the contents of the questionnaire are appropriate and relevant to the purpose of the study. The validity of the content shows the contents reflecting the complete range of attributes under study (Devon et al, 2007). Estimates of the validity of the content of the tests are obtained thoroughly and systematically in examining test items to determine the extent to which they reflect and do not reflect the content domain (Kowsalya, 2012). Thus, content validity shows the high and

low agreement among experts who assess the feasibility of a measurement scale (Azwar, 2012).

As said, content validity is the representation of content that should be to evaluate (Napitupulu, 2005). Content validity should be conducted in the instrument development stage and also judgmental one (Burns, N., & Grove, 1993). Developing instrument had the purpose of understanding the construct that is being measured. The constructs could be obtained from qualitative ways such as literature reviews, interviews, and focus groups. Selecting the domain of constructs will bring undoubtedly research variables, scope and elements of the subject could be obtained.

In the other hand, the instrument judgment stage is based on expert opinion that surveyed with a questionnaire in quantitative ways (Yaghmaie, 2003). In this case, during testing, the validity of an item, an expert gave opinion or agreement according to the measurement item that is being assessed. Content validity is determined by professional or expert and assessed through an expert agreement, not by the researcher (Yang, 2011). In another word, content validity shows the extent of expert agreement toward item or construct in the instrument being assessed. Involvement of at least five to ten experts in the same domain was valuable to evaluate each item or construct of the instrument (Yaghmaie, 2003). Conducting the content validity become the main activity in testing instrument had been designed. Therefore, this study used quantitative survey to explore expert agreement or opinion about critical factors of ISO 9001 implementation as items proposed in the instrument. Based on expert comment or rating quantitatively, the statistical approach used to measure the extent of instrument validity. In this research, we tested the validity using Aiken approach (1980, 1985) that widely used to validate a scale (Yu, 1993; Lai & Chang, 2007; Aiken, 1980; Aiken, 1985). The extent of agreement between experts indicated the significance of items, and it was calculated symbolized by V coefficient.

Content validity coefficient (V) has a value between 0 to 1 where the higher the value of the coefficient V, the higher the validity of the contents. In other words, if the content validity coefficient (V) is large and reaches the standard of significance specified for a number of experts (expert) it can be said that the item tested has good content validity. The value of the coefficient V depends on the rating category or scale (c) which has a range from 2 to 7 and the number of items (m) or experts as an appraiser (n) that has a range of 2 to 25 (Aiken,

1985). V coefficient based on Aiken was formulated (Aiken, 1980; Aiken, 1985):

$$V = \sum S / [n (c-1)] \quad (1)$$

$$S = r - l_0 \quad (2)$$

With n is the number of experts. The coefficient of V had a value from lowest 0 to maximum of 1. According to Aiken Table (Aiken, 1980; Aiken, 1985), content validity index (V) required of the item is significant if above the cut off value 0.75 ($V > 0.75$). It means if the validity index of the item below 0.78 ($V > 0.75$). It means if the validity index of the item below 0.70 ($V < 0.75$), an item doesn't have a good content validity or not significant (Yu, 1993, Lai & Chang, 2007; Aiken, 1985; Cohen, 1960).

In the other hand, V Coefficient was confirmed by the extent of consistency of items namely homogeneity reliability. Homogeneity reliability is used to test how much consistency among experts in giving the same inter-rater agreement to a measurement item. Homogeneity reliability was calculated symbolized by H coefficient. H coefficient based on Aiken was formulated (Yu, 1993, Lai & Chang, 2007; Aiken, 1985; Azwar, 2012):

$$H = 1 - S / (c-1) (n^2-k) \quad (3)$$

With n is some experts.

The reliability coefficient of homogeneity (H) also has a range of values between 0 to 1 where the higher the value of the H coefficient, the higher the reliability of the homogeneity. In other words, if the reliability coefficient of homogeneity (H) is large and reaches a standard of significance determined for a number of experts, it can be said that the tested item has good internal reliability or consistency. The value of the H coefficient also depends on the rating category or scale (c) which has a range from 2 to 7 and the number of items (m) or experts as an appraiser (n) that has a range of 2 to 25.

Another approach to testing content validity is the CVR (content validity ratio) proposed by Lawshe (1975). The weakness of the CVR approach proposed by Lawshe (1975) is that the coefficient value generated by this approach can be negative because it ranges from -1 to +1. In addition to the Lawshe approach, there is no assessment standard that shows the coefficient can be considered significant or not. In other words the standard of

significance is not explicitly defined so that the justification of the importance of an item in measurement becomes unclear (Yu, 1993). In another side, some researchers proposed Cohen's kappa introduced by Jacob Cohen (1960), as a robust method for nominal scale collecting data comparing to Aiken (Cohen, 1960). However, we use Aiken approach since we collect and analyze data based on five points scale yaitu 1 (strongly disagree), 2 (disagree), 3 (netral), 4 (agree) and 5 (strongly agree) for each item asked.

Instruments containing 20 items using a Likert scale were distributed to five SMEs who had implemented and managed to get international recognition in the form of ISO 9001 certification. Of the four SMEs there were 8 people surveyed and asked for their level of approval of the list of critical factors submitted. All 8 people are owners and managers who understand the application of ISO 9001 in their organizations.

3 RESULT & DISCUSSIONS

At this stage, each item is validated in the form of critical factors in the instrument that has been obtained with the help of expert judgment. A total of 8 experts were involved in the instrument validation activities using the Delphi technique. The Delphi technique has been widely used and accepted to achieve convergence of opinions about real-world knowledge requested from experts in certain topics. Delphi technique is designed as a group communication process that conducts detailed examinations and discussion of specific issues aimed at setting goals, research policies or predictions of future events (Hsu & Sanford, 2007). Unlike the Focus Group Discussion (FGD), the experts were not met face-to-face, and the identities of each expert were hidden so that each expert did not know the identity of the other expert. This aims to avoid the domination of other experts and can minimize biased opinions (Boar, 2001) as often happens in FGDs (Afiyanti, 2008).

To reach an agreement regarding critical factors that are considered important by experts, the Delphi process is carried out up to 2 rounds. The results of the instrument validity test with Aiken approach in round 1 can be shown as follows:

Table 1: Instrument Validity Test (Round 1st)

No	Critical Factors of ISO 9001 in SMEs	Validity (V) Aiken
1.	Customer Focus	0.81

2.	Top Management Support	0.84
3.	Information & Analysis	0.90
4.	Strategy & Planning	0.87
5.	Training & Development	0.87
6.	Design Quality	0.84
7.	Process Control	0.81
8.	Continuous Improvement	0.84
9.	Motivation	0.87
10.	Enough Funding	0.87
11.	Supplier Quality Management	0.87
12.	Infrastructure & Technology	0.87
13.	Team Involvement	0.72
14.	Clear Job Responsibility	0.81
15.	Awareness of ISO 9001	0.78
16.	Quality Oriented Culture	0.78
17.	Employee Acceptance	0.66
18.	Cooperation & Teamwork	0.69
19.	Communication	0.72
20.	Audit	0.72

In Table 1, the validity of the instrument has been tested, especially each item in the form of critical factors ISO 9001 for SMEs. The test results with the Aiken approach show the validity coefficient (V) has a range from 0.66 to 0.90. Based on Aiken's minimum significance requirement, for 8 experts with 5 rating scales, each item must have a greater coefficient value of 0.75 ($V > 0.75$). Of the 20 items, five invalid items were found based on expert opinions, namely the Involvement Team (0.72), Employee Acceptance (0.66), Cooperation & Teamwork (0.69), Communication (0.72) and Audit (0.72). This indicates that the coefficient V does not exceed 0.75 ($V < 0.75$) according to the minimum requirements. In other words, the five items are not considered significant by expert opinion so the consequences can be eliminated from Table 1 above. However, after seeing that not all experts have the same opinion or reach agreement on these five factors, considering this matter should be carried out by Dephi round 2 to obtain consensus. Validity test results of round 2 instruments can be shown in Table 2 especially for the five items that have not reached an expert agreement.

Table 2: Instrument Validity Test (Round 2nd)

No	Critical Factors of ISO 9001 in SMEs	Validity (V) Aiken
1.	Team Involvement	0.82
2.	Employee Acceptance	0.50
3.	Cooperation & Teamwork	0.81
4.	Communication	0.78

5.	Audit	0.78
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Based on Table 2 the instrument validity testing process was carried out on some invalid items in the first round. After being re-confirmed to the expert with an explanation, finally an agreement or consensus can be found where only the Employee Acceptance item is invalid with a coefficient of $V < 0.50$ ($V < 0.50$). This is in the opinion of experts that the application of ISO 9001 is an obligation that must be carried out by all stakeholders. Because it is mandatory or mandatory, the Employee Acceptance factor is no longer important. Even more important is preparing employees through training and socialization so that they are capable of carrying out tasks related to ISO 9001. Furthermore, the next stage will also be tested the level of reliability or consistency of experts. Instrument reliability test results can be shown in Table 3 as follows:

Table 3: Instrument Reliability Test

No	Critical Factors of ISO 9001 in SMEs	Reliability (H) Aiken
1.	Customer Focus	0.89
2.	Top Management Support	0.89
3.	Information & Analysis	0.88
4.	Strategy & Planning	0.88
5.	Training & Development	0.88
6.	Design Quality	0.89
7.	Process Control	0.89
8.	Continuous Improvement	0.89
9.	Motivation	0.88
10.	Enough Funding	0.88
11.	Supplier Quality Management	0.88
12.	Infrastructure & Technology	0.88
13.	Team Involvement	0.90
14.	Clear Job Responsibility	0.89
15.	Awareness of ISO 9001	0.90
16.	Quality Oriented Culture	0.90
17.	Employee Acceptance	0.93
18.	Cooperation & Teamwork	0.91
19.	Communication	0.90
20.	Audit	0.90

The reliability coefficient value in Aiken is called the homogeneity-reliability coefficient (H). Based on Table 3 above, it can be shown that the reliability coefficient has a range between 0.88 to 0.90. Based on Aiken's minimum significance requirement, for 8 experts with 5 rating scales, each item must have a greater coefficient value of 0.67 ($H > 0.67$). In Table 3 it can be seen that the entire item has met the threshold value of the coefficient that is considered significant, namely $H > 0.67$. But for Employee Acceptance items with a high coefficient value of

0.93. This shows that all experts consistently agree to issue the item on the proposed scale. Thus it can be said that the instrument has been tested for reliability and shows good internal consistency. The total of 19 items obtained in this study have met the required validity and reliability criteria so that this paper contributes. The importance of this research can provide information regarding what key factors should be considered by SMEs in order to support the successful implementation of ISO 9001 in their organizations.

4 CONCLUSIONS

This study contributes to critical factors in implementing ISO 9001 in SMEs. The results of the validity and reliability test show that there are 19 critical factors that meet the minimum criteria or requirements. Other contributions are the use of Delphi techniques and Aiken's approach in testing the validity and reliability that had not previously been used especially in critical factors studies on the application of ISO 9001 in SMEs. Further research is in the form of elaborating operational definitions and measurement indicators because critical factors are generally still latent so that instruments can be used to evaluate the success rate of SMEs in implementing ISO 9001.

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