

Critical Success Factors Decision Support System for SME

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Abstract: Decision support system is part of information system to support decision making. This research purpose to identify the critical factors influence the successful implementation of decision support systems in SMEs. The purpose of this paper is also to analyze the part of decision support systems in SMEs to see the optimization of decision support system development. This research uses a methodology by identifying systematic literature from several sources from 2006 to 2019. The study found 42 articles relating to decision support systems and SMEs. The results of this research are the critical success factors of decision support system implementation in SMEs.

Keyword: Decision support system, Critical success Factor, SME.

I. INTRODUCTION

SME as one of the nation's economic strengths has an important and major role and contribution and is widely recognized in almost all countries [1]. One of the requirements is that SMEs must have high competitiveness in order to improve the company's performance. Decision making is part of a company's business and uncertain conditions will lead to the accuracy process of decision making. Uncertainty will be difficult to predict without using information technology, hence the decision support system helps the company in the process of decision making. Decision support systems are built to help decision makers more effectively and efficiently. The use of a DSS is a must to be able to produce the best decisions with environmental conditions that are constantly changing and the same thing faced by SMEs

DSS is the process of applying information technology that can help decision makers and improve the quality of decision outcomes. DSS can also reduce the level of complexity of the problem by grouping decision-making variables into structured [2].

Problems faced by companies such as SMEs are complex which require accurate resolution in a fast time. This condition requires information technology that can help the decision making process with many variables that must be considered which results in better decisions. DSS as part of information technology can be a solution for SMEs in decision making

DSS is divided into 4 main components namely Data, Model, User Interface and Knowledge-Based Subsystem [2].

This research identifies the factors determine successful implementation of the Decision support system in SMEs and also identifies part of the decision support system namely

Data, Model, User Interface and KBS Subsystem Research that is implemented in the SMEs.

There are several methods related to DSS implementation, for example AHP. AHP is a method of dividing a decision with several criteria for consideration. The AHP will also produce several alternative decisions. AHP is used to produce components of very complex problem solving and unstructured conditions. With the AHP the component will be arranged hierarchically which will then compare one component with other components subjectively. In the end each component or variable will be given a weight based on the priority level of importance.

The success factor of Decision Support System in SMEs has been done by V Bharathi [3] but only explains the success factors of Decision Support System in SMEs from ERP adoption factors so that it does not describe the success factors of Decision Support System implementation in SMEs more broadly.

This research was conducted to identify the critical success factor to support the successful implementation of Decision Support System in SMEs by studying several literatures from 2006 to 2019. The main purpose of this research was to analyze systematically and structured the determinants of Decision Support System success in SMEs which also became the research questions.

II. LITERATURE STUDY

A. Decision Support System

Decision support systems are a part of information technology, especially information systems that are used for decision making. Another definition explains the function based on changing data into information where the information will be used in taking from problems to problems, especially semi-structured problems. Another definition of DSS is described as a system that has the ability to analyze data and produce decision models can be used in unstructured conditions [4]. DSS becomes a system that can make decisions that are impossible to do manually. The complexity of the problems encountered is not possible manually because it requires complex calculations. Decision Support System also presents interactive simulations using data and models to be an important part [5].

B. Critical Success Factor (CSF)

One of the originators of the term CSF was Daniel [6]. His thoughts set forth in a sentence that there are certain factors that will affect the success of a company, if the company does not have these factors then the company fails. Another understanding of the definition of CSF is the success of competitive organization.

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Definition of CSF with the minimum factors that must be possessed by the organization in order to excel in competition which is also successful in achieving company goals

III. RESEARCH METHODOLOGY

Research is carried out through a number of steps in the following sequence: first, determining the research question as stated at the beginning. The second step is to determine the sources used to answer the research question. The next step is to determine keywords to find the required information followed by extracting data. The final step is to carry out an analysis process to answer the RQ.

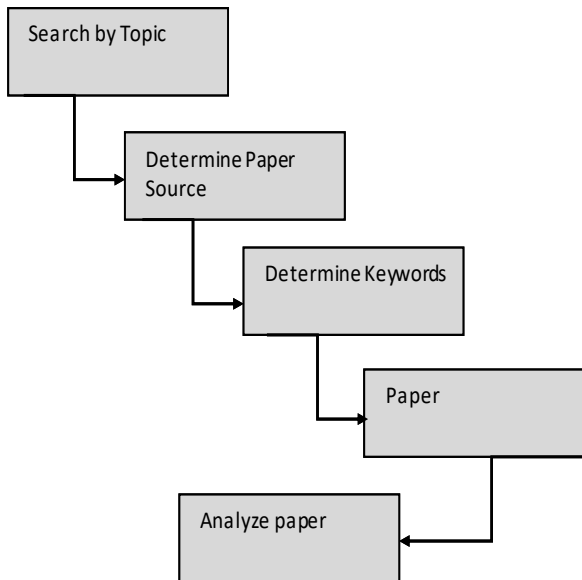


Figure 1

The first process is the search for articles by referring to several sources namely: IEEEExplore Digital Library (<http://ieeexplore.ieee.org>), ScienceDirect (www.sciencedirect.com), Wiley Online Library (onlinelibrary.wiley.com), Inderscience (www.emeraldinsight.com) and Springer Link (link.springer.com). Choosing the right keywords will produce a collection of articles that have a relationship with the research question. The next quest is to find the related research is to write sentences RQ, keywords searching with Boolean operators AND, OR, NOT. Searchengine will find related keywords:

- "DECISION SUPPORT SYSTEM" or
- DSS
- "SME" or
- "SMALL BUSINESS" and
- "CRITICAL SUCCESS FACTOR"

The results Then the keywords used are 'critical success factor' or 'CSF', '. The detailed information can be seen in Table 1.

The next step is to group the findings from the search process that has been done. All articles generated based on keywords are called 'articles found'. Then the next step is to look at the relevance of the research question based on the title of the article found and then group it into candidate articles. The final step is to identify candidate articles through their abstracts which will later be analyzed in more detail into selected articles. September 2019 research began with the findings of 235 papers from the results of previous research. Of the 235 findings were selected again into 95 candidate

articles based on the similarity of the research title and the final selection by looking at the contents of the paper found 43 results of previous research to be studied deeper. Table 1 explains these groupings

Table 1

Sources	Found article	candidate	Choose
IEEE Explore	30	10	5
Science Direct	25	15	6
Emerald Insight	20	5	2
Springer Link	10	5	1
Google Scholar	70	30	16
Research Gate	20	7	3
Semantic Scholar	15	8	2
Taylor & Francis Online	45	15	8
Total	235	95	43

IV. RESULT AND DISCUSSION

A. Classification by sources

Table 2

Sources	Name	Qty.	%
Journal	1. Int. Jour. Production, Eco. Volume 136, Issue 1, March 2012	23	51 %
	2. Int. Jour. OF COMP. ENGINEERING © ASCE /FEBRUARY 2010		
	3. Expert Sys. With App.		
	4. Procedia Tech. (2014) 542 – 552		
	5. Jour. of Enterprise Inf. Emerald Group Publishing Limited		
	6. Mgt Dec. Emerald Publishing Limited 0025-1747		
	7. Jour. of DECISION SUPPORT SYSTEM, 2018		
	8. Int. Jour. of Civil Engineering and Tech.		
	9. Int. J. Prod. Economics		
	10. Group Decision and Negotiation		
	11. Construction Management and Economics		
	12. Journal of Decision Systems		
	13. Int. Jour. of Prod. Research Publication detail		
	14. International Journal of Prod. Research		
	15. Journal of Decision Systems		
	16. Int. Journal of Prod. Research		
	17. Prod. Planning & Control: Management of Operations		
	18. Int. Jour. of Production Research		
	19. Int. Journal of Business Inf. Systems		
	20. Int. Adv. Manuf. Tech.		
	21. Springer International Publishing		
	22. Informatyka Ekonomiczna		
	23. Journal of DSS, 2018		

Conference	1. 2013 Hawaii Int. Conf. on System Sciences 2. CINTI 2016 3. 2014 IEEE Int. Conf. Computational Intelligence and Computing Research 4. 2015 48th Hawaii Int. Conf. on System Sciences 5. 2006 IEEE Conference on Emerging Tech. automation 6. Inf. Systems in Agri. and Forestry 7. Inter. Conf. ISAS, pages 208-211 8. Proceedings of Ind. Engineering Research Conf. 9. 2010 Int. Conf. on Management and Service Science 10. 1st Nordic Conf.on Product Lifecycle Management - 2006 11. PROCEEDINGS OF THE 3RD INT. CONF. ON COMMUNICATIONS AND INF. TECH. 12. Int. J. Management and Dec. Making, 2009 13. Building Information Modelling 2015 14. 2016 IEEE Workshop on (AIEEE),. 15. Proceedings of the 10th Int. Conf. ICMR 2012 16. Australasian Conf. Inf. Systems 2015, 17. Int. Conf. on engineering of ICISE. 2013.	18	44 %
3	Thesis	2	4%

A. Results of research year selection

Table 4. Paper years selection

Table 3

Year	Qty.	%
2006	3	7%
2007	2	5%
2008	2	5%
2009	4	9%
2010	3	7%
2012	5	12%
2013	2	5%
2014	6	14%
2015	6	14%
2016	4	9%
2017	1	2%
2018	3	7%
2019	2	5%
TOTAL	43	100%

Based on table 3, it can be concluded that research on the Decision Support System in SMEs is almost evenly distributed every year.

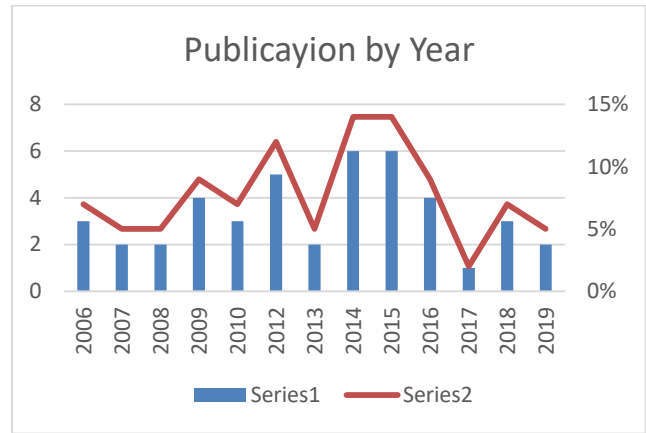


Figure 2

B. Result by Country

Following this will be the publication of the topic Decision Support System in SMEs. Table 3 shows that most of the articles that examined the Decision Support System in SMEs came from European countries. While from the continent of Asia the number of studies with the same topic is only a little

Table 4

Country	Qty.	%
Czech	1	2.3%
Algeria	1	2.3%
Australia	2	4.7%
Greek	4	9.3%
Brazil	2	4.7%
China	2	4.7%
Chili	1	2.3%
France	3	7.0%
Germany	4	9.3%
Hongkong	2	4.7%
India	1	2.3%
Indonesia	1	2.3%
Italy	2	4.7%
Lithuania	1	2.3%
Portugal	1	2.3%
Romania	1	2.3%
Saudi Arabia	1	2.3%
Singapore	2	4.7%
Spaniel	1	2.3%
Swedes	1	2.3%
UK	8	18.6%
USA	1	2.3%
TOTAL	43	100%

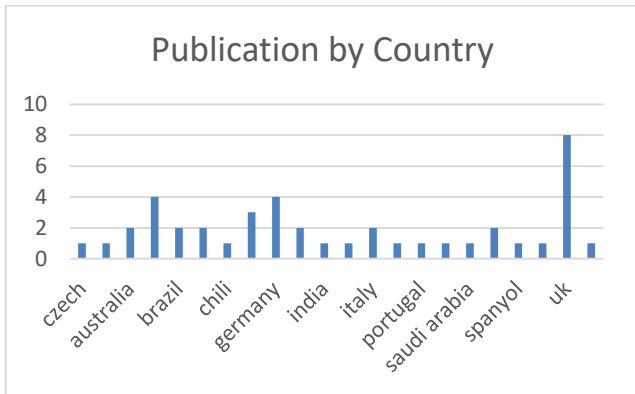


Figure 3

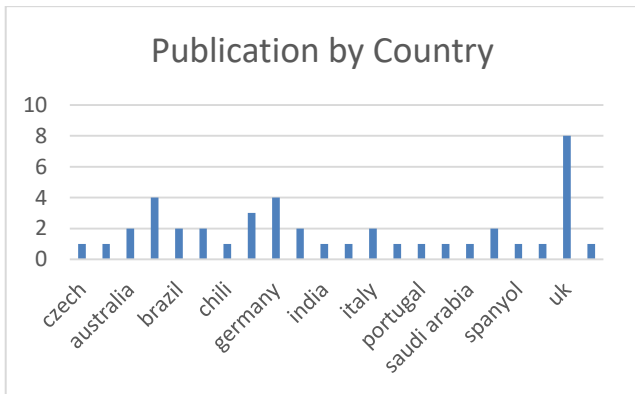


Figure 4

V. RESULT BY COMPONENT DECISION SUPPORT SYSTEM

Decision Support System is divided into 4 components namely [2]: Data, Model, and User Interface Knowledge-Based Subsystem.

Table 6. Critical Success Factors (CSF)

Table 5

Title	Decision Support System		
	Data and Model	Knowledge	User Interface
(GMDSS) for a manufacturing [7]	V	V	-
A DSS Small Business B2C Websites [8]	V	V	V
A DSS for small E-commerce[9]	V	V	V
DSS for information system in SMEs.[10]	V	-	-
A DSS-Based Framework for Manufacturing SME Supply Chains.[11]	V	-	V
Study on SMEs- DSS on Competitive Intelligence.[12]	V	V	-
Design of a Global DSS manufacturing SME:.[13]	V	-	-
DSS Based CLP Approach in SMEs[14]	V	-	-
Decision making in SMEs[15]	V	V	-

Interdisciplinary design DSS in SME.[16]	V	V	-
DSS for servitization of SMEs.[17]	V	-	-
Using of multi-agents in DSS for collaborative SME.[18]	V	V	-
Int.DSS for SME managers.[19]	V	-	-
DSS for Sustainability Assessment in SMEs[20]	V	-	-
Competitive Int. for SMEs: A Web-based DSS.[21]	V	-	-
DSS and Strategic Planning: Inf. Tech. SMEs Performance.[22]	V	-	-
An int. DSS for SMEs' in the energy sector.[23]	V	-	-
Dev.. Inter. Spec. For Design & Imp.. Of It Scheduling DSS: An SME Case of Study.[24]	V	-	-
An entropy-based financial DSS for project and analysis in constr. SMEs.[25]	V	V	V
Entropic Risk Analysis by a High Level DSS for SMEs.[26]	V	V	-
CMDSSI: for SMEs in India.[27]	V	-	-
Increasing The Existence Of SME In Banyuwangi Digital Commerce Through DSS.[28]	V	-	-
DSS to support the SMEs' network.[29]	V	-	-
Aligning Enterprise Knowledge and KMS effectiveness Performance: Fuzzy-based Decision Support System.[30]	V	-	-
Cloud DSS for SMEs Using (AHP).[31]	V	-	-
An integrated DSS for ERP in SME.[32]	V	V	-
KM Model Based on the Enterprise Ontology for DSS in the SME Sector.[33]	V	V	-
A many criteria dec.. approach for the assessment of SME.[34]	V	-	-
A DSS Tailored For Romanian SMEs.[35]	V	-	-
A research for evaluate effectiveness of sim. based DSS in ERP in SMEs.[36]	V	-	-
A DSS to manage cust. for SMEs at the cust. enquiry.[37]	V	-	-

Case study of DSS for collaborative net. SME-s.[38]	V	V	-
DSS for collaborative of strategies in enterprise networks.[39]	V	V	V
How SME decision for choose 1 ERP using AHP method.[40]	V	-	-
DSS framework to customer order enquiries in SMEs.[41]	V	V	V
A DSS-focused KM framework to support collaborative decision making.[42]	V	-	-
An integrated DSS support system for ERP in SMEs.[43]	V	V	V
An effective DSS framework for imp. EIS for SMEs.[44]	V	-	-
A DSS to support production planning and control in SME.[45]	V	-	V
A web-based (DSS) to assist SMEs to broker risks and rewards.[46]	V	-	V
Towards a cloud migration DSS for SME Tamil Nadu.[47]	V	-	V
The effect of Structured and Unstructured for Integrated DSS on SME Eco. Performance.[48]	V	-	V

VI. CRITICAL SUCCESS FACTOR

Based on the literature review of some of the articles described above, then the table 6 explains a summary of the critical success factor

Table 6

1	Technology and management support, human, cultural, documentation	[48][44][33][32][31][16][28][37]
2	indicators for deciding the problem on hand and collaborative with internal and external organization as a solutions	[10][11][13][30]
3	DSS will succeed if integrated with Knowledge mgt.	[13][22][36]
4	DSS will succeed if combined with competitive intelligence	[12]
5	problem identification and alternative solutions become part of DSS success	[14]
6	specify a modelling and simulation approach	[17]
7	a multi-agent model	[18]
8	Ongoing assessment can be implemented and part of the success of the DSS	[20]
9	Evaluation methods are part of the success of the DSS	[21]
10	Strat. Inf. Systems Planning (SISP) and integrated system	[23][26][40]
11	entropy method is one of the success factors of DSS	[27]
12	The DSS model created has what-if analysis capabilities for	[38]

	marketing managers and is one of the success factors of DSS	
13	DSS ability to provide strategy selection features for SMEs is one of the success factors of DSS	[40]
14	the use of AHP on DSS will result in maximum decisions for SMEs	[41]
15	DSS will succeed if you have clear parameters to produce the desired product.	[42]
16	Customer and supplier relationships to share knowledge become part of the successful implementation of SCM and DSS	[43]
17	The final decision-support methodology The final DSM consists many of which are supported by worksheets and tools.	[45]
18	DSS integrated with ERP has a positive impact on the company	[49]

VII. CONCLUSIONS

The conclusion of research exploring 42 articles is that there are 17 CSF for DSS implementation in SMEs, of which 17 are general factors, most of which are critical determinants of successful DSS implementation in SMEs and there are some special factors that only apply to certain SMEs. . This condition is caused by the implementation of DSS in SMEs being applied in several different fields so that the success factors are also different from one SME to another.

From the literature review by analyzing DSS components, almost all articles do not explain in detail the DSS components that they use. Although there are some meanings that discuss them quite deep. This can be caused because researchers already understand the importance of these components so there is no need to discuss them in more detail.

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