



NOVELTY DOES MATTER: SLM IS A CONVENIENT WAY FINDING A RESEARCH ORIGINALITY

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ABSTRACT

A good research is a research with a clear research novelty of research originality. However, finding the novelty or originality is one of the most challenging process in research in any field. Although there are many proposed models to assist researchers and scholars to determine research novelty-such as Systematic Literature Review, K-Chart, Card System, Decision Tree, Mind Mapping- most of the tools or models fail to fulfill the need of some researcher to effectively present the complex result of literature review. To deal with this obstacle, a new tool named SLM (Systematic Literature Mapping) is proposed in this article in order to visually present the result of a complex literature review in the form of a decision tree that leads to an effective and efficient literature review process. The newly proposed model combines SLR (Systematic Literature Review), an established-well-known tool for literature review with a model named K-Chart. To verify the proposed model, a case study is discussed to accompany the example of the application of this new tool. The case study is finding the research opportunity of the application of big data in the industry. The result shows that SLM is capable to serve its purpose in the process of literature review.

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1. INTRODUCTION

In the process of producing a quality research, proving the originality of the research is essential. For early researchers or Ph.D students, the process of finding research originality that drives to the novelty of the research is frustrating in some way. The report published by (Elgar, 2003) and (Hefce, 2007) indicates that the success rate of Ph.D completion in UK and Canada is approximately 50%. One of the main reasons for the failure is the too-broad research topics (Genius, 2019). It is arguably that too-broad topic is one strong indicator of poor quality of research novelty or originality. To deal with this difficult situation, many efforts, methods, and approaches have been proposed and applied however those options are impractical in many ways. For instance, in note-taking or some researchers are familiar with the term card system for literature review, the researchers must read the selected paper papers or articles then write or just “copy-and-paste” the critical idea on a piece of card. The challenging process is this approach is what to highlight or find in the paper. Instead of highlighting the critical or important information, many researchers end with highlighting too much information or no information at all. This process also requires the researchers to read the whole content of the paper before making the note. Also, it is time-consuming. How many papers can be read in one day?

Another common approach used by researchers is to tabulate the idea got from the review of literature into a table. Selecting the correct name of the column may lead to finding research originality. But it should be noted that the content of a table is limited and when it extends to two or three pages long, the readers start losing idea because the table is complicated. It becomes ineffective. The result: instead of having a sharp literature review for finding research originality, the authors may be trapped in an author-centric paragraph when writing the literature review. It's a parade of authors in the whole paragraphs. However, it is argued that concept centric is more critical in this case.

In this paper, a new approach is proposed in order to make the process of finding research originality. The new approach is a combination of two methods: Systematic Literature Review and K-Chart. The steps of those two methods are

synthesized into an integrated framework. The newly proposed integrated framework is then called as Systematic Literature Mapping (SLM). To demonstrate the capability and convenience of SLM in finding originality of research, a simple case study is provided. The case study is finding research originality and opportunity in the use of big data in industries.

2. Review of Literature

As aforementioned that SLM – the name of the new approach – is the combination of Systematic Literature Review (SLR) and K-Chart. SLR is a very common method used by researchers to collect all possible and available data based on particular some pre-determined criteria in order to answer a specific research question (Tikito and Souissi, 2019). Developing a firm structured plan on literature review is a very essential process in the process of finding a research novelty. One common tool that is widely used by researchers and scholars to prepare and perform a review on literature is the Systematic Literature Review (SLR).

Among the broad area of research used SLR, several examples of articles applying SLR are presented by (Alsolai and Roper, 2020, Burgers et al., 2019, Wilson et al., 2017). SLR, as advocated by Tranfield et al. (2003) has three main stages:

1. Planning the Review,
2. Conducting the review,
3. Reporting and disseminating.

Each main stage in (Tranfield et al., 2003) has phases, the detail of the phases in each stage is shown in Table I.

TABLE I. PHASES IN SLR

No	SLR Stage	Phases in each Stage
1.	Planning the Review,	Phase 0 - Identification for the need for a review Phase 1 - Preparation of a proposal for a review Phase 2 - Development of a review protocol

2.	Conducting the review,	Phase 3 - Identification of research Phase 4 - Selection of studies Phase 5 - Study quality assessment Phase 6 - Data extraction and monitoring progress Phase 7 - Data synthesis
3.	Reporting and disseminating.	Phase 8 - The report and recommendations Phase 9 - Getting evidence into practice

The second tool to construct the SLM is K-Chart. The articles on the internet discussing and using this tool is very limited. The result of the search about the tool shows that the K-Chart was firstly proposed by Abdullah, et al. in (Abdullah et al., 2006). It is arguably that the name of K-Chart is taken from the name of the first author, Khasani. It is stated in (Abdullah et al., 2006) that K-Chart is a tool developed for research planning in the form of a decision tree. In the original version of the K-chart shown in (Abdullah et al., 2006), it consists of several layers from a general and moves down to a more specific layer. The detail of the layers is as follows:

1. Issues layer,
2. Methodologies layer,
3. Results layer,
4. Timeline layer.

It is also indicated from the paper that there are possibilities to add sublayers in every four layers proposed that are originally proposed.

3. Research Method

In this section, the procedure of this research is presented. The proposed procedure consists of the stages in SLR combined with the steps of developing the K-Chart. The result of the combination steps is presenting as the procedure of this research as shown in Fig. 1.

Briefly, SLR and K-Chart independently are very beneficial for researchers and scholars to support their effort in the literature review process and to find research novelty or originality. On one hand, SLR is a beneficial tool to direct the process of finding the literature effectively. But in SLR, researchers may face difficulties to relate one article and other as well as to place the result of the SLR to find the novelty. As mentioned in (Tikito and Souissi, 2019), the result of the SLR is presented in the data description. Most of the results by researches tend to display the result of SLR based on the pre-determined inclusion criteria and lack of visual appearance. The common presentation of the result is in the form of a table, chart (bar chart or pie chart). This circumstance may lead to an author-centric style of writing in paragraphs, or paragraphs contain of a parade of authors. On the other hand, K-Chart has a structured and rich of visualization in terms of concept centric. In the original version of K-Chart in (Abdullah et al., 2006), it only a form of decision tree separated to different layers as aforementioned. Please see the original form of K-Chart in (Abdullah et al., 2006). The original one lacks information about supporting references in each box in the chart but once again it is a sophisticated tool to model the concept centric. So in this article, both benefit of SLR and K-Chart is combined into a new proposed tool named SLM. It is indicated that the new model is capable to support the process of literature review by enabling the result of SLR to be visually enriched based on the appearance of K-Chart. The rich visual appearance in a form of decision tree containing the information of the supporting references is argued to visually effective to help researchers and scholars to determine a research novelty.

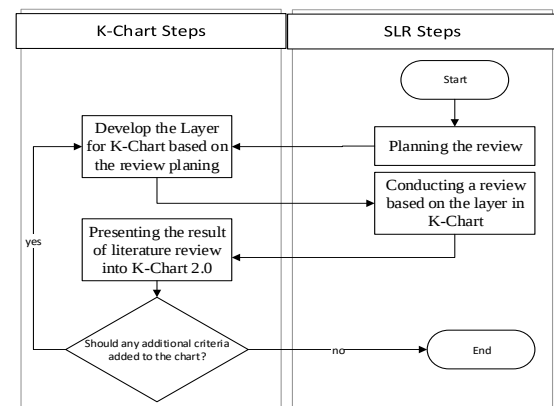


Fig. 1. The Procedure of SLM

The figure consists of two columns: K-Chart steps in the left column and SLR steps in the right column in Fig. 1. The initial step of the procedure is taken from the first step in SLR: planning the review. Basically, in this step, the first SLR stage in Table I is executed. It includes:

1. Identification for the need for a review
2. Preparation of a proposal for a review
3. Development of a review protocol

The phase number 3 in stage 1: Development of a review protocol is then used to develop the first draft of the K-Chart. This first version of K-Chart can be extended as the result of the SLR developed. This first version is called conceptual K-Chart. The layer presented in the conceptual K-Chart is considered as one of the inclusion criteria to perform the literature review. After the result of the literature review is attained based on the inclusion criteria, it is inserted into the associated box in the conceptual K-Chart. The conceptual K-Chart contains the supporting reference(s) in each box is then called K-Chart 2.0. A new criterion to review may appear in the process of literature review and it should be added into the K-Chart 2.0. Otherwise, the process is completed.

4. Case Study and Discussion

The case study in this article is an instance of the implementation of SLM to determine a research novelty or research originality in the research of big data applications in industry. The review protocol, or further mentioned as the inclusion criteria, used in the process of SLR as the part of the SLM procedure is as the following:

1. The keywords used for the searching are: "big data in manufacturing industry" and "big data in service industry"
2. The papers are the research paper,
3. The papers are published in the last 2 years.
4. The papers are written in English.
5. The source of the papers is from Sciencedirect.

The procedure of SLR as the integrated part of SLM for this case study is shown in Fig. 2. From the inclusion criteria and exclusion criteria, several papers are selected, and the papers are reviewed based on the Conceptual K-Chart and the result is then inserted into the K-Chart 2.0 as shown in Fig.3.

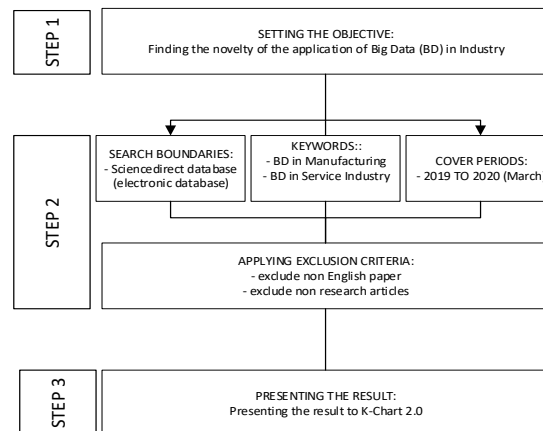


Fig. 2. The Procedure of SLM in applied for the case study

From the K-Chart 2.0 as shown in Fig. 3, the K-Chart 2.0 consist of four layers:

1. Issue layer: in this case, the issue layer is the big data application in industry.
2. System Layer: the system layer represents the system covered by the issue layer. For this case study, the system layer consists of manufacturing industry and service industry.

Or in other words, the word “industry” in the issue layer is divided into manufacturing and service industries.

3. Element Layer: this layer could be flexible basically, in one case the element of an industrial system may consist of people, material, information, equipment, and energy. But to simplify the case study, only

three elements included in this layer: the input of the business process (or the system), the process, and the output. However, this element layer can be extended to a sub-element layer that may include people, material, information, equipment, and energy as necessary.

4. Methodology Layer: in this layer, the methodology used in the selected papers are identified and inserted in the associated box. From the selected articles, it is identified that seven different methods are used. However,

one method that is predicted and prepared in the conceptual K-Chart is not used by any selected papers. That is the main reason for the box of Agent-Based modeling has no associated paper number. Result Layer: from the selected paper it is also indicated that there are six different results. Similar to the methodology layer, where there is a box without any associated paper number, in this layer, there is no paper produce the result of process design in the selected papers.

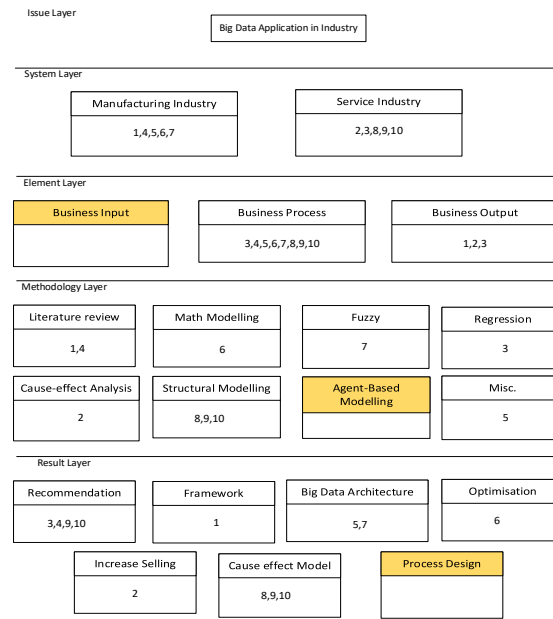


Fig. 3. K-Chart 2.0

In the Fig. 3, some boxes contain numbers that are associated with the paper selected for this case study. The detail of the authors associated with the numbers in Fig. 3 is presented in TABLE II.

TABLE II. THE REFERENCE IN SLM

No. in Fig. 1	Authors
1	Ren et al. (2019)
2	Boldosova (2019)
3	Allen et al. (2020)
4	Belhadi et al. (2019)
5	Wang et al. (2019)
6	Xu et al. (2019)
7	Fahmideh and Beydoun (2019)
8	Cabrera-Sánchez and Villarejo-Ramos (2020)
9	Park (2019)
10	Park et al. (2019)

The boxes without any associated paper number in the K-Chart 2.0 are the potential area of research. In Fig.3, there are three boxes without any associated paper number: Business input in the element layer, Agent-Based Modeling in the methodology layer, and process design in the result layer. With this instance, a paragraph to represent the main idea of this research opportunities can be conveniently developed as the following:

From the result of the literature review, it can be indicated that researches in the big data application in industry have been done in two different sectors of industry: manufacturing industry and service industry. However, most of the researches is focus on the application of big data in the business process and the output of the business process. There is a lack of research in the

application of the big data in the input of the business process. Furthermore, based on the SLR with the inclusion and exclusion criteria, the research in this area has not been found. The methodology used also varies from the literature review, fuzzy, mathematical modeling, regression, cause-effect analysis, and structural modeling. But as far as we observed, there is no article use agent-based modeling as the accompanying method for the big data application in Industry. Also, there is a research opportunity to apply big data to design, develop, or improve a business process.

The previous paragraph is an example paragraph that can be generated from the K-Chart 2.0. The paragraph is still simple because it only includes the main idea produced from the K-Chart 2.0. It should be noted that the paragraph can be extended to some pages depends on the creativity, experience, and the thoroughness and the richness of the literature review

. In general, it can be stated that from the brief process of SLM that one of research originality found is a research associated with the big data application in industry using agent-based modeling to design a business process. To ensure that this research originality is strong, a new

search using two keywords: "agent based modeling" and "big data" is conducted in sciencedirect. The result shows that this research opportunity is strong to proceed. The screenshot of the result is shown in Fig.4.

From the presented case study, the SLM can serve its purpose to identify research originality. Further, it can be indicated also that SLM may work on other fields of research by altering or adjusting the layers in the SLM. It should be noted that the name and the layers in K-Chart in SLM can be designed according to the area and the nature of research. For instance, the system layer doesn't always consist of manufacturing and service industry. In other research areas in industry. For instance, in finding the research originality on scheduling problems, the system layer can be altered to operations scheduling and project scheduling as well as altering the element layer and so. SLM is also potential to be used in social studies and other areas. For instance, in social studies to identify originality on community perception on government policy. In the K-Chart in SLM, the system layer can be designed to include urban community, sub-urban community, and rural community

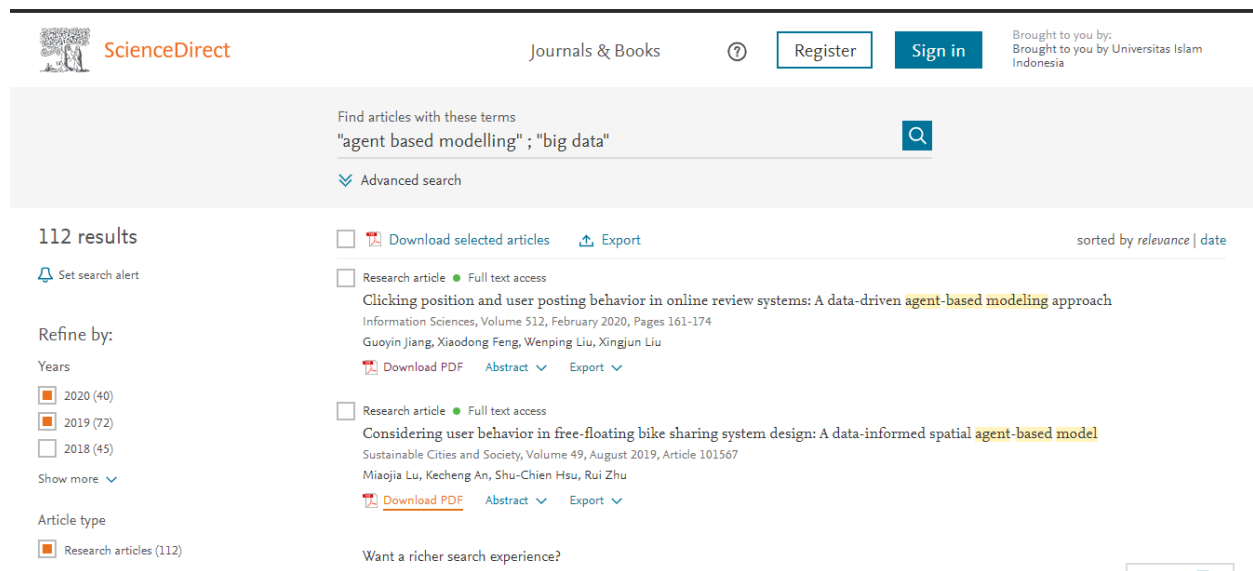


Fig. 4. The result of the search using the new keywords

In spite of the convenience of using the SLM, it is argued that SLM may have limitations. First, the quality and the deep of the analysis depend on the ability and the knowledge in the research

area of the people developing the K-Chart. Also, in some cases, the result of the SLR is abundant, and it is difficult to read and place the result in

the K-Chart. In this case, the discretion of the researchers is required.

5. Conclusion and Recommendation

A newly tool to assist researchers and scholars in the process of literature review to determine the novelty of originality of a research is proposed. The new tool is named Systematic Literature Mapping (SLM). From the result of the case study to find research originality in the area of the application of big data in industry, it can be indicated the newly proposed tool is capable to assist the process of finding research originality. However, the number of papers selected in the process of SLM is very limited because it is only for the purpose of providing an example. Adding a significant number of papers by extending the inclusion criteria such as extending the publication year and the article database may help. It is one of the opportunities for the further research.

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Reference

- Abdullah, M. K., Suradi, N. R. M., Jamaluddin, N., Mokhtar, A. S., Talib, A. R. A. & Zainuddin, M. F. 2006. K-Chart: A Tool For Research Planning And Monitoring. *Journal of Quality Measurement and Analysis*, 2.
- Allen, B., Tamindael, L. E., Bickerton, S. H. & Cho, W. 2020. Does citizen coproduction lead to better urban services in smart cities projects? An empirical study on e-participation in a mobile big data platform. *Government Information Quarterly*, 37, 101412.
- Alsolai, H. & Roper, M. 2020. A systematic literature review of machine learning techniques for software maintainability prediction. *Information and Software Technology*, 119, 106214.
- Belhadi, A., Zkik, K., Cherrafi, A., Yusof, S. R. M. & El Fezazi, S. 2019. Understanding Big Data Analytics for Manufacturing Processes: Insights from Literature Review and Multiple Case Studies. *Computers & Industrial Engineering*, 137, 106099.
- Boldosova, V. 2019. Telling stories that sell: The role of storytelling and big data analytics in smart service sales. *Industrial Marketing Management*.
- Burgers, C., Brugman, B. C. & Boeynaems, A. 2019. Systematic literature reviews: Four applications for interdisciplinary research. *Journal of Pragmatics*, 145, 102-109.
- Cabrera-Sánchez, J.-P. & Villarejo-Ramos, Á. F. 2020. Acceptance and use of big data techniques in services companies. *Journal of Retailing and Consumer Services*, 52, 101888.
- Elgar, F. J. 2003. PhD Degree Completion In Canadian Universities Canada: Dalhousie University.
- Fahmideh, M. & Beydoun, G. 2019. Big data analytics architecture design—An application in manufacturing systems. *Computers & Industrial Engineering*, 128, 948-963.
- Genius, D. 2019. The Six Laws of PhD Failure. *Dissertation Genius* [Online]. Available from: <https://dissertationgenius.com/the-six-laws-of-phd-failure/> [Accessed March, 30th 2020].
- Hefce 2007. PhD research degrees: update United Kingdom: Higher Education Funding Council for England.
- Park, E. 2019. The role of satisfaction on customer reuse to airline services: An application of Big Data approaches. *Journal of Retailing and Consumer Services*, 47, 370-374.
- Park, E., Jang, Y., Kim, J., Jeong, N. J., Bae, K. & Del Pobil, A. P. 2019. Determinants of customer satisfaction with airline services: An analysis of customer feedback big data. *Journal of Retailing and Consumer Services*, 51, 186-190.
- Ren, S., Zhang, Y., Liu, Y., Sakao, T., Huisingh, D. & Almeida, C. M. V. B. 2019. A comprehensive review of big data analytics throughout product lifecycle to support sustainable smart manufacturing: A framework, challenges and future research directions. *Journal of Cleaner Production*, 210, 1343-1365.
- Tikito, I. & Souissi, N. 2019. Meta-analysis of Systematic Literature Review Methods. *International Journal of Modern Education and Computer Science*, 11, 17-25.
- Tranfield, D., Denyer, D. & Smart, P. 2003. Towards a Methodology for Developing Evidence-Informed Management Knowledge by Means of Systematic Review. *British Journal of Management*, 14.
- Wang, J., Zheng, P., Lv, Y., Bao, J. & Zhang, J. 2019. Fog-IBDIS: Industrial Big Data Integration and Sharing with Fog Computing for Manufacturing Systems. *Engineering*, 5, 662-670.
- Wilson, J., Arshed, N., Shaw, E. & Pret, T. 2017. Expanding the Domain of Festival Research: A Review and Research Agenda. *International Journal of Management Reviews*.
- Xu, F., Li, Y. & Feng, L. 2019. The influence of big data system for used product management on manufacturing–remanufacturing operations. *Journal of Cleaner Production*, 209, 782-794.