

Cluster Analysis Based on McKinsey 7s Framework in Improving University Services

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Abstract

The epidemic of Covid-19 has impacted all aspects of human life, including education. Academic and administrative services for academic community are suffering, as a result of the fact that not all universities are able to provide online services to help break the chain of Covid-19 distribution. This is due to a lack of human competencies to use technology and a lack of information technology resources, necessitating the development of new strategies by universities to address these flaws. The goal of this study is to develop a university service strategy based on McKinsey 7s cluster results on the part that is having issues based on questionnaire data. The questionnaire is organized on seven McKinsey elements. The Manhattan distance calculation and the K-Medoids algorithm results demonstrated that the structure, system, skill and staff are all part of elements that clustered in $k=2$ and has to be addressed in aiding services during the Covid-19 pandemic. The McKinsey 7s showed that universities service enhancements may be achieved by combining clustering techniques and McKinsey framework.

Keywords: University services, McKinsey 7s, Manhattan distance, K-Medoids algorithm

1. Introduction

The Covid-19 epidemic has impacted a wide range of human activities, including Indonesia. Several provinces have been named a red zone due to the high amount of Covid-19 distribution. Indonesia government, as stated by website covid19.go.id on September 11, 2020, originally delivered this information. This has a major impact on community and organizational activities, as well as university. Almost universities, offer online learning and services according to the needs of the academic community.

The dilemma that this circumstance has created is that some universities are still unable to provide online learning and administrative services. During the spread of Covid-19, the university's incapacity to supply human resources and information technology resources had a negative impact and lowered public confidence in its ability to provide services. This means that the university's leadership must be able to improve and manage existing resources to ensure the university's long-term viability.

Various Covid-19 investigations have begun, ranging from determining the source to developing a cure [1]-[2]-[3]-[4]. The goal of this study was to improve academic and administrative services by a framework through human resources and university technology, based on cluster results, in order to inhibit the development of Covid-19. The framework in question is the McKinsey 7s, which calculates the Manhattan distance using the K-Medoids algorithm. This may make it easier for universities in Covid-19 affected areas to devise measures that meet the needs of the academic community.

The McKinsey 7s framework is a prominent strategic planning tool that may be used by academics and practitioners alike [5]. There has been a lot of research on the implementation of McKinsey 7s, including [6]-[7] in the academic field and [8]-[9]-[10] in business enterprises and startups. Several of these studies showed that McKinsey 7s has been successful in establishing strong management in a variety of organizations, including educational institutions and businesses. Contributions are provided to this research through management based on cluster results, and it is envisaged that the university's good services will help to prevent the spread of Covid-19.

2. Material

2.1. K-Medoids Algorithm

One of the clustering analysis algorithms is K-Medoids. The clustering is unsupervised or directionless in nature, therefore the calculation outputs of each algorithm do not require external targets [11]. The K-Medoids algorithm, also known as the Partitioning Around Medoids (PAM) algorithm, is a collection of partitioning clustering approaches that reduce the distance between the labelled point in the cluster and the designated cluster centre. Leonard Kaufman and Peter J. Rousseeuw came up with this method in 1987. Data points are chosen as the

centre (medoids) using K-Medoid [12], and the clustering process' outcomes are unaffected by the order in which the dataset is entered [13]. The following algorithm is used to run K-Medoids:

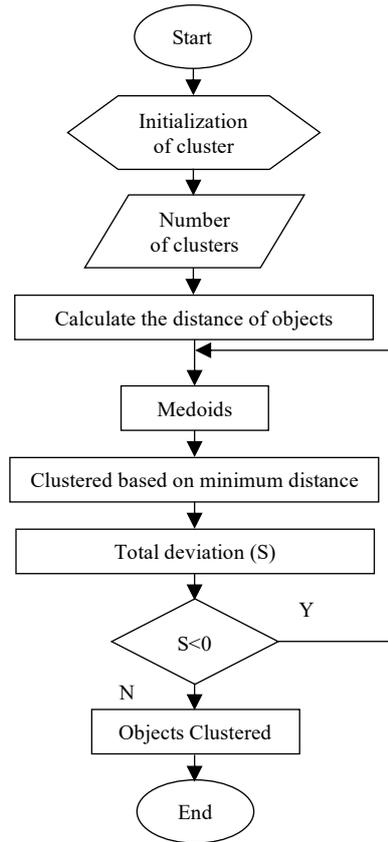


Fig. 1: K-Medoids algorithm

2.2. Manhattan Distance

The Manhattan Distance (City Block Distance) is a method of measuring distance numerically. The sum of the differences between two objects is used to calculate distance, and the results are expressed in absolute values [14]. The following is the Manhattan Distance equation.

$$d(i, j) = |x_{1i} - x_{1j}| + |x_{2i} - x_{2j}| + \dots + |x_{ni} - x_{nj}| \quad (1)$$

Where:

$$d(i, j) = \text{distance of data } i \text{ to cluster centre } j \quad (2)$$

$$x_{ni} = \text{data to } i \text{ on attribute data to } n \quad (3)$$

$$x_{nj} = \text{centre point to } j \text{ on the } n^{\text{th}} \text{ attribute} \quad (4)$$

2.3. McKinsey 7s Framework

Tom Peters and Robert Waterman of McKinsey established the McKinsey 7s concept in the early 1980s [5] as shown in Figure 2.

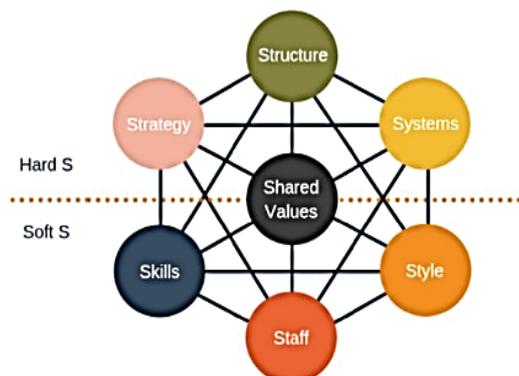


Fig. 2: McKinsey 7s model

Correlation Values	0.849	0.842	0.689	0.688	0.849	0.883	0.921	0.775	0.824	0.827	0.772	0.871	0.908
Number of Statements	14	15	16	17	18	19	20	21	22	23	24	25	26
Correlation Values	0.854	0.781	0.806	0.747	0.672	0.758	0.363	0.768	0.768	0.768	0.733	0.897	0.881

4.2. Clustering Results

The information gathered from the questionnaire in Table 1 was put to the test in 10 iterations with 3 cluster centre points. The questionnaire was completed by 467 respondents for cluster needs and Rapid Miner is used to process the data, which is based on the K-Medoids algorithm in Fig. 1 and equations (1) up to (4). Tables 5, 6 and 7 showed the clusters that formed.

Table 5: First Cluster Results (0)

No	Elements	Statements	Cluster
1	Structure	Components and personnel can be adjusted based on the assessment	cluster_0
2	System	There is a particular policy for special instances in each eligible procedure	cluster_0
3	Staff	Have a structure in place for educators and educational professionals to be evaluated	cluster_0
4	Staff	All structural levels have the same ability	cluster_0
5	Style	Cooperating and providing services	cluster_0
6	Style	Communicate with an open mind and a kind demeanor.	cluster_0
7	Style	The ability to adjust attitudes at all levels of the structure	cluster_0
8	Share Values	Always improve creativity, innovation and collaboration	cluster_0
9	Share Values	Creating a high-quality culture	cluster_0
10	Share Values	Mutual respect and support are implemented	cluster_0

Table 6: Second Cluster Results (1)

No	Elements	Statements	Cluster
1	Strategy	Always be on the lookout for external changes.	cluster_1
2	Structure	Each component serves a distinct role	cluster_1
3	Structure	Each component contributes in a responsible and quantifiable manner.	cluster_1
4	Structure	Have a system in place for assessing performance.	cluster_1
5	System	Providing various ways to collect, access information and learning in times of disasters such as Covid-19	cluster_1
6	System	All required data is accurate	cluster_1
7	System	The availability of documents is quite important	cluster_1
8	Skill	Each component's work are organized along a line of acceptable standards and competencies	cluster_1
9	Skill	The work is done by professionals who have the necessary qualifications.	cluster_1
10	Staff	The institution has processes in place for dealing with mechanisms involving educators and educational professionals	cluster_1
11	Staff	Each structure is occupied by the appropriate individual.	cluster_1
12	Staff	Possess the ability to assist and collaborate	cluster_1

Table 7: Third Cluster Results (2)

No	Elements	Statements	Cluster
1	Strategy	Institutions have readiness in dealing with disaster problems such as Covid-19	cluster_2
2	Strategy	The plans drawn up can be realized by taking into account the needs of students	cluster_2
3	Strategy	Focus on internal problems	cluster_2
4	Staff	Possess communication skills	cluster_2

The cluster results in Tables 5, 6, and 7 represented the outcomes of the questionnaire data calculation. Based on the respondents' opinions, the factors that need improvement were highlighted based on the 7 McKinsey factors. During the Covid-19 period, services for all administrative and educational needs were still deemed inadequate. Based on questionnaire, there are some respondents that provide a rating of Very Bad and Not Good on some statements of Structure, System, Skill, and Staff elements, implying that some colleges have not been able to deliver the best service to lecturers and students even receiving slow or no service. The absence of services is also due to a lack of human resources to respond to this unprecedented incident, which runs counter to the government's goals of halting the spread of Covid-19. Accordingly, the low level of respondents' evaluation of the structure component led to the conclusion that universities need to develop new methods for stronger and more robust structural arrangements in order to continue to deliver services to the academic community during pandemic. Table 6 was the second cluster included these low rating and illustrated in the following graph:

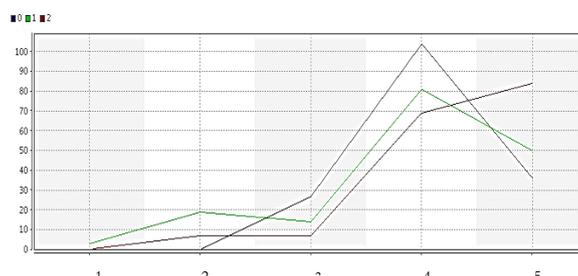


Fig. 4: Cluster results by category

4.3. McKinsey 7s Implementation

According to the cluster's findings, universities intend to resolve their structure, systems, skills, and personnel, while paying little attention to strategy in recognizing and responding to external events like the Covid-19 pandemic. Therefore, the McKinsey 7s should be applied to the appropriate portion of the university, that is Bureau of Academic and Student Administration (BASA). In this study, one of universities that acted as respondents was used as an example. The implementation of McKinsey 7s in this research, is explained as follows.

4.3.1. Strategy

Strategy formulation using Operational Excellence [18]. The goal is to eliminate all activities that do not have an impact on student improvement, minimize costs, and optimize the process of activities between functions and internal organizational relationships. Figure 5 depicts the notion of BASA development strategies.

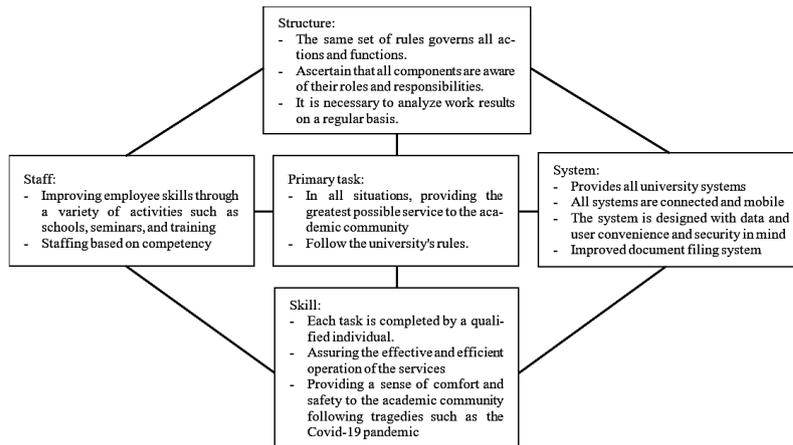


Fig. 5: Operational excellence strategy of BASA

4.3.2. Structure

McKinsey 7s are used in all BASA structures which each structure incorporates the 7s elements to effective human and technology management.

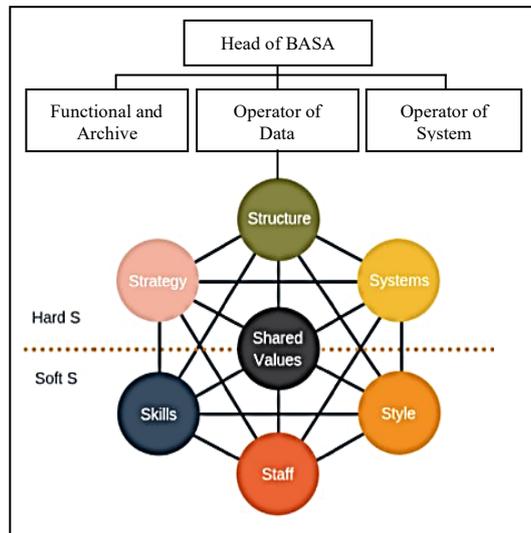


Fig. 6: McKinsey 7s concept for BASA

4.3.3. System

The system requires command and control to ensure that each BASA staff is accountable for their work. The head of BASA exercises command by issuing orders to subordinates. These instructions are presented in accordance with each job's description. The head of BASA is also in charge of control, supervising all work. There is also a section of the system that governs remuneration in the form of rewards and punishment based on the quality of effort.

4.3.4. Skill

The capacity possessed by each employee in this BASA area is invention, job mastery, time management, issue solving, work safety, and a service attitude that includes friendliness and patience. For the effectiveness of BASA operations, every talent must be learned and developed through various trainings, online/offline seminars, and the like, especially during disasters like Covid-19.

4.3.5. Skill

Employees' existence is tailored to the needs of BASA. Employee recruitment necessitated job analysis. The BASA structure is examined in order to identify employees with university compliant skills. Employee placement is altered based on competency and test results, as well as some on the training. Employee capacity development is a method of motivating employees to achieve job results that are in line with university objectives, as proven by a certificate of competence. The employee's performance is then evaluated. Employee dismissal or recruitment, on the other hand, is required to bring new ideas and innovations for the organization's advancement, particularly in disaster scenarios such as Covid-19.

4.3.6. Style

Style is a competency-based and transactional leadership. The head of BASA must be able to lead by example, develop and motivate subordinates to complete work in accordance with the university purpose, as well as the current condition, such as the Covid-19 pandemic. The head must be able to assess the outcomes of subordinates' efforts and then make appropriate and equitable rewards or punishments. The Head's decision-making ability is based on the standard operating procedures that have been established for each section. This can motivate subordinates to work harder in order to achieve the university objectives.

4.3.7. Share Values

The values in question are university personalities that must be shared by the entire academic community and embedded in every position. In every activity, the placement of these values becomes the norm of quality. Every employee must animate and become accustomed to using the values that have been established in their activities, especially during disasters such as Covid-19, in order to realize the aims and services of university to the best of their ability.

4.4. Discussion

The McKinsey 7s framework should be used by large and small businesses alike. The cluster results help universities identify service flaws during the Covid-19 pandemic. On 467 data and 26 statement of McKinsey 7s, the K-Medoids and Manhattan Distance algorithms perform well. Some statements that aren't included in the second cluster, which is the group that needs to be improved the most, are due to the use of Manhattan to calculate categorical variables.

In this study, the McKinsey 7s was applied to a section of university, demonstrating a sharp analysis as a solution to the BASA's shortcoming. However, it is important to remember that the consequence of a cluster that employs McKinsey's 7s model is a change or improvement across the entire university. Integration amongst sections in responding to the deficiencies of other parts simplifies and improves service delivery during the Covid-19 pandemic.

5. Conclusion

Clustering approaches based on seven elements of the McKinsey framework can be used to improve academic and administrative services in universities during a pandemic. The second cluster, according to the cluster results, contains 12 statements with four elements that must be handled immediately. This framework has been used in the management of human resources and technology in university services, demonstrating that it can work with clustering approaches in data mining and contributing to this research. The McKinsey cluster results are correct and in line with the reality that several universities have not been able to properly deliver good services throughout the Covid-19 pandemic. Not only in terms of technology availability, but also in terms of human competency. The findings of the study can still be utilized to assess the application of McKinsey 7s and the test equipment that was employed.

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