

Analyzing Technopreneurial Intentions of Generation Z in Indonesia: A Fuzzy Clustering Approach

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Abstract. The development of the business world today is inseparable from advances in science and technological innovation. Technopreneurship is an entrepreneurship approach that utilizes technology to produce innovative and competitive products, contributing to the dynamic social and economic development. This study aims to determine the intention of Generation Z in Indonesia to engage in technopreneurial activities. This study analyzed the technopreneurial intentions of 190 Indonesian university students representing Generation Z using Fuzzy C- means (FCM) clustering method for analysis. Students were sampled from business management and information technology degree programs to discern differences across educational backgrounds. The outcomes of the research model exhibit two key clusters - those interested in technopreneurship (51.25% IT students, 41.82% business students) and those exhibiting disinterest (48.57% IT students, 58.18% business students). The disparity highlights that technology based entrepreneurial inclination depends on prior technical knowledge. The lower interest among non-IT student indicates a need to integrate technology literacy within entrepreneurship education to effectively cultivate Generation Z technopreneurs in Indonesia.

Keywords: Entrepreneurship, Technopreneurship, Entrepreneurship Intention; Generation Z, Fuzzy C-Means

1. Introduction

The development technology has been widely acknowledged as the key factor contributing to societal prosperity. Today, the industrial sector has entered the Industrial Revolution 4.0, marked by a transformation in technology-oriented work systems, and is inseparable from scientific advancements and technological innovation (Nurhayati & Machmud, 2019). Information technology has helped industries improve their business processes to compete globally (Fowosire et al., 2017). This rapid advancement of technology has not only developed sophisticated industries but also spurred the government initiatives to encourage the integration of information technology among small and medium enterprises (SMEs) (Akomea-Bonsu & Sampong, 2012). Digital transformation has become a new force for accelerating economic growth and development, especially in developing countries (Maziriri et al., 2024).

The application of technology in entrepreneurship, known as technopreneurship, has received attention and recognition since the Internet's development in 2000s. Technopreneurship involves the fusion of technological expertise and entrepreneurial talent and skills in the transformation of goods and services (Hoque et al., 2017). The era of Industrial Revolution 4.0 has elevated the significance of information technology within entrepreneurship, driving enhanced productivity, efficiency, and better customer service (Machmud et al., 2020). Technopreneurship presents an alternative solution in increasing efficiency and fostering innovative business models, combining technological prowess with entrepreneurial skills to develop exceptional products (Selladurai, 2016). Moreover, technopreneurship extends beyond entrepreneurs exclusively involved in information technology. Any business that leverages information technology, such as employing the Internet for product marketing (e-commerce) or implementing specialized software to cut production costs, can be classified as technopreneurship (Pratiwi et al., 2022).

Businesses that utilize information and communication technology can positively affect competitiveness (Akomea-Bonsu & Sampong, 2012). Combination technical knowledge and entrepreneurial skills can create a new versatile business model. Information technology can aid in enhancing the comprehension of customers, products, competitors, and suppliers (Paulus, 2021). The provision of information and technology support will add value to goods or services, introduce new techniques to enhance performance and efficiency, and strengthens relationships with customers and suppliers (Akomea-Bonsu & Sampong, 2012; Fowosire et al., 2017; Machmud et al., 2020). Consequently, conventionally-operated business are projected to align with technological advancements (Paulus, 2021). Combining the power of technology with the core of entrepreneurship will create a competitive advantage to provide benefits to improve people's quality of life and support the sustainable development of the country (Nurhayati & Machmud, 2019). In essence, technology-aided technopreneurship has the potential to enhance the efficiency and effectiveness of the traditional entrepreneurial process.

Therefore, technopreneurship has extensive growth opportunities worldwide, particularly in developing countries. Technopreneurship forms an essential national development strategy as it serves as a dynamic avenue for economic growth, competitiveness, and national interest solutions (Liñán et al., 2011), as well as expected to support the sustainable development for a country. Although technopreneurship remains a relatively new concept in developing countries (Selladurai, 2016), technology-oriented entrepreneurship is currently emerging in developing countries like Indonesia. The role of technopreneurship is growing as technology development becomes increasingly pronounced in Indonesia, particularly highlighted during the pandemic. Diverse stakeholders have significantly benefited from technology adoption throughout the pandemic and this trend is expected to persist. The importance of technology-based entrepreneurship is essential, especially in areas impacted by the economic crises (Maresch et al., 2016). The Ministry of Communication and Information of the

Republic of Indonesia emphasized that the digital economy has served as a catalyst for economic growth and crucial driver for expediting economic recovery amidst the pandemic (Yusuf, 2021). Recognizing the importance of technology-based entrepreneurship development, the Government of the Republic of Indonesia provides support for startup development through the 1000 Startups National Movement Program. The movement provides technology-based entrepreneurship opportunities to all corners of the archipelago. This movement aims to realize Indonesia's potential to become The Digital Energy of Asia, which will be a solution to various problems using digital technology (Bambani, 2022).

The presence of Generation Z has made significant contribution to the advancement for a better Indonesia. Many university students, as part of the well-educated Generation Z, aspire to generate employment opportunities through entrepreneurial endeavors (Asmuruf, T.A & Soelaiman, 2022). Entrepreneurial activities are generally well-received among Generation Z (Chillakuri, 2020; Otieno & Nyambegera, 2019). Generation Z is predicted to exhibit a more pronounced entrepreneurial spirit compared to prior generations (Chillakuri & Mahanandia, 2018). Research by the IDN Research Institute in 2019 showed that 69.1% of Indonesian millennials have an interest in entrepreneurship. Unfortunately, the entrepreneurial potential of the millennial generation has not been well managed thus far. Therefore, the Indonesian Ministry of Education and Culture has designed many programs to motivate students to start businesses from an early age. These initiatives are aimed at honing students' entrepreneurial spirit and encouraging creative problem-solving (Satriadi et al., 2022).

Furthermore, the concept of technopreneurship aligns seamlessly with Generation Z as digital natives, having grown up with technological sophistication and internet access in their everyday life (Roblek et al., 2019). University students today have characteristics that are less interested in conventional businesses but tend to prioritize social media, digital networks, and digital applications for work (Susilo et al., 2019). The advancement of technology and information furnish Generation Z with numerous references to convert limitations into opportunities (Hamdi et al., 2022). The actual perspectives of Generation Z in Indonesia towards engaging in entrepreneurial activities, particularly those grounded in technology, have not yet received comprehensive investigation. Whereas, the reliance on technology in business processes is growing in Indonesia and has tremendous potential for growth in the future (Paulus, 2021). Technopreneurship business participants stands at only 0.43% of Indonesia's total number of entrepreneurs. This data highlights an existing gap in technology-driven entrepreneurship (Machmud et al., 2020). For this reason, there is still a need for many competitive technopreneurs to influence the country's economy significantly (Wibowo et al., 2022). The proportion of entrepreneurs, particularly from the younger generation, holds significance considering the substantial growth in e-commerce and the approaching Indonesia's demographic bonus in 2030 (Saputra, 2022).

This study aims to discern the inclination of Generation Z Indonesia towards technology-based entrepreneurial activities. The research employs university students to represent Generation Z because these students contemplate crucial career paths, including founding entrepreneurial ventures or working for start-ups and established enterprises. Moreover, universities foster a culture capable of shaping students' entrepreneurial passion through curricula that promote entrepreneurial initiatives. The research targets students majoring in business management and information technology. It is postulated that business management students possess managerial and entrepreneurial competencies, whereas information technology students are selected due to their expertise in technology applications. Based on a study on the curriculum applied in management and information technology departments at the top ten universities in Indonesia, it was discovered that only a few universities incorporated technology content into the management learning curriculum. On the other hand, Indonesian universities had included elements of entrepreneurship in the information technology curriculum, albeit in the form of basic knowledge.

Research on entrepreneurial intention needs to be done because entrepreneurial intention is predicted as the primary and strongest predictor to investigate a person's behavioral pattern from ideation to business creation (Travis, 2017). Higher education plays a pivotal role in introducing the required technological skills while fostering entrepreneurial attitudes to form an effective technopreneur. Entrepreneurship education is believed to cultivate entrepreneurial dispositions, skills, and competencies of students (Maresch et al., 2016). Many university students take their first foray to the entrepreneurial ecosystem within universities that offer initial support, acceleration, and incubators through entrepreneurship education (Yordanova et al., 2020). Through such courses and support, students are expected to develop a technopreneur mindset, characterized by technology understanding, creativity, innovation, and a willingness to take risks (Winarno, 2019). Entrepreneurship education provided by universities is expected to increase students' intentions for technopreneurship, thereby guiding individual endeavors toward the development and application of technology-driven business concepts (Hoque et al., 2017). This knowledge possessed by a technopreneur can become the catalyst to competitive advantage upon entry into the wider business ecosystem (Paulus, 2021). Hence, technopreneurs courses in universities play an essential role in advancement of national economic growth, as they expedite the dissemination innovative ideas and cultivate entrepreneurial intention among the younger generation (Naudé, 2010).

Therefore, the researchers feel the need to conduct a further review of the curriculum in Indonesian universities in regard to increasing students' technopreneurship intentions. This should be a concern for Indonesian government in preparing Generation Z to have entrepreneurial skills by leveraging technological advancements. Application of technology in entrepreneurship is believed to strengthen the economy and enhance Indonesia's global competitiveness. The study of entrepreneurial intention model aids in better understanding of the rationale behind individual's decision-making in their behavior (Yordanova et al., 2020). By employing the Fuzzy C-means method, this study will comprehensively delineate how Generation Z's attitude, differing across educational backgrounds, influences their entrepreneurial intention.

2. Literature Review

2.1. Technopreneurship

Previous studies define technopreneurship as part of the field of entrepreneurship, characterized by business individuals who possess technological expertise on top of creativity, innovation, dynamism, a willingness to make a difference and a lack of fear towards failure (Selladurai, 2016). Another perspective states that technopreneurship entails entrepreneurship related to the technological context by combining technological and entrepreneurial skills to revamp goods and services (Hoque et al., 2017). Technopreneurship applies technology to create added value through something innovative to compete in global business (Soomro & Shah, 2020). Distinctions can be drawn between conventional entrepreneurs and technopreneurs. For technopreneurs, market acumen must be coupled with technological expertise to ensure sustainability. Technopreneurship is an innovative application of technological developments in traditional entrepreneurial business by taking risks to make a successful product or service (Fowosire et al., 2017).

2.2. Technopreneurship Behavior of Gen Z

Generation Z, often referred to as digital natives, has grown up amidst the technological sophistication of computers and had greater accessibility to the internet compared to previous generations (Rastati, 2018). This generation Z is characterized by high creativity and innovation because they like to learn and seek experience for something new and create usefulness. Therefore, they are interested in

entrepreneurship-based activities (Chillakuri, 2020). The upbringing of Generation Z aligns with the evolution of digital technology, resulting in their inclination towards real-time communication, immediate feedback, and exploration of global diversity (Hamdi et al., 2022). The profound changes brought about by the Covid-19 pandemic have further accelerated the shift towards a digital era. With continual advances in technology and information, Generation Z is poised to utilize such growing technological innovations as a catalyst to hunt for business opportunities (Paulus, 2021).

3. Methodology

This study employs quantitative research methods through a survey conducted among university students. The population of this study was active university students in Jakarta. The samples used were students from business management and information technology majors. The selection of these samples is based upon their respective capabilities in entrepreneurship and technology. The sample selection in this study was conducted using convenience sampling technique, which is based on the researchers' ease in accessing information from respondents.

Data was collected through questionnaires in Google Forms. The study's data collection involved a total of 190 student participants. The questionnaire starts with a screening question to ensure that respondents are indeed students majoring in business management or information technology.

Table 1: Characteristics of Respondents

	Frequency	Percentage
Education Background		
Business Management	110	57.89%
Information Technology	80	42.11%
Gender		
Man	103	54.21%
Female	87	45.79%
Year Class		
1 st – 2 nd Semester	18	9.47%
3 rd – 4 th Semester	23	12.10%
5 th – 6 th Semester	112	58.94%
7 th Semester and above	37	19.47%
Family Background in Entrepreneurship		
Yes	113	59.47%
No	77	40.53%

Descriptive data of respondents in Table 1 indicates that 57.89 percent of respondents are students with a business management educational background, while 42.11 percent are information technology students. The majority of respondents are male (54.21 percent) and are currently in the 5th – 6th semester of their academic year (58.94 percent). Lastly, 59.47 percent of respondents have a family background in entrepreneurship, while the remaining 40.53 percent do not come from a family with an entrepreneurial background.

Respondents answered queries related to each indicator, assessing the likelihood of their involvement in technopreneurship-related activities. Indicators were structured by adapting the entrepreneurial intention research instrument from Linan et al (2011) to address the research question aimed at understanding the inclination of Generation Z toward technology-based entrepreneurial activities. Each statement on the indicators is filled based on the probability of the statement's relevance

to the respondents themselves. Data identification was conducted based on indicators, as detailed in the following table.

Table 2: Measurement Indicator

Indicator
X1: Keeping up with business developments based on technology
X2: Enthusiasm in using technology.
X3: Willingness to take part in entrepreneurial activity.
X4: Desire to contribute through entrepreneurship
X5: Interest in entrepreneurship based-on technology.

The choice of the model to be utilized for clustering the intentions of students in technopreneurship is crucial. One of the key components of data mining is clustering (Haqiqi & Kurniawan, 2015). Clustering is a technique that divides objects into groups based on the similarity of attributes within the given samples. According to Bezdek et al. (1984), clustering methods can be employed to generate data for testing objects as part of a decision support system.

This study will employ the Fuzzy C-Means (FCM) clustering technique for data processing. FCM is considered more efficient for analyzing fuzzy data, and its simplicity is a notable advantage of the method. Fuzzy methods, which determine data belonging to clusters, often yield improved results. The FCM method has been successfully applied in various applications (Hashemi et al., 2016).

The degree of membership for each cluster determines whether a data point is assigned to a cluster using the Fuzzy C-Means clustering technique. Logic with a fuzziness value between true and false is referred to as fuzzy logic. Problems are mapped from input to expected output using fuzzy logic. The goal of this approach is to use a function with a value between zero and one to express how similar each group member is to the others (Bezdek et al., 1984). Fuzzy logic is utilised to translate quantities that are expressed using terminologies such as "a little," "quiet," and "very."

Samples that belong to the same cluster share a significant number of characteristics with one another (Bezdek et al., 1984). Fuzzy clustering, as opposed to hard clustering, determines the degree of membership of a data point to all groups, hence a data point towards the end of the group is likely to have a low degree of membership compared to data at the group's centre. This method divides data into clusters so that data with similar qualities are put together in the same cluster, and data with dissimilar features are then sorted into other groups. Each data point's cluster centre and membership degree are repeatedly calculated, causing the cluster centre to shift to the right direction (Nayak et al., 2016).

The use of the Fuzzy C-Means approach has the benefit of robust grouping against data groups that are not evenly distributed (Bezdek et al., 1984). Because a data point may belong to more than one group depending on the degree of data membership, the fuzzy C-Means method will result in more accurate estimates (Nayak et al., 2016).

According to Elena (2013), the c-means fuzzy algorithm works in the following general manner:

- 1 Provide parameter values in the form of matrix $n \times m$ with specified dimensions to input sample data into the system for conversion into a matrix.
- 2 Specify the following inputs for the fuzzy c-means calculations:
 - a The number of clusters (k) to be formed as needed.
 - b The value of the rank/weight exponent (w).
 - c The maximum limit on the number of repetitions or iterative iterations (MaxIter).
 - d The error tolerance constraint (ξ), once reached, concludes the looping process upon achieving the desired error value.
 - e A value of 0 corresponds to obtaining the minimum value for the initial objective function ($P_0 = 0$). This function is optimized to either maximize or minimize.

- 3 The system will begin its calculations by randomly creating the first partition, and then it will determine the location of the $k:V_{kj}$ cluster centre: where $k = 1,2,...,c$ and $j = 1,2,...,m$.

$$V_{kj} = \frac{\sum_{i=1}^n ((\mu_{ik})^w * X_{ij})}{\sum_{i=1}^n (\mu_{ik})^w} \quad (1)$$

- 4 In the t^{th} iteration, the objective function is calculated:

$$P_t = \sum_{i=1}^n \sum_{k=1}^c \left(\left[\sum_{j=1}^m (X_{ij} - V_{kj})^2 \right] (\mu_{ik})^w \right) \quad (2)$$

- 5 Partition matrix change and partition matrix change U calculations.

$$\mu_{ik} = \frac{\left[\sum_{j=1}^m (X_{ij} - V_{kj})^2 \right]^{\frac{-1}{w-1}}}{\sum_{k=1}^c \left[\sum_{j=1}^m (X_{ij} - V_{kj})^2 \right]^{\frac{-1}{w-1}}} \quad (3)$$

- 6 If the condition $(|P_t - P_{t-1}| < \epsilon)$ is met at the method's conclusion, the system will terminate.

Cluster validation aim to measure the compactness, connectivity, and separation within clusters. To assess internal cluster validation, the Silhouette Index can be employed to determine the quality of clustering based on the generated results. Since the same data set's number of clusters yields a variety of evaluation values, the Silhouette Index helps to assess how well an object is positioned within a cluster. The larger the silhouette value, the better the cluster. Table 3 displays the explanation of the values for the Silhouette coefficient.

Table 3: Interpretation of Silhouette Coefficient Value

Silhouette Coefficient	Interpretation
0.71 - 1.00	The structure is strong
0.51 - 0.70	The structure is good
0.26 - 0.50	The structure is weak
≤ 0.25	Unstructured

Source: (Struyf et al., 1997)

4. Results

The calculations for fuzzy C-Means clustering are conducted using Matlab R2015a software package. The collected data reflects respondents' probabilities of responding to the assertions within each indicator. In the initial stage, researchers determined the number of clusters to group students' technopreneurship intentions as the basis for data analysis. With the following classification, it is assumed that there are three clusters to forecast students' intents for technopreneurship: C1 = interested, C2 = cautious, and C3 = lack of interest. Table 3 displays the outcomes of these three clusters' grouping.

Table 4: Percentage of Student Intention in Technopreneurship with Three Clusters

Cluster	Percentage	
	Business Management	Information Technology
C ₁ = Interested	32.73%	36.25%
C ₂ = Cautious	53.64%	33.75%
C ₃ = Lack of Interest	13.63%	30%

Table 4 showed that 36.25% of students studying information technology and 32.73% of students with backgrounds in business management were interested in technopreneurship-related activities. As for clusters with cautious intentions, 53.64% of business management students and only 33.75% of business technology students are reluctant to engage in technopreneurship activities. Additionally, for

the cluster characterized by lack of interest, 13.63% of business management students and 30% of information technology students expressed disinterest in technopreneurship activities.

The results of the clustering procedure are presented through a scatter graph visualization, as depicted in Figure 1. Cluster membership is indicated by different colors: blue represents membership in cluster 1, red represents membership in cluster 2, and green represents membership in cluster 3.

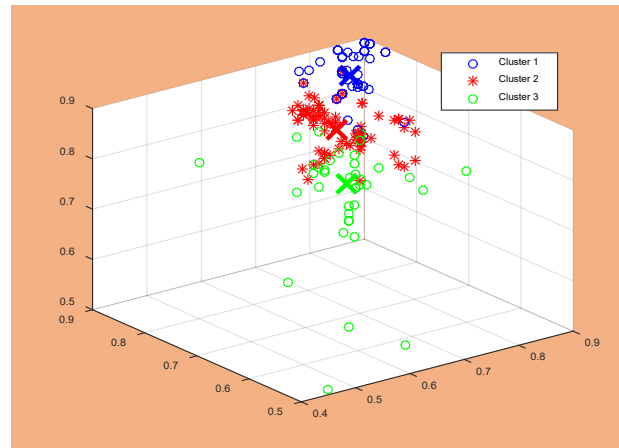


Fig. 1: Data on Student Technopreneurship Intentions with Three Clusters

This is followed by the cluster centre value calculation. Table 4 displays the cluster centre value for each indicator in each cluster. The cluster center values for each indicator within every cluster are provided in Table 5.

Table 5: Cluster Center Value Student Technopreneurship Intentions with Three Clusters

Cluster	Cluster Center Value				
	X1	X2	X3	X4	X5
C_1 = Interested	0.841828	0.866305	0.856483	0.855004	0.868681
C_2 = Cautious	0.750931	0.796828	0.80738	0.802064	0.805869
C_3 = Lack of Interest	0.71166	0.738105	0.736626	0.728843	0.729243

The cluster center value for the technopreneurship intention was established based on the observations of 190 individuals from Generation Z with scientific backgrounds in information technology and business management, as outlined in Table 4. Generation Z who are interested in following technology-based business developments (X1) has a probability of 0.8418, then the interest in implementing technology (X2) has a probability of 0.866, the willingness to carry out entrepreneurial activities (X3) has a probability of 0.8564, the desire to contribute through entrepreneurship (X4) with a probability of 0.855 and the interest in doing technology-based entrepreneurship (X5) is 0.866. The same interpretation applies to the clusters representing cautious and lack of interest.

This analysis was done using the Silhouette Index to assess the outcomes of the three clusterings in Figure 1 and Table 5. The calculated average silhouette value for the three-cluster configuration is 0.458, indicating that the final structure is showing weak correlation. To improve the findings the data points will be streamlined into two clusters to improve data placement. We shall classify both clusters as follows: C_1 = interested, and C_2 = lack of interest. Table 6 displays the outcomes of grouping using two clusters.

Table 6: Percentage of Student Intention in Technopreneurship with Two Clusters

Cluster	Percentage	
	Business Management	Information Technology
C ₁ = Interested	41.82%	51.25%
C ₂ = Lack of Interest	58.18%	48.75%

Table 6 shows that 41.82% of business management students are interested in technopreneurship-related activities and 51.25% of information technology students are interested. As for the second cluster, 58.18% of business management students stated that they were not interested in technopreneurship and 48.75% of information technology students were not interested in technopreneurship activities.

Figure 2 depicts the scatter graph visualization, with blue data points representing membership in cluster 1 and red data points indicating membership in Cluster 2.

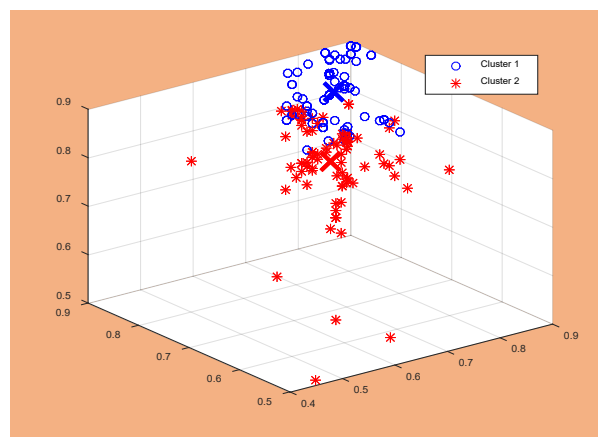


Fig. 2: Graph of grouping technopreneurship intentions with 2 clusters

Table 7: Cluster Center Value Student Technopreneurship Intentions with Two Clusters

Cluster	Cluster Center Value				
	X1	X2	X3	X4	X5
C ₁ = Interested	0.817967	0.849161	0.842885	0.843339	0.851615
C ₂ = Lack of Interest	0.728088	0.760399	0.765219	0.753648	0.755866

Based on grouping with 2 clusters in table 7, it is known that students who are interested are interested in following technology-based business developments (X1) by 0.8179. A probability of 0.8491 students are interested in implementing technology (X2) and a probability of 0.8428 have a willingness to carry out entrepreneurial activities (X3). The indicator regarding the desire to contribute through entrepreneurship (X4) is known to have an interest of 0.8433 and a probability of 0.8516, it is stated that Generation Z has an interest in doing technology-based entrepreneurship (X5). The interpretation of the probability for the second disinterest cluster is identical to that of cluster 1. Through the Silhouette Index testing, an average silhouette value of 0.514 was obtained when applying Fuzzy C-Means clustering with two clusters, resulting in an improvement of the final structure. Based on the validation results in Table 8, it can be confirmed that the cluster for student technopreneurship intentions in the two-cluster approach has a good structure.

Table 8: Cluster validation using Silhouette Index

Number of Cluster	Silhouette Index	Interpretation
3	0.458	The structure is weak
2	0.514	The structure is good

The results of this study differ from previous research conducted by Hutasuht & Aditia (2021), which described entrepreneurship portraits in Indonesian students with very high scores. That study also proved that economic students have higher entrepreneurial intentions than non-economic students. The difference in results could be attributed to the previous research being more general entrepreneurial intentions. However, different results are obtained when the research is applied more specifically, focusing on technology-based entrepreneurship. This study indicates that the interest in technopreneurship among Indonesian students is not exceptionally high. This is evident as the percentage of interest in technopreneurship is 41.82% for business management students and 51.25% for information technology students. The research results also demonstrate that technopreneurship intention is more favored by students with an educational background in information technology than business management students.

5. Discussion

Data is grouped into two clusters shows a decent structure based on the outcomes of fuzzy C-Means clustering. This study classifies the entrepreneurial aspirations of Generation Z into two distinct cluster: Cluster 1, consisting of those interested in technopreneurship, and Cluster 2, comprising those who do shows lack of interest. The clustering results underscore the divergence in technopreneurship aspirations among Generation Z individuals with backgrounds in information technology and business management. 41.82% of students with backgrounds in business management are interested in technopreneurship, according to data processing results. Technopreneurship is appealing to 51.25% of students with backgrounds in information technology. This demonstrates that students with prior information technology knowledge are more engaged and confident in their capacity to engage in technopreneurship than students with background in management business.

There remains a lack of available information on technology-based entrepreneurship for students with business management background. However, it can be postulated that technology literacy, defined as the capacity to use technology effectively, cannot be isolated from technopreneurship (Hidayat & Yunus, 2019). Technology literacy may become increasingly necessary because of the increasing use of technology in business, such as automation and Internet of Things. Enhancing technology literacy, which refers to the ability to use technology effectively, cannot be separated from entrepreneurship in the current era of globalization. The implementation of a curriculum that supports entrepreneurship also needs to be focused on. In practice, the failure rate of technology-based startups in Indonesia remains high. There are many factors that can contribute to such failures, including the lack of careful business planning that fails to address market changes and consumer needs, as well as a lack of knowledge in business operations management, marketing strategies, and financial management, all of which can impact overall business growth. Therefore, the implementation of a curriculum that supports entrepreneurship activities should be a concern for policymakers. The authors opine that first stage in creating technopreneurs in Indonesia is to ingrain technological literacy on top of traditional business competencies, especially important to adapt to the evolving digital landscape in the post-pandemic new normal.

The author acknowledges that there are limitations to the study methodology, such as the limited sample selection within specific regions in Indonesia, resulting in a relatively small sample size. To provide a more substantial contribution, it is recommended that future research considers a broader

sample scope to enable Generation Z's views on technopreneurship intention. The researcher also suggests exploring other clustering methods in future studies.

6. Conclusion

Technopreneurship refers to business models that leverage technology to produce innovative and competitive products. It cannot be denied that technopreneurship is necessary to contribute to more dynamic social and economic growth. The application of the Fuzzy C-Means algorithm enabled insightful clustering of Generation Z students based on their technology-oriented entrepreneurial aspirations. The findings present realistic perspectives, revealing Indonesian Gen Z still lacks ubiquitous interest in technopreneurship, countering assumptions as digital natives. The study's findings that students with an education background in information technology are more inclined to pursue technopreneurship than those with a background in business management. The results underscore the importance of improving technology related components in entrepreneurship curriculums to better prime Generation Z as prospective technopreneurs and contribute to dynamic emerging digital economies.

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