Understanding indigenous entrepreneurship in Malaysia: A gender perspective

Nur Atiqah Rochin Demong[a*], Erne Suzila Kassim[b], Irwan Ibrahim[c],
Norol Hamiza Zamzuri[d], Emi Normalina Omar[e], Siti Ayu Jalil[f]

[abcde]*Faculty of Business and Management, Universiti Teknologi MARA Puncak Alam, Malaysia*
[f]*MITRANS, Universiti Teknologi MARA Shah Alam, Malaysia*

ARTICLE INFO

ABSTRACT

Indigenous entrepreneurship has been an important part of the Malaysian economy for centuries. It is a key factor in the economic development of the country and is usually associated with traditional or family-owned businesses. This article investigates the many forms of indigenous entrepreneurs' type of business and the gendered attitudes influencing entrepreneurship. Traditional gender roles in indigenous communities, such as males handling hunting, fishing, and trade, have had a substantial influence on women's access to resources and business prospects. Thus, it is essential to explore the gendered perspective of indigenous entrepreneurship towards type of business classification that are grouped into four categories namely food, non-food, retail and service industry. WEKA software was used to analyze the dataset downloaded from department of statistic of Malaysian government database platform with 1000 instances and seven attributes. The findings depicted that the major type of business dominated was retail industry followed by food industry, service industry and non-food industry. Both male and female dominate the similar type of business which refer to retail industry. For food industry show similar patterns for both genders. However, for non-food and service industry there was a bigger portion for male as compared to female. The gendered perspective of indigenous entrepreneurship, and the implications for the type of business that indigenous entrepreneurs start, is an important factor to consider when planning for economic development. By creating an environment that is supportive of all types of businesses, the Malaysian government can ensure that indigenous entrepreneurs are able to start businesses that can contribute to the economic growth and development of the country.

1.   Introduction

Indigenous entrepreneurship plays an important role in the economic development of Malaysia. The gendered perspective of indigenous entrepreneurship has been studied extensively in Malaysia. Studies have found that women entrepreneurs tend to have different motivations than men when it comes to starting businesses (Solesvik et al., 2019). For example, women are more likely to start businesses out of necessity than out of opportunity, whereas men are more likely to be motivated by profits and financial gains (Jafari-Sadeghi, 2020). This difference in motivations has implications for the type of businesses that these entrepreneurs are likely to start. Studies have also found that women are more likely to start businesses that are related to the care economy, such as childcare, home help services, and care for the elderly (Power, 2020). These types of businesses are often seen as "less lucrative" or "low-status" compared to businesses in the manufacturing or technology sectors, which are traditionally dominated by male entrepreneurs (Xheneti et al., 2019). This is because these care-related businesses are often viewed as "women's work" and are not seen as having the same potential for growth and financial returns as other types of businesses.

Indigenous entrepreneurship is a vital source of economic development in many countries worldwide. Indigenous business models have been in existence for centuries, with traditional models focusing on barter and trade, family and communal ownership, and sustainability and resource management (Ensign, 2023). In recent years, modern indigenous business models have emerged, including incorporation and company structures, social enterprise and impact investing, and partnerships and joint ventures (Morales et al., 2021). However, indigenous entrepreneurs face numerous challenges, including historical and ongoing colonization and marginalization, limited access to financial resources and business support, and cultural and language barriers (Parhankangas & Colbourne, 2023). This paper explored the different types of indigenous business types and the gendered perspective factors affecting indigenous entrepreneurship for economic development. Indigenous entrepreneurship is defined as the entrepreneurial activity of indigenous peoples, which is often based on the traditional knowledge and culture of the community (Scheyvens et al., 2021). Indigenous entrepreneurs in Malaysia come from various backgrounds, including the Orang Asli, the coastal Bajau, and the Kadazan-Dusun (Abdullah et al., 2021). Indigenous entrepreneurs in Malaysia are often involved in a variety of business activities, ranging from agriculture, fishing, and small-scale manufacturing to retail and service-based businesses (Hanafiah et al., 2023).

Research has shown that there are gender-based differences in the type of businesses established by indigenous entrepreneurs in Malaysia (Chow & Hock, 2021). Women are more likely to be involved in agricultural and small-scale manufacturing businesses, while men are more likely to be involved in fishing, retail, and service-based businesses (Mkuna et al., 2021). This is likely due to the traditional gender roles that are often observed in indigenous communities in Malaysia, where women are often expected to be involved in domestic activities such as agricultural and small-scale manufacturing (Jabeen et al., 2020), while men are expected to be involved in activities such as fishing and retail (Jang et al., 2021). In addition, research has also shown that women are more likely to be involved in informal businesses, while men are more likely to be involved in formal businesses (Aljarodi et al., 2022). This is likely due to the fact that women often lack access to formal business opportunities, as well as the traditional gender roles that are often observed in indigenous communities in Malaysia.

The type of business that indigenous entrepreneurs start is an important factor in economic development. In order to maximize economic growth and development in Malaysia, it is important for the government to create an environment that is conducive to the growth of all types of businesses, including those that are traditionally seen as "low-status" or "women's work" (Boshmaf & O'Keeffe, 2022). This includes providing access to capital and other resources, as well as creating an environment that is supportive of entrepreneurship. The gendered perspective of indigenous entrepreneurship in Malaysia has been largely overlooked in the research on economic development. This has resulted in an incomplete understanding of the type of businesses that are established by indigenous entrepreneurs and their contribution to the

Malaysian economy (Simpong et al., 2022). Thus, it is important to study the gendered perspective of indigenous entrepreneurship towards type of business classification for economic development in Malaysia in order to facilitate economic development.

Economics and businesses research area uses WEKA tool for solving many data mining and analysis applications. WEKA is an abbreviation for Waikato Environment for Knowledge Analysis, which was established at the University of Waikato in New Zealand in 1997 and is publicly available at http://www.waikato.ac.nz/ml/weka and written in Java. WEKA may be utilised at a number of different levels and has modules for data categorization and prediction accuracy (Attwal & Dhiman, 2020). The major contribution of this paper was to extract useful classification machine learning algorithms accuracy prediction based on dataset extracted from department of statistic, Malaysia platform, compare five different machine learning algorithms that produce high accuracy on the selected dataset and identify the best machine learning algorithms for classification or prediction of type of business among indigenous entrepreneurs based on gender perspectives. Several different machine learning algorithms from two groups namely Bayes and Rules have been selected to perform the analysis.

2.   Related work

Malaysia is a country rich in cultural and ethnic diversity and is home to a number of indigenous communities, each with its own unique cultural identity and economic practices. Indigenous entrepreneurs form an important part of the Malaysian economy, providing a range of services and goods to the population. In recent years, the Malaysian government has taken steps to promote indigenous entrepreneurship through various initiatives and policies (Isa et al., 2021). However, the lack of empirical data has prevented a detailed analysis of the gender perspective on indigenous entrepreneurship and its economic implications for the country.

Understanding the gendered perspective of indigenous entrepreneurship in Malaysia is important for the development of type of business classification. Business classification is an important tool for policymakers, as it allows them to better understand the type of businesses that are established by indigenous entrepreneurs and their contribution to the Malaysian economy (Derani et al., 2023). Type of business classification can also help to identify potential areas of intervention, such as providing access to formal business opportunities for both type of genders (Osunmuyiwa & Ahlborg, 2019). Indigenous people have been engaged in business activities for centuries, with traditional business models focusing on barter and trade, family and communal ownership, and sustainability and resource management (Ensign, 2023). Barter and trade were the primary means of exchange among indigenous communities, with goods and services being exchanged for other goods and services (Finau & Scobie, 2022). Family and communal ownership were also prevalent, with families and communities owning and managing businesses collectively (Tretiakov et al., 2020).

Indigenous entrepreneurship has gained increasing attention in recent years as a means of promoting economic development and preserving cultural traditions. However, little attention has been paid to the gendered dimensions of indigenous entrepreneurship, particularly with regards to the types of businesses that are preferred by Indigenous women entrepreneurs (Croce, 2020). Traditional gender roles have played a significant role in shaping indigenous entrepreneurship. Historically, men and women in indigenous societies have had distinct roles and responsibilities, with men often being responsible for hunting, fishing, and trading, while women were responsible for gathering, processing food, and raising children (Bonvillain, 2020). These gendered roles have had a significant impact on access to resources and opportunities for entrepreneurship. For example, women may have limited access to capital and resources due to the gendered division of labor, which can make it more difficult for them to start and grow businesses (Kabeer, 2021). The gendered perspective of indigenous entrepreneurship towards type of business is a fascinating topic that has been gaining attention in recent years. Indigenous entrepreneurs represent a unique group of people

who are often neglected or overlooked in the business world (Onwuegbuzie & Mafimisebi, 2021), yet they create jobs, stimulate economic growth, and bring innovative ideas and services to their communities. Indigenous entrepreneurship is an important way for indigenous people to gain economic independence, create wealth, and have a positive impact on their communities.

Indigenous entrepreneurs face particular challenges as a result of their unique cultural, social, and economic circumstances. Many indigenous entrepreneurs lack access to capital, lack business acumen, and often lack access to resources and networks that would help them succeed (Parhankangas & Colbourne, 2023). In addition, indigenous entrepreneurs may face discrimination and prejudice based on their race or culture (Shirodkar, 2021). Indigenous entrepreneurs tend to pursue different types of businesses, depending on the type of community they live in. In rural and remote indigenous communities, businesses tend to be focused on traditional activities such as hunting, fishing, and gathering (Micelotta, 2022). In urban indigenous communities, businesses tend to focus on services, such as technology, media, and consulting (Akbar & Hallak, 2019). Despite the fact that indigenous women are more likely to start businesses than indigenous men, indigenous women are vastly underrepresented in the business world (Cukier et al., 2022; Parmenter & Drummond, 2022).

It is essential to understand the unique challenges and opportunities faced by indigenous entrepreneurs in order to provide them with the support and resources needed to succeed. Research must be conducted to understand the experiences of indigenous women entrepreneurs, the types of businesses they pursue, and the challenges they face. The gendered perspective of indigenous entrepreneurs in Malaysia regarding the type of business for economic development can be influenced by various factors, including cultural norms, societal expectations, and individual aspirations (AlMehrzi et al., 2023). It is essential to recognize that gender perspectives are not static and can vary widely among individuals within indigenous communities. To promote economic development among indigenous entrepreneurs in Malaysia, it's important for policymakers and support organizations to be inclusive, addressing the specific needs and aspirations of both male and female entrepreneurs while respecting cultural diversity and gender equality. Additionally, providing access to education, training, and resources can help empower indigenous entrepreneurs to choose and succeed in the businesses that align with their goals and abilities.

3.   Methodology

Popular open-source data mining tool, WEKA was used to carry out the experimentations and implementation of the data analysis to classify the accuracy of the dataset by applying different machine learning algorithms approaches and top five accuracy of the machine learning algorithms were selected for comparison. WEKA data mining techniques used were Explorer and Experimenter. Explorer features such as classify and visualize were applied to the dataset for the classification analysis. Experimenter were used to open the csv file downloaded to be readable by explorer for further analysis. Five machine learning algorithms that produces highest accuracy were selected for the classification or prediction of the type of business among indigenous entrepreneurs. These five algorithms were used to represent, utilize and learn the statistical knowledge to achieve significant results.

3.1   Datasets

For classification of machine learning algorithms, a dataset extracted from department of statistic, Malaysia at https://beta.data.gov.my/data/zh_CN/dataset/senarai-usahawan-orang-asli-mac-2018. As shown in Appendix, Figure 1 and 2 shows a description of indigenous entrepreneur types of business in Malaysia for the year of 2018 that contains seven attributes and 1000 instances both in MS Excel and WEKA viewer respectively. Table 1 describes the attributes of dataset which presented in Appendix (Figure 1 and Figure 2).

Table 1: Description of dataset attributes.

Attributes	Description	Data type	Label
Year	The current year of data collected	Nominal	2018
Gender	Gender of the respondent	Nominal	Male
			Female
State	State of the respondent	Nominal	Johor, Kelantan, Melaka, Negeri Sembilan, Pahang, Perak, Selangor
District	District belongs to the state	Nominal	58 districts listed in the database
Village	Village of the respondent	Nominal	282 different villages listed in the database
Parliament	Parliament responsible for the village or district	Nominal	71 distinct values listed in the database
Type of Business	Type of business that the entrepreneurs currently registered	Nominal	Food Industry
			Non-food Industry
			Retail Industry
			Service Industry

4. Experiment and Results

The experiment using the data mining machine learning algorithms classifiers were used to display the results. All machine learning from bayes and rules group of classification features have been tested to the selected dataset and the top five accuracy of the machine learning algorithms have been selected for further analysis such as comparison and precision levels to measure the performance of the machine learning classifiers. The dataset has been divided into two different subsets of data based on gender for further analysis.

4.1 Exploratory Data Analysis

Exploratory data analysis was performed to gain insights of the selected dataset by creating the visualizations like histograms to understand the data's distribution and relationships. The objective of the analysis is to understand the economic implications of indigenous entrepreneurship in Malaysia, with a focus on the differences between male and female entrepreneurs. The data used in this analysis was obtained from the Malaysian Department of Statistic. The dataset consists of information on indigenous entrepreneurs in Malaysia, including demographic data and type of business. The analysis was conducted using descriptive statistics with the aim of understanding the differences between male and female entrepreneurs in Malaysia. As shown in Figure 3 until Figure 6 in Appendix section, there were four different types of businesses conducted by indigenous entrepreneurs namely retail industry represented in turquoise colour, food (blue), retail (cyan) and service industry (red). The result shows that majority of the indigenous entrepreneurs dominate the retail industry type of business with 450 occurrences (45%), followed by food industry 222 (22.2%), service industry 202 occurrences (20.2%) and non-food industry 126 occurrences (12.6%). Figure 4 depicts the screenshot of gender attributes which reflect the main objective of this study to discover gender perspectives that will influence the type of business among indigenous entrepreneur's graphical user interface, the Explorer. The results of the analysis show that the majority of indigenous entrepreneurs in Malaysia are male. Of the total number of entrepreneurs, 62% are male and 38% are female. This gender disparity is also reflected in the type of businesses, with the majority of businesses owned by male entrepreneurs being in the retail sector with 233 occurrences (37.6%), followed by service 171 occurrences (27.6%), service 153 occurrences (24.7%) and non-food 63 occurrences (10.1%) as shown in Figure 5. Similarly, as shown in Figure 6, the majority of businesses owned by female entrepreneurs are in the retail sector with 217 occurrences (57.1%), but in contract followed by food 69 occurrences (18.1%), non-food 63 occurrences (16.6%) and service 31 occurrences (8.2%).

This exploratory data analysis of a dataset related to gender perspective of indigenous entrepreneurship towards type of business classification has revealed important differences between male and female entrepreneurs in Malaysia. The analysis has shown that both male and female entrepreneurs are more likely to own businesses in the retail industry. This suggests that indigenous entrepreneurs in Malaysia are at a disadvantage when it comes to exploring other areas of economic development. Therefore, it is important for the Malaysian government to take steps to promote economic opportunities for indigenous entrepreneurs in order to ensure inclusive economic development in the country.

In conclusion for the exploratory data analysis, as shown in Figure 7, overall attributes were dominated by retail industry represented with cyan color either in 7 different states, districts, or parliaments.
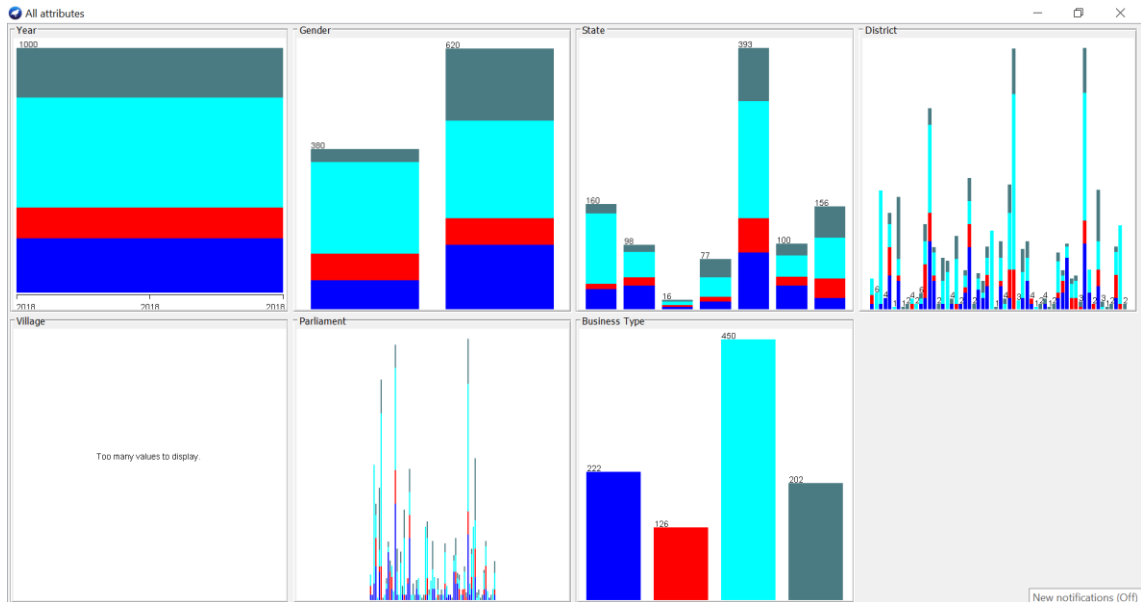
Figure 7: Screenshot of all attributes related to type of business among indigenous entrepreneurs.

5.   Classification Machine Learning Algorithms

As the world becomes increasingly connected and technology becomes more advanced, it is becoming increasingly important to consider the gender perspective when it comes to economic development in Malaysia. With the rise of machine learning algorithms, it is possible to gain insight into how different types of businesses can benefit from a gender perspective. By understanding the different types of businesses, their potential for economic growth, and how they might be affected by gender-based differences, organizations in Malaysia can better understand how to create an equitable and profitable environment for all. The data was then analyzed using machine learning algorithms. The algorithms used included BayesNet and NaiveBayes from bayes group and Decision Table, OneR and PART from rules group of WEKA classifiers. Figure 8 until Figure 14 shows the accuracy of these five algorithms showing good accuracy ranges from 70.6% until 84.3% for in overall. Table 2 shows the summary of accuracy and precision percentage for the five selected machine learning algorithms divided into three categories namely, overall dataset, male and female for further analysis. For male category, the accuracy ranges from 72.6% until 86.2% while for female, the accuracy ranges from 79.7% until 90.3%. In overall, all five algorithms fit with the selected dataset. These algorithms can help to identify patterns in data that can provide insight into how different types of businesses are affected by gender-based differences. By understanding these

differences, organizations can better understand how to create an environment that is equitable and beneficial for all.

Table 2: Summary of Classification Results.

Category	Group	Algorithms	Accuracy	Precision (%)
Overall	Bayes	BayesNet	72.8	74.1
		NaiveBayes	70.6	71.4
	Rules	Decision Table	83.5	84.5
		OneR	80.9	82.6
		PART	83.9	84.7
Male	Bayes	BayesNet	76.5	77
		NaiveBayes	72.6	73.2
	Rules	Decision Table	83.5	83.6
		OneR	85.3	86.2
		PART	77.7	80.4
Female	Bayes	BayesNet	82.4	83.5
		NaiveBayes	79.7	80.7
	Rules	Decision Table	89.7	90.3
		OneR	89.5	89.5
		PART	83.9	84.6

5.1   Bayes Network (BayesNet)

Bayes Network(BayesNet) learning using various search algorithms and quality measures. Bayes Network learning algorithms are a type of machine learning algorithm that utilizes probabilistic models to identify patterns and relationships in data. These algorithms use a set of variables, or nodes, to capture the relationships between the variables (gender, state, village, parliament, year, district) and the target class (type of business). The Bayes Network learning algorithms have been used in a variety of applications, including classification, clustering, and prediction. The algorithms can identify patterns and relationships between the variables used and the target class as shown in Figure 8 with the accuracy of 72.8%. This could provide valuable insight into the gender perspective of indigenous entrepreneurs and their contribution to economic development in Malaysia.
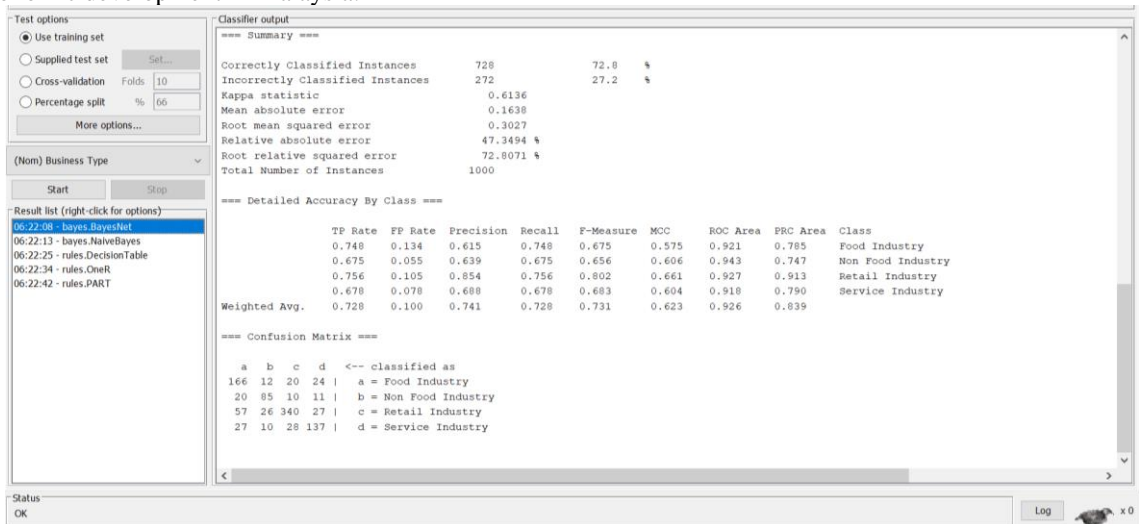
Figure 8: Screenshot view of BayesNet algorithm from bayes group.

5.2   NaiveBayes

Naive Bayes is a machine learning algorithm that is often used in the field of data mining and predictive analytics. It is based on the Bayes' theorem, which provides a method for calculating the probability of an event occurring, given certain conditions. This algorithm is popularly used for classification tasks, where the goal is to determine the probability of a given outcome (type of business), given a set of input data points (year, gender, state, district, village and parliament). The results of the analysis show that the Naive Bayes algorithm was able to accurately classify the gender perspective of indigenous entrepreneurs in Malaysia, as it relates to their type of business. The algorithm was able to accurately classify the gender perspective in over 70.6% of cases as shown in Figure 9. This demonstrates the potential of this algorithm in helping to better understand the gender perspective of indigenous entrepreneurs in Malaysia, as it relates to their type of business.
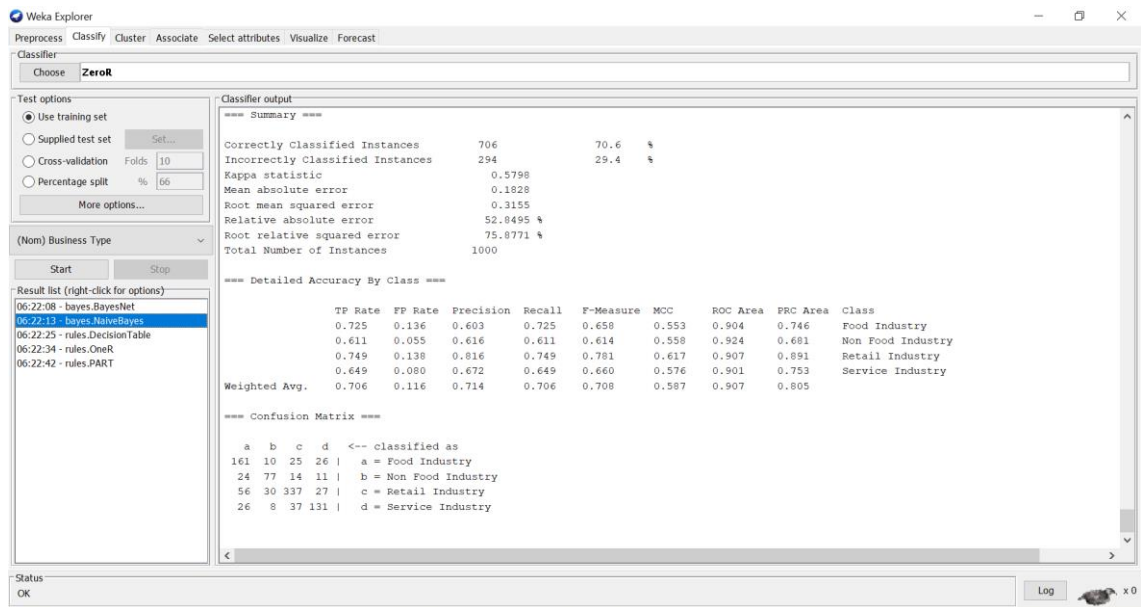
Figure 9: Screenshot view of NaiveBayes algorithm from bayes group.

5.3   Decision Table

Decision table learning algorithms involve the use of data sets that contain information about the decision-making process of individuals, such as their gender and the type of business they are engaged in. By analyzing this data, the algorithms can identify patterns in the decision-making process and classify them accordingly as shown in Figure 10 with the accuracy of 83.5%. This helps in understanding the gender dynamics of the indigenous entrepreneurs in Malaysia and how their activities contribute to the nation's economy.
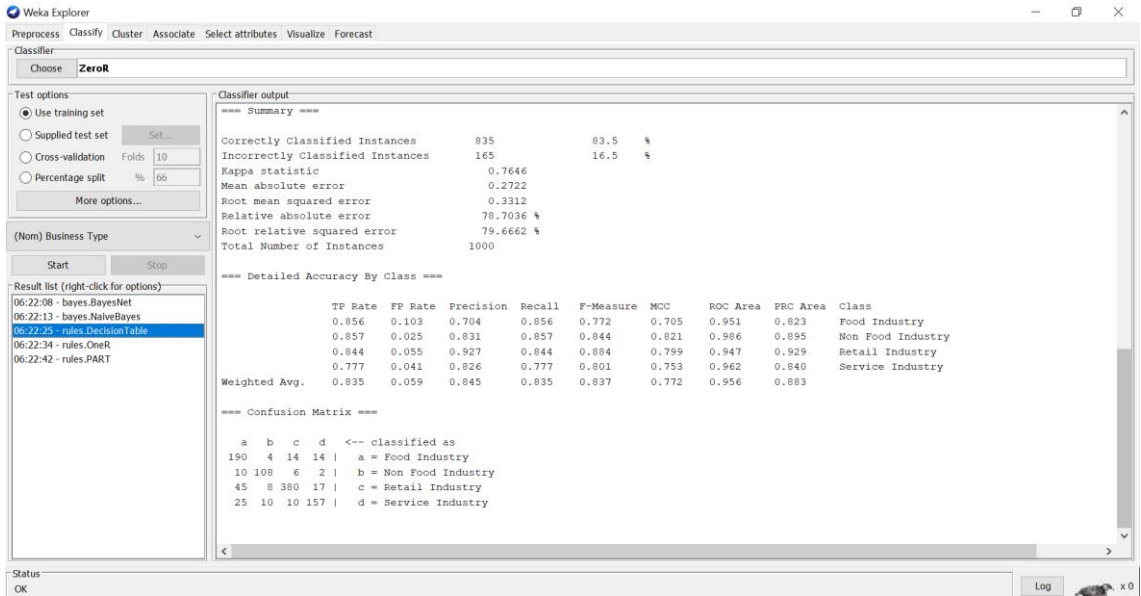
Figure 10: Screenshot view of Decision Table algorithm from rules group.

5.4   OneR

The OneR learning algorithms use data from a set of independent variables to classify a new set of data. This method allows for a more comprehensive analysis of the gender perspective of the type of business among indigenous entrepreneurs. As shown in Figure 11, the accuracy of 80.9% showing that this model is good and fit to classify the gender perspective of the type of business among indigenous entrepreneurs.
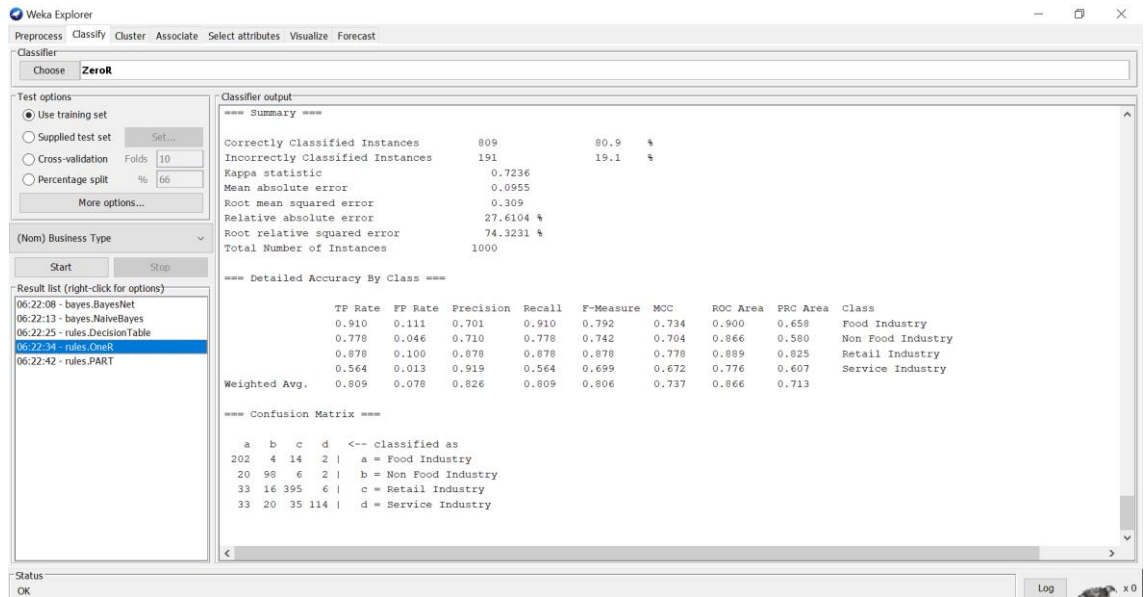

Figure 11: Screenshot view of OneR algorithm from rules group.

5.5   PART

PART (Partial C4.5 Decision List) class for generating a PART decision list. This uses a separate and conquer approach to build a partial C4.5 decision tree in each iteration and makes the 'best' leaf into a rule. The PART class can help to identify the gender perspectives and create a decision list that will help to ensure that the decisions made are the best for the business's success. As shown in Figure 12, the accuracy of the dataset using this algorithm produced 83.9% which is also good and fit model.
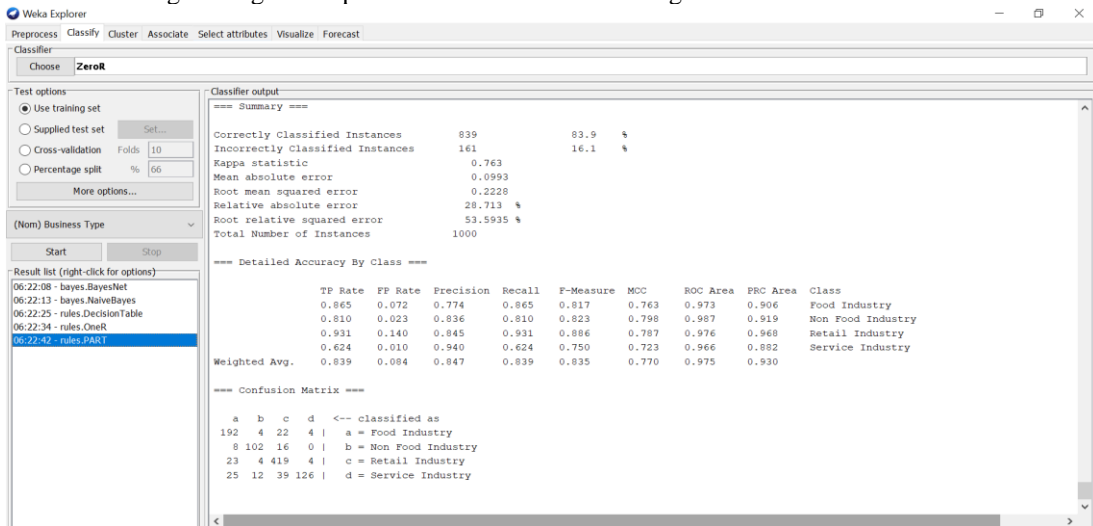
Figure 12: Screenshot view of PART algorithm from rules group.
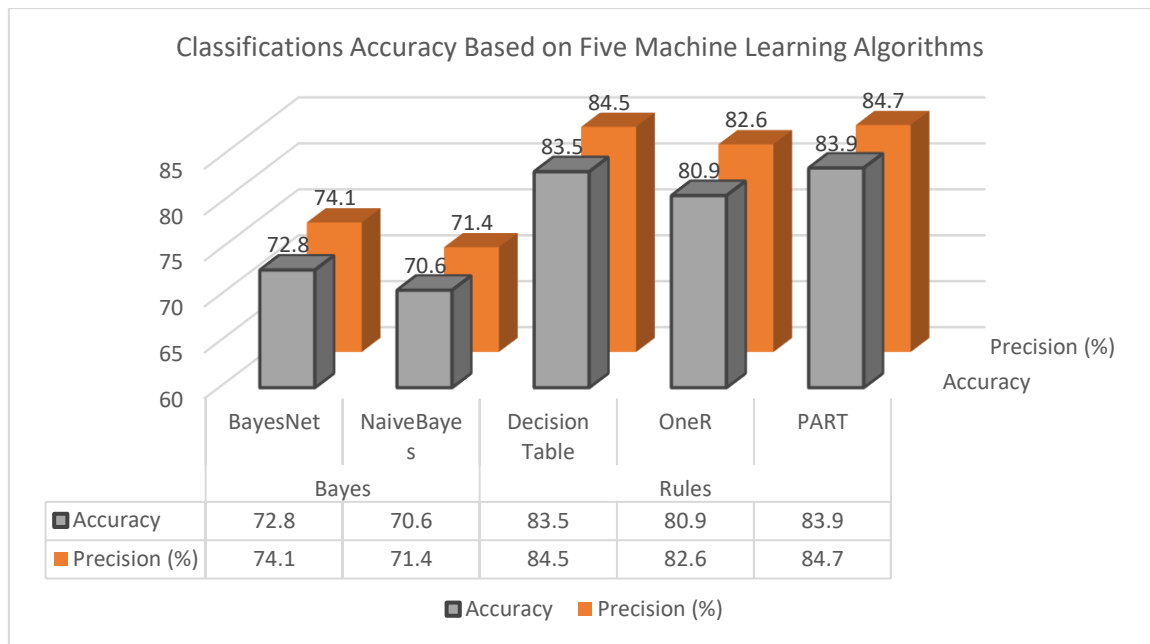
Figure 13: Classification accuracy based on top five machine learning algorithms accuracy for overall dataset

Machine learning algorithms classification accuracy based on gender

		Male					Female			
		Bayes		Rules			Bayes		Rules	
		BayesNet	NaiveBayes	Decision Table	OneR	PART	BayesNet	NaiveBayes	Decision Table	OneR	PART
■	Precision (%)	77	73.2	83.6	86.2	80.4	83.5	80.7	90.3	89.5	84.6
■	Accuracy	76.5	72.6	83.5	85.3	77.7	82.4	79.7	89.7	89.5	83.9

■ Precision (%)   ■ Accuracy
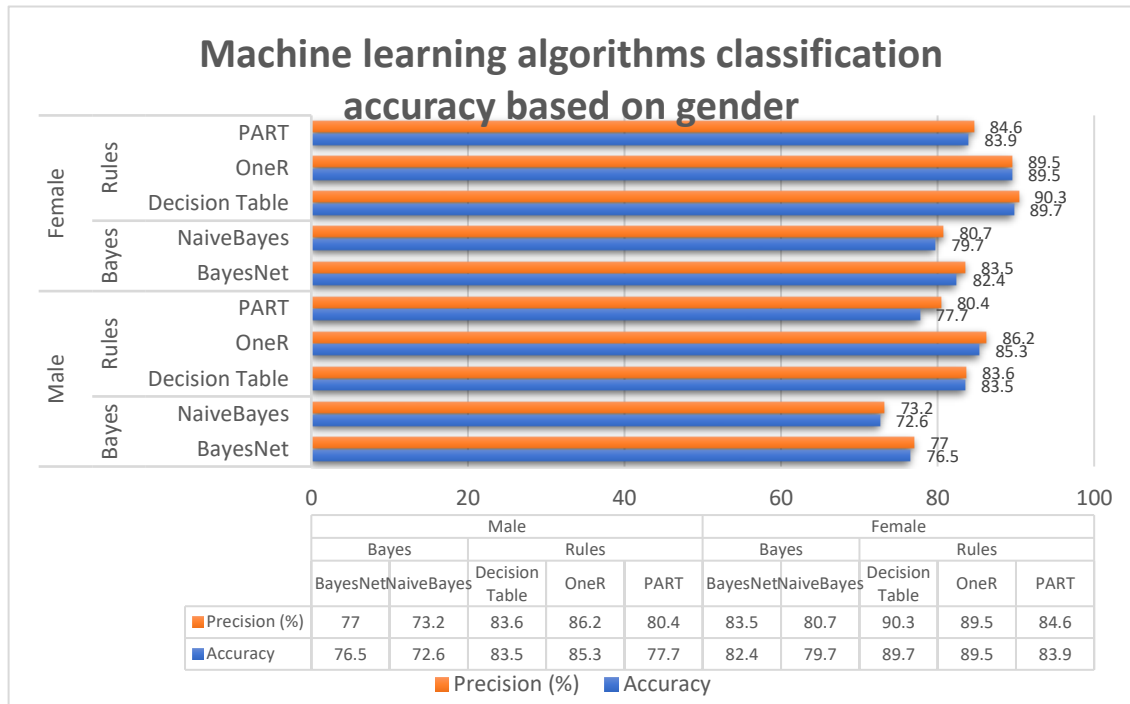
Figure 14: Classification accuracy based on top five machine learning algorithms accuracy for male and female dataset.

Based on Figure 14, it shows that female dataset has better accuracy as compared to male and both categories generate good accuracy.

6.   Discussion and Conclusion

The main objective of this paper is to classify the type of business based on gender perspectives using WEKA data mining tool. Five machine learning algorithms have been selected from two groups namely bayes and rules the generate highest accuracy among other machine learning algorithms. Retail industry type of business dominated the result for both male and female followed by food industry, service and non-food industry respectively. The world's increasing interconnection and technological improvement need the inclusion of gender views in economic development. Machine learning algorithms such as BayesNet, NaiveBayes, Decision Table, OneR, and PART can help firms understand how to gain from a gender perspective. Organizations may build an equal and prosperous environment for everybody by acknowledging these variances. The accuracy of these algorithms spans from 70.6% to 84.3%, with male categories doing better (72.6% to 86.2%) and female categories performing better (79.7% to 90.3%). These algorithms may find trends in data that give insight into how gender inequalities effect various industries, allowing organizations to establish an equitable and advantageous workplace. The gendered perspective of indigenous entrepreneurship has been a topic of increasing interest in both academic and practical fields.

Food businesses are those that produce, process or distribute food products. This includes restaurants, cafes, fast-food outlets, and other food-related businesses. Research has found that indigenous women are more likely to engage in food-related businesses than Indigenous men (Phillipps, 2021). This is likely due to the traditional role of women in Indigenous communities as primary providers, which includes food production and preparation. Non-food businesses are those that do not involve food products. This includes

businesses related to manufacturing, construction, agriculture, and other non-food related activities. Studies have found that indigenous men are more likely to engage in non-food related businesses than Indigenous women (Leakey et al., 2022). This is likely due to the traditional role of men in indigenous communities as protectors and providers of resources, such as land, which can be used for non-food businesses.

Retail businesses are those that involve the sale of goods and services to customers. This includes retail stores, online stores, and other types of businesses that involve selling products to customers. Research has found that indigenous women are more likely to engage in retail businesses than indigenous men (Yap et al., 2023). This is likely due to the traditional role of women in Indigenous communities as caretakers and traders, which includes the selling of goods and services. Service industries are those that involve providing services to customers. This includes businesses related to health care, education, tourism, and other services. Studies have found that indigenous men are more likely to engage in service industries than Indigenous women (Schirle & Sogaolu, 2020). This is likely due to the traditional role of men in Indigenous communities as leaders, which includes providing services to the community.

The implications of exploring the gendered perspective of indigenous entrepreneurship are significant. For example, it provides insight into the types of businesses created and operated by Indigenous people, which can help identify potential opportunities for business growth. Additionally, understanding the traditional roles of women and men in Indigenous communities can help inform policies and practices that support ndigenous business development and growth. Overall, exploring the gendered perspective of indigenous entrepreneurship has important theoretical implications for the four types of business classification that are grouped into food, non-food, retail and service industries. This research can help identify potential opportunities for business growth, while also providing insight into the traditional roles of women and men in indigenous communities.

The gendered perspective of indigenous entrepreneurship in Malaysia is an important but largely neglected area of research. This has resulted in an incomplete understanding of the type of businesses that are established by indigenous entrepreneurs and their contribution to the Malaysian economy. Thus, it is important to study the gendered perspective of indigenous entrepreneurship towards type of business classification for economic development in Malaysia. Type of business classification can help to identify potential areas of intervention, such as providing access to formal business opportunities for women, which can help to facilitate economic development. The application of WEKA can be extended further to other economic field of indigenous community with different attributes or determinants contributing to their economy such as demographic profiling of the community. Furthermore, other variables such as external and internal environments of business also very useful for data analysis to gain insightful information.

Indigenous entrepreneurship has unique challenges and opportunities, especially when it comes to type of business classification. Indigenous communities around the world have traditionally been marginalized and excluded from the global economy, leaving them with limited access to capital, resources, and business opportunities (Bennett et al., 2021). Despite this, many indigenous communities have developed successful businesses and contributed to their local economies. When it comes to type of business classification, indigenous entrepreneurs face a unique set of challenges. This is due to the fact that Indigenous communities have a long and complex history of being excluded from traditional economic systems (Hoicka et al., 2021). As a result, indigenous entrepreneurs often have different needs and perspectives than other entrepreneurs. The challenge of type of business classification for indigenous entrepreneurs is to develop a system that is both comprehensive and appropriate for their particular needs. While traditional business classification systems typically categorize businesses into four categories (food, non-food, retail, and service industry), this isn't necessarily the best approach for indigenous entrepreneurs.One way to address this challenge is to explore the gendered perspective of indigenous entrepreneurship towards type of business classification. By taking a gendered approach to business classification, indigenous entrepreneurs can identify and address the unique needs and perspectives of their communities.For

example, indigenous women may be more likely to pursue businesses in the service industry, while indigenous men may be more likely to pursue retail and non-food businesses (Gupta et al., 2023). By taking a gendered approach to business classification, indigenous entrepreneurs can identify opportunities and resources that are more tailored to their particular needs.

In addition, exploring the gendered perspective of indigenous entrepreneurship towards type of business classification can also help indigenous entrepreneurs identify potential sources of funding and resources. For example, indigenous women may be more likely to receive funding from public and private organizations that focus on women's economic empowerment (Field et al., 2021). By understanding the gendered perspective of indigenous entrepreneurship, indigenous entrepreneurs can identify potential sources of funding and resources that could help them meet their business goals. Overall, exploring the gendered perspective of indigenous entrepreneurship towards type of business classification can help indigenous entrepreneurs identify opportunities and resources that are tailored to their particular needs. By doing so, indigenous entrepreneurs can gain access to capital and resources that could help them create successful businesses and contribute to their local economies.

By leveraging machine learning algorithms, organizations can gain insight into how different types of businesses can be affected by gender-based differences. This information can help organizations in Malaysia to create an equitable and profitable environment for all. By understanding the different types of businesses and the role they play in the Malaysian economy, and by understanding how gender-based differences can affect different businesses, organizations in Malaysia can create policies that promote economic growth while also promoting gender equality. For future research, in addition to helping to identify differences between businesses, machine learning algorithms can also be used to identify opportunities for economic growth. For example, one algorithm may be able to identify businesses that could benefit from the promotion of women in leadership roles. By understanding these opportunities, organizations can create policies that promote gender equality while also increasing economic growth.

Acknowledgements

Conflict of Interest Statement

The author, Nur Atiqah Rochin Demong, is a technical editor for this journal. It is important to note that her paper underwent the same blind peer review process as applied to all other submissions. Her editorial position within the journal had no influence on the evaluation or decision-making process for this article. The peer review and editorial decision were conducted impartially to maintain the integrity and fairness of the review process.

References

Abdullah, A. A., Awang, M. D., Kadir, M. N. A., Fadzil, A. F. M., & Hamzani, D. H. (2021). Ethics and Civilization in Malaysian Multiracial Society.

Akbar, S., & Hallak, R. (2019). Identifying business practices promoting sustainability in aboriginal tourism enterprises in remote Australia. Sustainability, 11(17), 4589.

Aljarodi, A., Thatchenkery, T., & Urbano, D. (2022). The influence of institutions on early-stage entrepreneurial activity: a comparison between men and women in Saudi Arabia. Journal of Entrepreneurship in Emerging Economies.

AlMehrzi, A. A., Tipu, S. A., & Sarker, A. E. (2023). Determinants, processes, and impacts of indigenous entrepreneurship: a systematic literature review. Journal of Enterprising Communities: People and Places in the Global Economy.

Attwal, K. P. S., & Dhiman, A. S. (2020). Exploring data mining tool-Weka and using Weka to build and evaluate predictive models. Advances and Applications in Mathematical Sciences, 19(6), 451-469.

Bennett, N. J., Blythe, J., White, C. S., & Campero, C. (2021). Blue growth and blue justice: Ten risks and solutions for the ocean economy. Marine Policy, 125, 104387.

Bonvillain, N. (2020). Women and men: Cultural constructs of gender. Rowman & Littlefield Publishers.

Boshmaf, H., & O'Keeffe, C. (2022). Promoting gender equality in jordan: A gender review of the national entrepreneurship and SME growth strategy 2015-2017. Dirasat: Human and Social Sciences, 49(5), 61-72.

Chow, M. M., & Hock, O. Y. (2021). Developing pre-retiree intent-entrepreneurship learning to new normal entrepreneurial initiatives. Solid State Technology, 64(2), 318-333.

Croce, F. (2020). Indigenous women entrepreneurship: analysis of a promising research theme at the intersection of indigenous entrepreneurship and women entrepreneurship. Ethnic and Racial Studies, 43(6), 1013-1031.

Cukier, W., Gagnon, S., Dalziel, M., Grant, K., Laplume, A., Ozkazanc-Pan, B., & Saba, T. (2022). Women entrepreneurship: towards an inclusive innovation ecosystem. In (Vol. 34, pp. 475-482): Taylor & Francis.

Derani, N. E. S., Mokhtar, M., Nawanir, G., & Zakaria, H. (2023). Bibliometric Review on Indigenous Entrepreneurship: Past Findings, Present and Ways Forward. Journal of Advanced Research in Business and Management Studies, 31(1).

Ensign, P. C. (2023). Contextual impact on indigenous entrepreneurs around the world: geographic location, socio-cultural context and economic structure. International Journal of Entrepreneurship and Small Business, 49(1), 150-186.

Field, E., Pande, R., Rigol, N., Schaner, S., & Troyer Moore, C. (2021). On her own account: How strengthening women's financial control impacts labor supply and gender norms. American Economic Review, 111(7), 2342-2375.

Finau, G., & Scobie, M. (2022). Old ways and new means: Indigenous accountings during and beyond the pandemic. Accounting, Auditing & Accountability Journal, 35(1), 74-84.

Gupta, M., Kishore, A., Roy, D., & Saroj, S. (2023). Post-farmgate food businesses of India: The enterprises, the entrepreneurs, and the employees. Global Food Security, 36, 100665.

Hanafiah, M. H., Zamzuri, N. H., Sharif, T. I. S. T., & Chartrungruang, B.-o. (2023). Reframing Indigenous tourism entrepreneurial personality, experience, sense of community and challenges in community-based tourism-related business. Journal of Enterprising Communities: People and Places in the Global Economy.

Hoicka, C. E., Savic, K., & Campney, A. (2021). Reconciliation through renewable energy? A survey of Indigenous communities, involvement, and peoples in Canada. Energy Research & Social Science, 74, 101897.

Isa, N. M., Sivapathy, A., & Kamarruddin, N. N. A. (2021). Malaysia on the way to sustainable development: Circular economy and green technologies. In Modeling Economic Growth in Contemporary Malaysia (pp. 91-115). Emerald Publishing Limited.

Jabeen, S., Haq, S., Jameel, A., Hussain, A., Asif, M., Hwang, J., & Jabeen, A. (2020). Impacts of rural women's traditional economic activities on household economy: Changing economic contributions through empowered women in rural Pakistan. Sustainability, 12(7), 2731.

Jafari-Sadeghi, V. (2020). The motivational factors of business venturing: Opportunity versus necessity? A gendered perspective on European countries. Journal of Business Research, 113, 279-289.

Jang, S., Allen, T. D., & Regina, J. (2021). Office housework, burnout, and promotion: Does gender matter? Journal of Business and Psychology, 36, 793-805.

Kabeer, N. (2021). Gender equality, inclusive growth, and labour markets. Women's Economic Empowerment: Insights from Africa and South Asia, 13-48.

Leakey, R. R., Tientcheu Avana, M.-L., Awazi, N. P., Assogbadjo, A. E., Mabhaudhi, T., Hendre, P. S., Degrande, A., Hlahla, S., & Manda, L. (2022). The future of food: Domestication and commercialization of indigenous food crops in Africa over the third decade (2012–2021). Sustainability, 14(4), 2355.

Micelotta, R. Relational Economics in Practice: The case of the Indigenous communities in Canada.

Mkuna, E., Nalaila, S., & Isaga, N. (2021). Extent and Determinants of Women Participation in Agro-processing Small and Medium Enterprises (SMEs) in Dar es Salaam-Tanzania.

Morales, A., Calvo, S., Martínez, J. M. G., & Martín, J. M. M. (2021). Hybrid forms of business: Understanding the development of indigenous social entrepreneurship practices. Journal of Business Research, 124, 212-222.

Onwuegbuzie, H. N., & Mafimisebi, O. P. (2021). Global relevance of scaling African indigenous entrepreneurship. Technological Forecasting and Social Change, 166, 120629.

Osunmuyiwa, O., & Ahlborg, H. (2019). Inclusiveness by design? Reviewing sustainable electricity access and entrepreneurship from a gender perspective. Energy Research & Social Science, 53, 145-158.

Parhankangas, A., & Colbourne, R. (2023). Indigenous entrepreneurship and venture creation: a typology of indigenous crowdfunding campaigns. Entrepreneurship Theory and Practice, 47(5), 1617-1659.

Parmenter, J., & Drummond, F. (2022). 'What did I get myself into?'Indigenous women and mining employment in Australia. The Extractive Industries and Society, 12, 101189.

Phillipps, B. (2021). Accessing Indigenous Foods in Urban Northwestern Ontario: Women's Stories of Indigenous Food Sovereignty and Resistance to Policy University of Waterloo].

Power, K. (2020). The COVID-19 pandemic has increased the care burden of women and families. Sustainability: Science, Practice and Policy, 16(1), 67-73.

Rahim, M., & Zulkefli, N. (2022). The Sustainability Entrepreneurship in Adaptive Resilience Among Indigenous Community in Malaysia. GeoJournal of Tourism and Geosites.

Scheyvens, R., Carr, A., Movono, A., Hughes, E., Higgins-Desbiolles, F., & Mika, J. P. (2021). Indigenous tourism and the sustainable development goals. Annals of Tourism Research, 90, 103260.

Schirle, T., & Sogaolu, M. (2020). A work in progress: Measuring wage gaps for women and minorities in the Canadian labour market. CD Howe Institute Commentary, 561.

Shirodkar, S. (2021). Unlocking Indigenous entrepreneurial potential: A mixed methods study of the pathways and barriers into business for Indigenous Australians.

Solesvik, M., Iakovleva, T., & Trifilova, A. (2019). Motivation of female entrepreneurs: a cross-national study. Journal of Small Business and Enterprise Development, 26(5), 684-705.

Tretiakov, A., Felzensztein, C., Zwerg, A. M., Mika, J. P., & Macpherson, W. G. (2020). Family, community, and globalization: Wayuu indigenous entrepreneurs as n-Culturals. Cross Cultural & Strategic Management, 27(2), 189-211.

Xheneti, M., Madden, A., & Thapa Karki, S. (2019). Value of formalization for women entrepreneurs in developing contexts: A review and research agenda. International Journal of Management Reviews, 21(1), 3-23.

Yap, C. S., Keling, W., & Ho, P. L. (2023). Determinants of entrepreneurial performance of rural indigenous women entrepreneurs in Sarawak, Malaysia. Gender in Management: An International Journal, 38(3), 337-356.

Appendix

Figure 1: Screenshot view of selected dataset in MS Excel (csv) format.

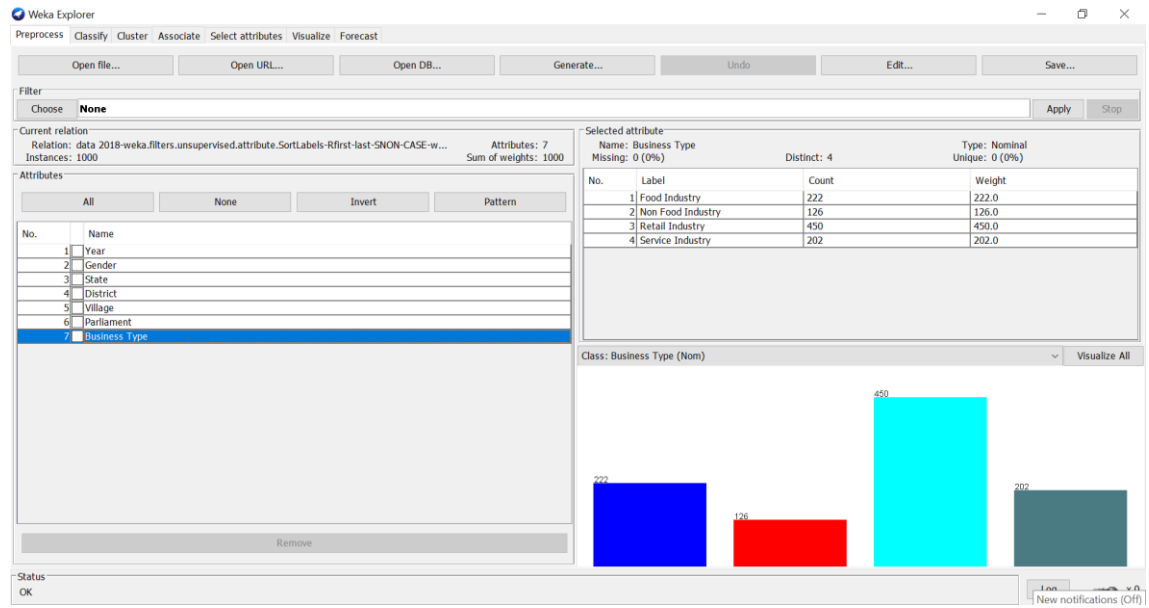Figure 2: Screenshot view of selected dataset in WEKA viewer (arff) format.

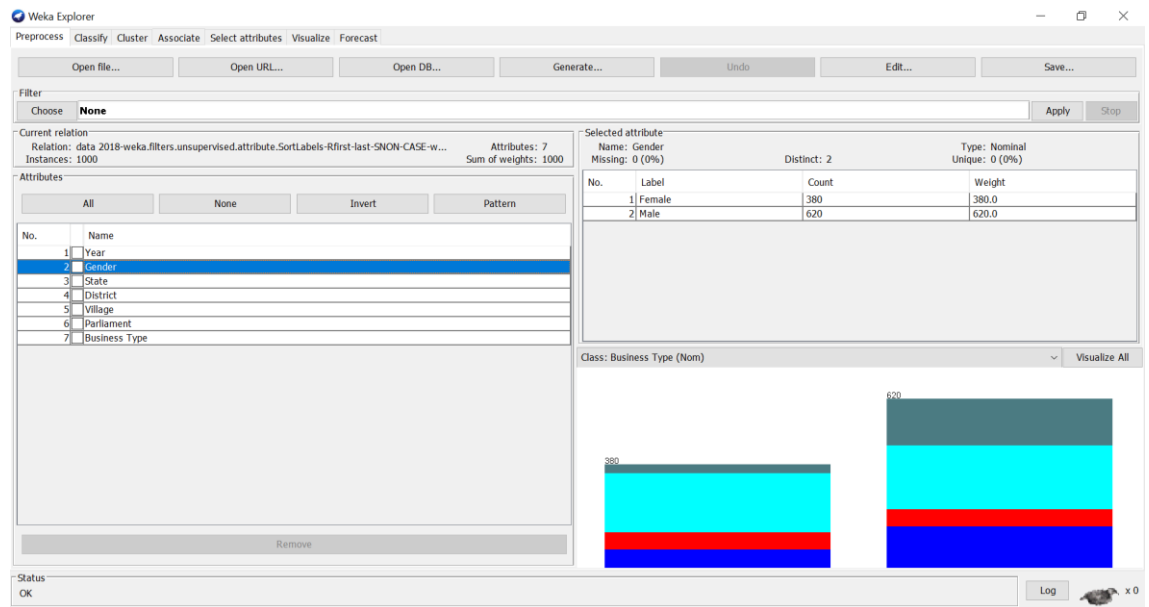Figure 3: Screenshot type of business among indigenous entrepreneurs.

Figure 4: Screenshot of gender attribute related to type of business among indigenous entrepreneurs.
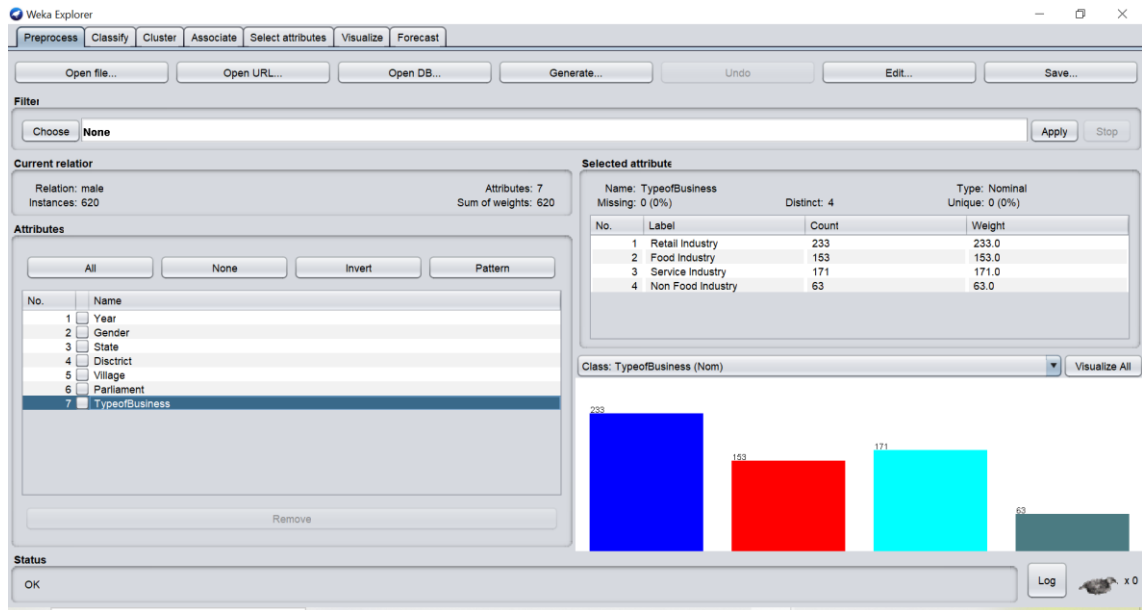
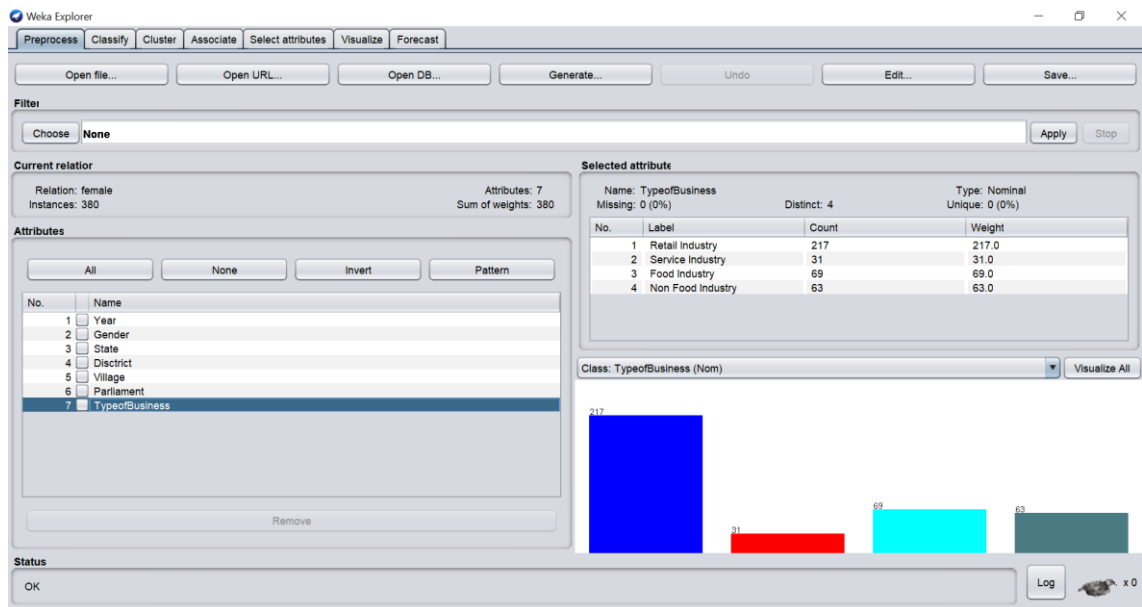Figure 5: Screenshot of type of business conquered by male.

Figure 6: Screenshot of type of business conquered by female.