Business constraints, internet use, and partnership among micro and small enterprises in manufacturing: a data mining to official statistics

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Abstract— **Governments in many countries make programs facilitating micro and small enterprises (MSEs) to grow. However, many MSEs and their numerous sectors and sub-sectors create complex issues on facilitating them appropriately. This study investigates the characteristics of Indonesian manufacturing MSEs, focusing on the association of business constraints, internet use, and business partnership. The result should assist policymakers in supporting MSEs based on their characteristics, and the problem faced. A data mining approach with the Cross-Industry Standard Process for Data Mining (CRISP-DM) framework was adopted to analyze official statistics about manufacturing MSEs. The data analysis uses the Knime Analytical Platform. The descriptive analysis shows that among 23 manufacturing sub-sectors, the food, wood, and apparel industry contribute 65% of MSEs. Business constraints, the purpose of internet use, and support obtained from partnership vary across sub-sectors. Clustering analysis indicates that sub-sectors with higher internet use associate with higher capital and competitor constraints. In addition, the result specifies that sub-sectors with a higher percentage of MSEs having partnerships perceive higher constraints in finding the capital source, responding to competition, and low constraint in raw material access. This study enriches the literature in the MSEs development by emphasizing analysis of manufacturing sub-sectors and addressing the association among business constraints, internet use, and partnership. This study suggests the policymakers supporting MSEs not with a one-for-all approach but based on the characteristics of MSE sub-sectors. Facilitation to enhance internet use for productive activities and business partnership should be pursued to help MSEs facing business constraints.**

Keywords—data mining, Indonesia, internet use, partnership, MSEs

I. INTRODUCTION

The development of big data offers a massive amount of complex data already collected by companies, governments, and other organizations or systems. The new terms, such as big data analytics, data mining, data science, machine learning, text mining, have become the buzzwords in this current information age. Big data could support the emerging digital economy as well as the conventional economy. The value of data comes from the productive information extracted. Big data analysis is progressing on the methodological and technological aspects [1], to produce information that guide practitioners, policymakers, and academics.

Country governments commonly collect data from the census, survey, business and trade statistics, city statistics, and other records. These "official data" are processed to produce "official statistics" about demographic, social, and economic figures of regions [2]. Furthermore, the government uses the data to formulate the development plan and make policy. Therefore, data mining offers an opportunity to process official statistics, find relationships between data, and discover patterns [3].

Based on the official statistics report, this study departs from the opportunity to find useful information from macro and small enterprises (MSEs) in the manufacturing sector. In Indonesia, the number of manufacturing MSEs in 2019 is 4,380,176 (99.3%) compared to medium-large size 30,072 (0.7%) in the same year. According to Indonesian Law No.20 the Year 2008, micro-enterprise is defined for business with asset value (excluding land and building) less than IDR 50 million (USD 3,496) and turnover less than IDR 300 million (USD 20,977). In the higher level is a small enterprise, defined as a business with asset value less than IDR 500 million (USD 34,961) and turnover less than IDR 2,500 million (USD 174,809). The exchange rate used was USD 1 = IDR 14,301 from xe.com by 1st Oct. 2021.

The essential primary role of MSEs in a country is their contribution to Gross Domestic Product (GDP) growth and employment. Developing sustainable MSEs is a great challenge among nations and regions. For example, a study in Bahrain suggested that the government should build up 'entrepreneurial spirits' among citizens to foster new firm establishment [4]. In this endeavor, the university's role in helping MSEs through education and training is relevant [5]. Despite its importance, MSEs face business constraints to survive in severe competition. An exploratory study among small technology firms in Malaysia identified four themes of business constraints: marketing, finance, human resource, research-and-development, and technology development [6]. Across country studies covering Bahrain, Egypt, and Jordan identified financial and marketing problems faced by micro, small, and medium enterprises [7]. A study among manufacturing MSEs in Uganda proved that business constraints, such as finance and market access, impede the MSEs' growth potential and performance [8]. A similar study in Tanzania produced the same finding [9]. Therefore, efforts to eliminate the business constraints should be intentionally pursued.

As MSEs have limited resources, the business partnership is a promising approach for MSEs to survive and grow. Therefore, the government is likely to foster and facilitate collaboration. However, firms might have different motives for making partnerships for solving resource limitations [10]. For example, the Indonesian Statistic Agency reported that

MSEs create partnerships with local government, cooperative units, government-owned companies, private companies, banks, and non-government organizations [11]. Furthermore, the partnerships establish various business schemas such as sub-contract, trading, profit sharing, operational cooperation, and joint venture.

Literature provides evidence that internet use positively impacts GDP growth, such as in Indonesia [12] and South Asian countries [13]. Internet use among MSEs also indicates a positive relationship with income per capita [14]. Though its clear benefits of MSEs using the internet, it shows that internet use among MSEs is low [15]. Internet applications or mobile apps for various business solutions are available. Therefore, internet use provides more significant potential benefits for MSEs responding to business constraints.

Many studies investigate manufacturing MSEs based on regions, for example [14], but less on studying the characteristics of the manufacturing sub-sector. A better understanding of those sub-sectors will assist policymakers in supporting MSEs more effectively. This study addresses the following research question: Are the partnership made, and how is the internet used among sub-sectors of manufacturing MSEs associated with business constraints faced? More specifically, this research has three objectives: (1) describe the business constraints faced by sub-sectors of manufacturing MSEs, as well as the purpose of internet use and business partnership made; (2) to characterize sub-sectors of manufacturing MSEs based on the level of internet use and business constraints; (3) to characterize sub-sectors of manufacturing MSEs based on partnership and business constraints. The analysis uses the official statistics about Indonesian manufacturing MSEs.

II. Methods

The research framework covers three variables, i.e., business constraints, internet use, and partnership, as presented in Fig. 1. The basic argument is that business constraints, the level of internet use, and partnerships made by MSEs are different among the manufacturing sub-sectors. Therefore, instead of hypothesis, the propositions are formulated. First, the level of internet use associates with MSE's business constraints which vary among manufacturing sub-sectors. Second, the level of partnership made by MSEs associates with MSE's business constraints which varies among manufacturing sub-sectors.

This study falls into secondary research, as it analyses secondary data. Data analysis implements a data mining approach, adopting and adapting the Cross-Industry Standard Process for Data Mining (CRISP-DM) framework [16]. It comprises six phases: Research understanding (initially business understanding), Data understanding, Data preparation, Modelling, Evaluation, and Deployment (Fig. 2). The tool for data analysis is Knime Analytical Platform, open-source software for data mining.

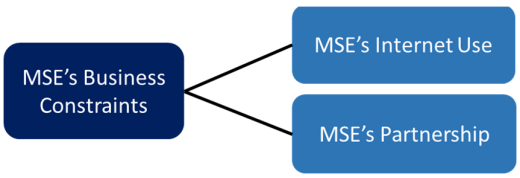

Fig. 1. Research framework.

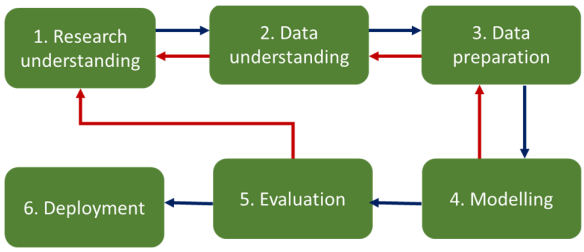

Fig. 2. CRISP-DM process framework.

The primary data source is the report titled "Profile of Micro and Small Scale Manufacturing Industry 2019," published by the Central Bureau of Statistics (BPS) [11]. Based on the Indonesia Standard Industrial Classification (IdSIC), the manufacturing sector is divided into 24 two-digit sub-sectors coded as 10 to 33. ISIC refers to the International Standard Industrial Classification of All Economic Activities (ISIC) Rev. 4 published by the United Nations of Statistical Division. As there are no data about MSEs in the coal processing sub-sector (code 19), 23 sub-sectors become the objects for data analysis.

This study determines three variables. The first is constraints faced by MSEs with nine measures: capital, market, competitor, raw material, energy, weather, labor, infrastructure, and others. The second is the purpose of internet use by MSEs with five measures: information, product, marketing, purchasing, and loan. The third is the partnership indicating assistance received by MSEs from their partner covering five measures: raw material, marketing, capital goods, money, and others.

The analysis consists of descriptive and clustering. The former covers three analyses separately for data 2019, namely (1) business constraints with all nine measures, (2) purpose of internet use with all four measures, and (3) partnership with all four measures. The clustering consists of two separate analyses: (1) the percentage of MSEs using the internet and top 4 business constraints, and (2) the percentage of MSEs having a partnership and top 4 business constraints.

III. Results

A. *Descriptive analysis*

Table I shows that the number of MSEs in the manufacturing sector is 4,380,176 firms, distributed into 23 sub-sectors. The food industry contributes 36%, wood 15%, apparel 14%, and these three totals 65%. Conversely, the bottom three on the list: The computer, electricals, and vehicles sub-sectors contribute only 0.11%.

Figure 3 presents the plot of business constraints with horizontal axis industrial code (sub-sector) and the vertical axis the percentage of MSEs perceived each constraint. For each industrial code, the relative percentage of each problem is calculated. The total percentage of all nine constraints of each industrial code is 100%. It appears the relative difference in the level of business constraints faced by MSEs.

The top five composing elements for business constraint, internet use, and partnership are presented in Table II. The highest position is filled by the marketing constraint, internet use for finding information, and partnership for marketing purposes. Basic visualization, for example, between sub-sectors vs. business constraints, is shown in Fig. 3. Standard descriptive statistics and basic visualization deliver relevant

information, but they cannot describe sub-sectors characteristics if multiple variables are involved. Therefore, data mining modeling is required.

Furthermore, Table III presents the top five sub-sectors for each of the four leading aspects of business constraints: capital, competitor, raw material, and marketing. Table IV shows the principal four purposes of internet use in descending order: information, marketing, purchase raw material, and financial-technology (fintech) loan. Fintech loan is online borrowing money that is recently emerged. The top five sub-sectors for each purpose are presented. Moreover, the variable partnership represents the benefits received by MSEs from their partnership. Table V shows the top four in descending order: raw material, marketing, capital goods, and money. The top five sub-sectors are filled up in the table.

TABLE I. NUMBER OF MSES IN EACH SUB-SECTOR

IdSIC	Count	IdSIC	Count
10-Food	1587019	18-Printing	31598
16-Wood	658426	21-Pharmaceuticals	14597
14-Apparel	613668	22-Rubber	14324
13-Textile	296154	17-Paper	9403
23-Non-Metal	240141	30-Oth.Transport	7202
32-Oth. Manuf.	227408	33-Installation	6886
12-Tobacco	205884	24-Metal Base	3743
31-Furniture	144775	28-Machines	2631
25-Metal Goods	120732	29-Vehicles	2446
11-Beverage	98901	27-Electrical	1331
15-Leather	57322	26-Computers	995
20-Chemicals	34590		

TABLE II. VARIABLE MEANS

Constraint		Internet use		Partnership	
Marketing	0.19	Information	0.26	Marketing	0.43
Capital	0.18	Product	0.25	Raw mat.	0.40
Competition	0.17	Marketing	0.25	Cap. good	0.16
Raw material	0.14	Purchasing	0.14	Money	0.09
Energy	0.09	Loan	0.10	Other	0.04

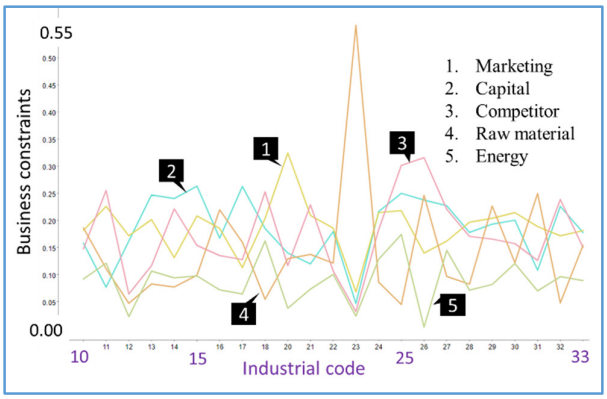

Fig. 3. Business constraints.

TABLE III. CONSTRAINTS AMONG SUB-SECTORS

Top	Capital	Competitor
1	15-Leather	26-Computers
2	17-Paper	25-Metal Goods
3	25-Metal Goods	11-Beverage
4	13-Textile	18-Printing
5	14-Apparel	32-Other Processing
Top	**Raw material**	**Marketing**
1	23-Non-Metal	20-Chemicals
2	31-Furniture	11-Beverage
3	26-Computers	25-Metal Goods
4	29-Vehicles	24-Metal Base
5	16-Wood	30-Other Transport

TABLE IV. INTERNET USE AMONG SUB-SECTORS

Top	Information	Marketing
1	12-Tobacco	26-Computers
2	21-Pharmaceuticals	27-Electrical
3	32-Other Processing	18-Printing
4	14-Apparel	10 Food
5	23-Non-Metal	28-Machines
Top	**Purchase raw material**	**Fintech Loan**
1	29-Vehicles	23-Non-Metal
2	17-Paper	25-Metal Goods
3	27-Electrical	11-Beverage
4	31-Furniture	22-Rubber
5	10-Food	20-Chemicals

TABLE V. PARTNERSHIP AMONG SUB-SECTORS

Top	Raw material	Marketing
1	26-Computers	27-Electrical
2	22-Rubber	20-Chemicals
3	32-Other Processing	21-Pharmaceuticals
4	13-Textile	12-Tobacco
5	14-Apparel	28-Machines
Top	**Capital goods**	**Money**
1	29-Vehicles	33-Installation
2	32-Other Processing	30-Other Transport
3	14-Apparel	28-Machines
4	12-Tobacco	23-Non-Metal
5	13-Textile	21 Pharmaceuticals

B. *Clustering*

The level of internet use is measured by the number of MSEs using the internet divided by total MSEs in each sub-sector. Internet use varies from the maximum 63% in the printing industry and a minimum of 5% in the non-metal industry. The first clustering was performed for internet use and four top business constraints. K-means algorithm is selected because of its simplicity. The number of clusters (k) was determined by considering the number of objects is only 23 sub-sectors. In addition, the two clusters provide a simple interpretation. Therefore, k=2 was selected, and the Silhouette coefficient (range from -1 to +1) was observed. The mean of the Silhouette coefficients is 0.29, an acceptable value. Table VI presents two clusters with 12 and 11 sub-sectors.

One way ANOVA test was performed to identify which variables differentiated two clusters. There is a debate whether

it is reasonable to conduct an ANOVA test after clustering. This study performed an ANOVA test not to evaluate the result of clustering instead to identify variables discriminating both clusters. Table VII shows that marketing appears as a non-significant variable that determined both clusters. In data mining, visualization is essential to deliver precise information to the audience; therefore, the selection of visualization type should consider the specific purpose of data analysis [17], [18]. Figure 4 visualizes the scatter plot of internet use between two clusters. It appears that internet use seems higher for cluster-1 than cluster-0.

The second clustering is for partnership and four business constraints. The partnership level was measured by the number of MSEs partnering divided by total MSEs in each sub-sector. Like the first clustering above, the k=2 for k-means was evaluated with the Silhouette coefficient. The mean of Silhouette coefficients is 0.25. Table VIII portrays the cluster memberships with 7 and 16 sub-sectors, and Table IX presents the normalized mean of each variable. Again, sub-sectors in cluster-1 appear to have a higher level of partnership. The p-value indicates that marketing constraint does not differentiate ($p>0.05$) both clusters. The scatter plot of the partnership level from the clustering is shown in Fig. 5.

TABLE VI. CLUSTER MEMBERS FOR INTERNET USE CLUSTERING

cluster-0 (12 sub-sectors)		
10 Food	16 Wood	23 Non-Metal
11 Beverage	17 Paper	29 Vehicles
12 Tobacco	20 Chemicals	31 Furniture
13 Textile	22 Rubber	33 Installation
cluster-1 (11 sub-sectors)		
14 Apparel	24 Metal Base	28 Machines
15 Leather	25 Metal Goods	30 Oth. Transport
18 Printing	26 Computers	32 Oth. Manuf.
21 Pharmaceuticals	27 Electrical	

TABLE VII. NORMALIZED VARIABLE MEAN

Cluster	Use	Cap	Com	Raw	Mar
Cluster-0	0.105	0.522	0.341	0.276	0.460
Cluster-1	0.466	0.768	0.670	0.106	0.468
p-value	0.000	0.026	0.000	0.054	0.914

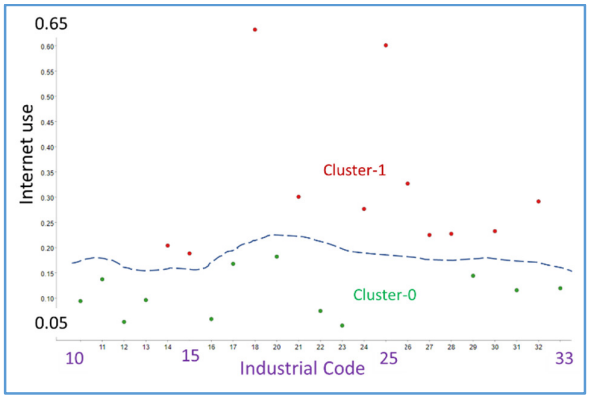

Fig. 4. The level of internet use in two clusters.

TABLE VIII. CLUSTER MEMBERS FOR PARTNERSHIP CLUSTERING

cluster-0 (7 sub-sectors)		
10 Food	23 Non-Metal	33 Installation
16 Wood	29 Vehicles	
20 Chemicals	31 Furniture	
cluster-1 (16 sub-sectors)		
11 Beverage	18 Printing	27 Electrical
12 Tobacco	21 Pharmaceutical	28 Machines
13 Textile	22 Rubber	30 Oth. Transport
14 Apparel	24 Metal Base	32 Oth. Manuf.
15 Leather	25 Metal Goods	
17 Paper	26 Computers	

TABLE IX. NORMALIZED VARIABLE MEAN

Cluster	Part	Cap	Com	Raw	Mar
cluster-0	0.095	0.438	0.327	0.391	0.477
cluster-1	0.321	0.728	0.574	0.109	0.458
p-value	0.025	0.014	0.027	0.002	0.826

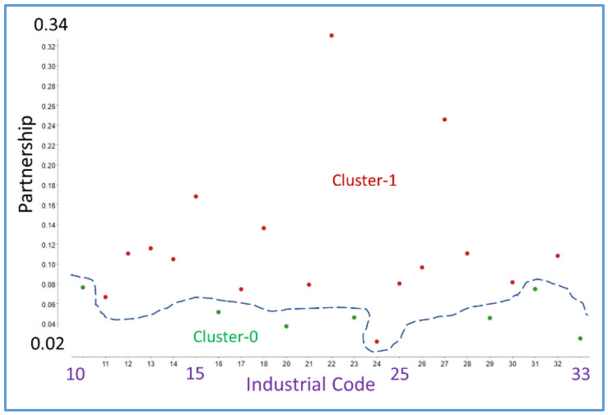

Fig. 5. The level of partnership in two clusters.

IV. DISCUSSION

This study focused on sub-sectors of Indonesian manufacturing MSEs by investigating the business constraints faced, the purpose of internet use, and the business partnership made. It is the first study in the context that identified sub-sector level and demonstrated the association between business constraints, internet use, and partnership. Several findings could be highlighted from the result of data mining. For the first research objective, the findings indicate that the business constraints faced, the purpose of internet use and the partnership made by manufacturing MSEs differ across sub-sectors. For example, the food sub-sector (the biggest sub-sector) doesn't enlist the top five constraints (Table II). The possible interpretation is that the raw material constraint is not an issue for those firms, as most use the local produce. In addition, as many MSEs in this sub-sector, the market structure and competition characteristic might resemble the perfect competition model. In this model, the information about the product and price as well as competitors are known. Therefore, MSEs in this food processing might not place one of the business constraints higher than others. On the other hand, the lowest number of MSEs is the computer sub-sector

(Table I). The computer sector sits on the top problem in the competitor constraint (Table II). The emphasis on competition constraints might come from the medium and large firms and products from overseas. It might explain that this sub-sector faces severe competition. On the other hand, the small number of firms could indicate the slow growth of the local MSEs.

Furthermore, MSEs use the internet for various purposes, with the highest for finding information, followed by marketing, purchasing raw material, and loans. The most extensive sub-sector food and the lowest computer sit as the top five internet use for marketing. It reflects that internet use for marketing might not depend on the specific sub-sectors. Next, the finding indicates that most partnerships made by MSEs are dedicated to obtaining raw material supply, especially for apparel, textile, and rubber sub-sectors. It is rational that the partnership is aimed to reduce the uncertainty in getting raw material. For MSEs in the computer sub-sector, the importance of raw material access might relate to making computers, which could be supplied from overseas.

For the second objective, the clustering analysis with internet use and business constraints indicates that sub-sectors with higher internet use associate with higher capital and competitor constraints (Table V). It might explain that those MSEs use the internet to find capital sources and information about competitors. The visualization in Fig. 4 clearly shows the different levels of internet usage between the two clusters. For example, food and beverages have a lower internet use than electrical and machine. On the other hand, the computer, electrical, and machine sub-sectors attempt to use the internet more intensively for marketing purposes (Table III) to address their competition constraints.

Moreover, for the third objective, the clustering analysis finds that the sub-sectors with a higher percentage of MSEs having partnerships perceive higher constraints in finding a capital source, responding to competition, and low constraint level in raw material access (Table VII). It can be interpreted that partnership is not likely to be prioritized for better raw material access. It is consistent with Table II, in which capital and competition constraints are above the raw material. Food and wood sub-sectors (as the top list MSEs) belong to a cluster with lower partnership, lower capital, and competition constraints but higher raw material constraint. It might indicate that those MSEs do not rely on collaboration to addressing their business problems.

Additionally, Fig. 4 and Fig. 5 portrays that some sub-sectors, i.e., food, wood, furniture, chemical, vehicle, non-metal, and installation, have lower internet use and partnership. In addition, they also face lower constraints in capital and competition. On the other side, apparel, printing, pharmaceutical, electrical, and machine experience higher internet use and partnership and encounter higher capital and competition constraints. Therefore, this study has identified the association between business constraints faced by MSEs and how they utilize the internet and partnership to address their problems.

V. Conclusion

This study has analyzed the official statistics to reveal helpful information about micro and small enterprises in the manufacturing sector. The result indicates that internet use and partnership made by MSEs associate with their attempts to address business constraints. This study contributes to the literature in MSEs, especially in manufacturing, emphasizing the analysis of sub-sectors. The use of a data mining approach for analyzing official statistics is also another contribution of this study. This study suggests the policymakers supporting MSEs not with a one-for-all approach but based on the characteristics of MSE sub-sectors. The policymakers should foster internet access and internet use among MSEs as it helps address business constraints. Education for MSEs is essential to make them use the internet for productive purposes. Furthermore, a partnership between MSEs should be more facilitated and directed to address business constraints. The finding is limited to the Indonesian case. As the attributes of manufacturing MSEs sub-sectors differ among countries, the generalization of the result beyond Indonesia is limited. Further study in other countries is suggested.

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09:10 – 09:15	**OPENING CEREMONY:** DEANSHIP OF GRADUATE STUDIES & SCIENTIFIC RESEARCH
09:15 – 09:20	**OPENING CEREMONY:** CONFERENCE STEERING COMMITTEE - PROF. HATEM MASRI
09:20 – 09:30	**BREAK**
09:30 – 10:00	 **KEYNOTE SPEAKER 1: DR. OMAR AL-UBAYDLI** Director of Research at Bahrain Center for Strategic, International and Energy Studies (DERASAT) Senior Research Fellow at Mercatus Center (USA) Associate Professor of Economics at George Mason University (USA)
10:00 – 10:30	 **KEYNOTE SPEAKER 2: PROF. PAULO LISBOA** Director of School of Computer Science and Mathematics Head of Department of Applied Mathematics Liverpool John Moores University (UK)
10:30 – 11:00	 **KEYNOTE SPEAKER 3: DR. IVAN OLIER-CAPARROSO** Senior Lecturer in Data Science School of Computer Science and Mathematics Faculty of Engineering and Technology Liverpool John Moores University (UK)
11:00 – 11:02	**VIRTUAL HONOURING OF CONFERENCE KEYNOTE SPEAKERS**

VIRTUAL MAIN HALL

11:02 – 11:10	**BREAK**
11:10 – 11:30	VIRTUAL ROOM 1A / VIRTUAL ROOM 1B / VIRTUAL ROOM 1C / VIRTUAL ROOM 1D / VIRTUAL ROOM 1E / VIRTUAL ROOM 1F / VIRTUAL ROOM 1G / VIRTUAL ROOM 1H / VIRTUAL ROOM 1I / VIRTUAL ROOM 1J
11:30 – 11:50	
11:50 – 12:10	
12:10 – 12:30	
12:30 – 12:50	
12:50 – 13:00	**BREAK**

DAY1: 25 OCTOBER 2021

13:00 – 13:20	VIRTUAL ROOM 2A	VIRTUAL ROOM 2B	VIRTUAL ROOM 2C	VIRTUAL ROOM 2D	VIRTUAL ROOM 2E	VIRTUAL ROOM 2F	VIRTUAL ROOM 2G	VIRTUAL ROOM 2H	VIRTUAL ROOM 2I	VIRTUAL ROOM 2J
13:20 – 13:40										
13:40 – 14:00										
14:00 – 14:20										
14:20 – 14:40										
14:40 – 14:50	**BREAK**									

14:50 – 15:20

KEYNOTE SPEAKER 4: PROF. LAURA ALBERT

Professor and the David Gustafson Department Chair of Industrial and Systems Engineering at the University of Wisconsin-Madison.

15:20 – 15:50

KEYNOTE SPEAKER 5: PROF. DAVIDE LA TORRE

Director of SKEMA Institute for Artificial Intelligence

Head of Programme Grande Ecole L3-M1 Finance and Quants at the SKEMA Business School - Université Côte d'Azur (France)

Full Professor of Business & Quantitative Methods at PRISM Research Center (SKEMA) Adjunct Professor of Mathematical Imaging at Department of Applied Mathematics - University of Waterloo (CANADA)

15:50 – 16:10

informs BAHRAIN INTERNATIONAL GROUP

16:10 – 16:12

VIRTUAL HONOURING OF CONFERENCE KEYNOTE SPEAKERS

16:12 – 16:20	**BREAK**								
16:20 – 16:40	VIRTUAL ROOM 3A	VIRTUAL ROOM 3B	VIRTUAL ROOM 3C	VIRTUAL ROOM 3D	VIRTUAL ROOM 3E	VIRTUAL ROOM 3F	VIRTUAL ROOM 3G		
16:40 – 17:00									
17:00 – 17:20									
17:20 – 17:40									
17:40 – 18:00									

CONFERENCE PARALLEL SESSIONS

VIRTUAL ROOM 2G 13:00 – 14:40

DATA MINING

A COMPARATIVE STUDY ON CLASSIFYING DIABETES DISEASE USING DATA MINING MODELS

SAAD EBRAHIM SAEED; BURAIR HASSAN AL TELAQ; AHMED M. ZEKI

DATA MINING

ON ANALYSIS OF EFFECTIVENESS OF ENSEMBLE, DISTANCE AND TREE BASED METHODS FOR SECURE POWER SYSTEMS

ASHUTOSH TRIPATHI; NAMAN BHOJ

DATA MINING

BUSINESS CONSTRAINTS, INTERNET USE, AND PARTNERSHIP AMONG MICRO AND SMALL ENTERPRISES IN MANUFACTURING: A DATA MINING TO OFFICIAL STATISTICS

GUNAWAN GUNAWAN

DATA MINING

POINT-OF-INTEREST RECOMMENDATION USING SUPERVISED LINK PREDICTION

ELIFGUL CAKMAK; BUKET KAYA; MEHMET KAYA

DATA MINING

A STUDY ON IDENTIFICATION OF IMPORTANT FEATURES FOR EFFICIENT DETECTION OF FAKE REVIEWS

TING-YOU LIN; BASABI CHAKRABORTY; CHUN-CHENG PENG

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