

# Analysis of Maturity Levels of ICT Utilization on East Java's Micro, Small, Medium Enterprises (MSMEs) in the New Habits Adaptation Era

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**Abstract**—The use of information and communication technology (ICT) have been increasing along with the Covid-19 pandemic in early 2020 which made the whole world turn into digitalization. This study focuses on analyzing the maturity level of ICT utilization on East Java's MSMEs using the Business Model Canvas (BMC) approach and the Capability Maturity Model (CMM) of ISAC FOUNDATION 2007 and evaluating gaps. The results of the analysis show the maturity average of ICT utilization in East Java's MSMEs is 0.86, which is at Level 1 (Initial), the gap average is 2,13 and the gap maturity value in ICT utilization on East Java's MSMEs is Large, that is 1,5.

**Keywords**—ICT, maturity level, MSMEs

## I. INTRODUCTION

The utilization of ICT has been indispensable in our daily lives since the world had been hitting by Covid-19 pandemic in early 2020. Almost all activities are carried out from offline to online, from conventional to digital. The whole world is experiencing economic and health crises, also in Indonesia. MSMEs is one of devastated sector, even though so far as the most important pillars of the national economy. Various studies conducted by government research institutions and several world institutions, the impact of the Covid-19 pandemic on the economy is more severe than the crisis in 1997-1998. This is because many MSMEs had closed their businesses, resulting in very high unemployment. The economic crisis in Indonesia in 1997-1998 only had an impact on big business and MSMEs were still able [1] to actively carry out their export activities and support the Indonesian economy.

The behavior of the economic community who prefers the online system for the sake of convenience in fulfilling all aspects of life requires business people to compete to determine the best strategy for competitive advantage. MSMEs, which are one of Indonesia's leading industries, must change their business strategy by utilized a technology [2] so that they are not left behind by other business actors. Nowadays technology, of course provides great impact on business people. Product approach can be done easily and quickly to consumers. Digital technology [3] is used as a means to market and sell products.

Technology plays a critical role in the development of business performance. For MSMEs, technological literacy is a vital knowledge resource that helps them to expand their business operations locally and globally. Technological know-how is also important to survive in the current business

turmoil. Hence, it motivates the entrepreneurs to improve their awareness of technology and thereby to use new technology in their business operations [4] to improve business performance. For those who are capable to use internet, digital technology is used for marketing the product. It can be through social media or the marketplace. Not only that, the internet is also used to find information on business development and raw materials. MSMEs that use the internet are also proven to be more able to withstand [5] the pressures of the crisis. MSMEs need to develops a business continuity plan while must pay attention the scope that may be affected by the pandemic, such as human resources, processes, locations, and technology. Technology includes processes and tools used to support business performance and security. For example, customer relationship management technology, human resources management, [6] supply chain management, and accounting software.

Business actors are currently competing to enter the digital world in order to expand market access and get closer to customers. This effort, however, is frequently hampered by a lack of human resources with knowledge and skills in the digital world. One of the reasons for the low number of e-commerce human resources is a lack of information, such as reference books, journals, magazines, or tabloids that discuss e-commerce. Furthermore, there is a lack of educational facilities, seminars, workshops, development centers that should be built, and e commerce experts. As a result, several steps must be taken to accelerate the development of human resources e-commerce so that the industry can grow quickly. The first step is to increase human resource's capacity through various trainings, competencies, coaching, and other means. Professional and skilled labor that is responsive to market demands/needs is an indicator of a country's ability to compete on a global scale. The government plays a critical role in developing strategic programs to produce the quality of human resources who are ready to enter the labor market. At the Job Training Center, the government can facilitate related training e-commerce. Furthermore, they can collaborate with the community, both associations and private parties, as well as universities, to organize e-commerce training or workshops for the community. For example, the Ministry of Communication and Informatics (Kemenkominfo) collaborated with Huawei Indonesia [7] to held online training related to e-commerce for 100 entrepreneurs.

In 2018, the high number of internet users in Indonesia became the basis of President Joko Widodo's vision and mission to build Indonesia as a strongest digital economy

country, especially in Southeast Asia by 2020. To achieve this goal, the President asked the Kemenkominfo as regulator, facilitator, aggregator and the accelerator to continues to carry out capacity building programs for society in the field of digitization. The government encourages the creation of 1000 startups in 2020 aimed for the next millennial generation. As declared in the 1000 Digital Start-up National Movement. Also conducts training for 40 thousand participants and only selected 200 participants who will meet investors. Then provides online assistance for SMEs with the target 8 million investors [8] which now has reached 82 percent. The development of digitalization of MSMEs will make the digital economy in Indonesia on 2025 will be the largest in Southeast Asia. Even though there are three obstacles faced by MSMEs, there are; First, MSMEs are still constrained by the production capacity of goods. Even many MSMEs failed in the digital market, because they were not able to fulfill the digital market demands. Second, the quality of MSME’s durability were not prevalent. Because in this digital market, perpetrators must be able to compete with large companies that during the pandemic also switch using the digital platform. Third, it is necessary to strengthen digital literacy education [9] and strengthen human resources for MSME’s perpetrators. Because so far, digital literacy and the quality of human resources for MSME’s perpetrators are very minimal, so give an impact of being less maximal in producing their respective superior products. In fact, the majority of MSME’s perpetrators [10] wants to practice digital business in order to develops their business.

Several studies had done in determine maturity level of ICT utilization, Research had conducted by Munengsih Sari Bunga [11] to determine the extent of public interest in using information technology in education and small and medium enterprises in Jatibarang village, Indramayu. Furthermore, the research that had carried out by Tri Andjarwati [12] is to find out the gaps and measure the readiness of information technology for MSMEs as a way to improve their competitive ability. Subsequent research carried out by Virginia Clara Ardella [13] to determine the role of business owners on business process maturity and IT readiness in SMEs. Another research conducted by Patricia Hanna [14] measured the level of business process maturity and IT readiness to implement 15 small-scale food and beverage companies based on the Business Process Orientation Maturity Model (BPOMM) by McCormack and Johnson. More research carried out by Nadya Chandra [15] measure the level of business process maturity and IT implementation readiness in small-scale garment companies based on the Business Process Orientation Maturity Model (BPOMM) method from McCormack and Johnson. Then Fitri Fatimah [16] had compared the maturity level of agro-industry-based MSME business processes in Jember Regency for each MSME and provide input regarding areas that need to be improved by the three MSMEs.

The author's paper is different from several similar studies because the measurement of the maturity level of ICT utilization and determine the category of gaps had carried out during a pandemic, the respondents were MSMEs on East Java, questions in survey use the BMC approach as one of the strategic media which is use by Kemenkominfo through digital training for MSMEs (UMKM Go Digital), using an analysis adopted from CMM of Isac Foundation 2007, and will be useful as a consideration for the Human Resources Research and Development Agency (Badan Penelitian dan

Pengembangan SDM) of Kemenkominfo to provides better services and support for MSMEs especially in East Java. The purpose of knowing the level of maturity is to find out in what level MSMEs on East Java are at by utilize ICT in their business processes, so that the Badan Penelitian dan Pengembangan SDM of Kemenkominfo can determine the next strategy to develops MSMEs Go Digital better.

## II. RESEARCH METHOD

This section describes the design of the research. Figure 1 below represents the step of the research.

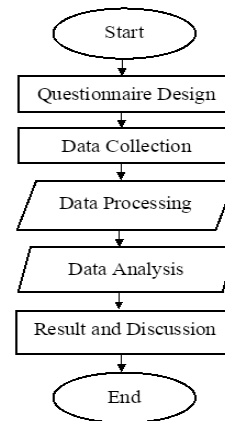


Fig.1. Research process diagram

### A. Questionnaire Design

The questionnaire design based on BMC. There were 18 questions in the survey with multiple choice. All questions were consisting of nine elements had assessed by 151 respondents, but only 9 questions which represent as important data. The details of questionnaire as in table I as follows:

TABLE I. QUESTIONS ON SURVEY

Elements of BMC	Question
Customer Segments	Who are your customer segments by using ICT?
Channels	How to get your channels by using ICT?
Customer Relationship	How to retain costumer by using ICT?
Revenue Streams	Where does your revenue streams come from by using ICT?
Key Partnership	During pandemic, what is your key partnership increase by using ICT?
Key Activities	What is your key activities by using ICT?
Key Resources (dwindling)	During pandemic, what is your key resources which decrease by using ICT?
Key Resources (adding)	During pandemic, what is your key resources which increase by using ICT?
Cost Structure	During pandemic, what cost structure that you must spent for by using ICT?

**B. Data Collection**

This research is quantitative by a survey technique. This research had used the primary data obtained from an online questionnaire that is Google Forms. Google Forms had used because Indonesia and even the world are currently facing the Covid-19. The survey had conducted randomly to MSMEs on East Java. There were three sections in this survey; respondent’s identity (type of business, telephone number, location of business, etc.), nine elements of BMC, and the utilization of ICT. Respondents were asked to choose multiple choice for each question based on their business experiences during almost two years of pandemic in Indonesia. The online questionnaire carried out in April 2021 to May 2021.

**C. Data Processing**

In this stage, the valuation’s results of survey use the keyword method, that is calculating all keywords. There are nine selected questions, each question has a different available keyword. All questions are multiple choice. The determination of scoring is as follows:

- if a responden did not chose any keyword = score 0
- if a responden chose 1 keyword = score 1
- if a responden chose 2 keywords = score 2
- if a responden chose 3 keywords = score 3
- if a responden chose 4 keywords = score 4

The detail explanation related to the scores is in table II as follows:

TABLE II. AVAILABLE KEYWORD/S AND SELECTED SCORE FOR EACH QUESTION

Question	Available Keyword(s)	Lowest Score	Highest Score
Customer Segments	Teenager/Mature, Old	0	1
Channels	Blog, Social Media, Website, Google Maps	0	4
Customer Relationship	Online, E-Banking, Digital Signature	0	3
Revenue Streams	Main, Other	0	1
Key Partnership	Online Marketplace	0	1
Key Activities	Online	0	2
Key Resources (decrease)	Database, Cloud	0	3
Key Resources (increase)	Database, Cloud	0	4
Cost Structure	Online, Hosting	0	2

**D. Data Analysis**

Data analysis use CMM Isac Foundation 2007 according to provide some distribution images of the maturity level of ICT utilization. Then author evaluate the gap maturity to determine the gap value of ICT utilization on East Java’s MSMEs. On CMM Isac Foundation 2007, to map the maturity status of IT processes on scale 0-5. More detail explanation is in table III as follows:

TABLE III. MATURITY LEVEL STATUS OF IT PROCESSES ON CMM ISAC FOUNDATION 2007

Maturity Level Status	Description of IT Processes	Maturity Value	Exact Value
0 (Non-Existence)	Absolutely no IT processes identified.	0-0,49	0
1 (Initial)	Company have started to recognize the IT process, no standardization, carried out individually, unorganized	0,50-1,49	1
2 (Repeatable but Intuitive)	Company has started to have procedures in the IT process but there is no formal training and communication about these standard procedures.	1,50-2,49	2
3 (Defined Process)	Procedures in the company have been standardized, documented, and communicated through training but the implementation still depends on the individual.	2,50-3,49	3
4 (Managed and Measurable)	Companies can measure and monitor existing procedures, easy to deal with if deviations occur. The existing process runs well and constant. Limited automation and IT tools	3,50-4,49	4
5 (Optimized)	Existing process has achieved best practice through a continuous improvement process. IT have been used in an integrated manner to automate work processes within agencies	4,50-5,00	5

**III. RESULT AND DISCUSSION**

**A. Survey Result**

In this study there are 151 MSMEs from 11 regencies/cities on East Java with different geographical locations, that is Jember, Sidoarjo, Tulungagung, Gresik, Mojokerto, Bondowoso, Situbondo, Jombang, Malang, Ponorogo, and Banyuwangi.

*1) Target Customer by Utilizing ICT (Customer Segments)*

151 MSMEs which use ICT, there are 109 MSMEs chose targeting teenagers/mature customers and 42 MSMEs chose elderly.

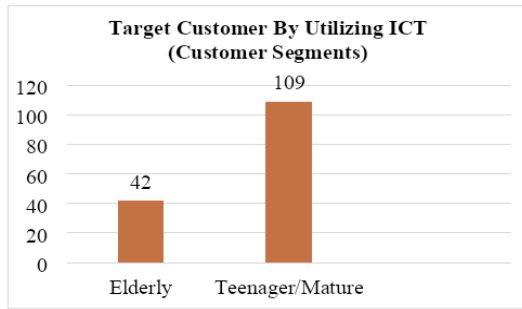


Fig. 2. Target customer by utilizing ICT (Customer Segments)

2) *How To Get Customer By Utilizing ICT (Channels)*

Several channels chose by MSMEs to get customers. On first rank, Social Media chose by 143 MSMEs, Google Maps chose by 68 MSMEs, Websites chose by 59 MSMEs and Blogs chosen by 33 MSMEs.

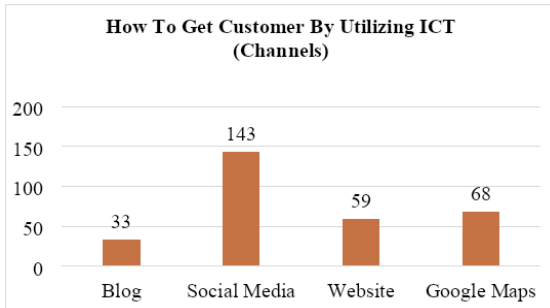


Fig. 3. How to get customer by utilizing ICT (Channels)

3) *How To Retain Customer by Utilizing ICT (Customer Relationship)*

MSMEs provides several services to retain customer, there are Online survey chose by 51 MSMEs, Payment via E-Banking chose by 44 MSMEs, Online Helpdesk chose by 13 MSMEs, Online Survey and Online Helpdesk chose by 9 MSMEs, Digital Signature chose by 5 MSMEs.

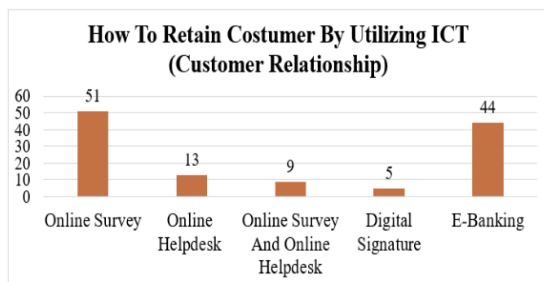


Fig. 4. How to retain customer by utilizing ICT (Customer Relationship)

4) *Income Streams by Utilizing ICT (Revenue Streams)*

Income streams of MSMEs is obtained from the sale of the main product chose by 140 MSMEs, and 11 MSMEs chose none.

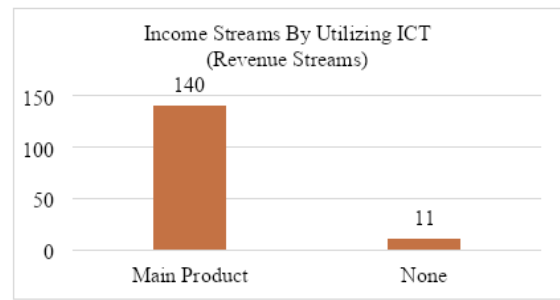


Fig. 5. Income streams by utilizing ICT (Revenue Streams)

5) *Addition of Business Partners by Utilizing ICT (Key Partnership)*

The most addition of business partners is joining Online Marketplace chose by 97 MSMEs, and 54 MSMEs chose none.

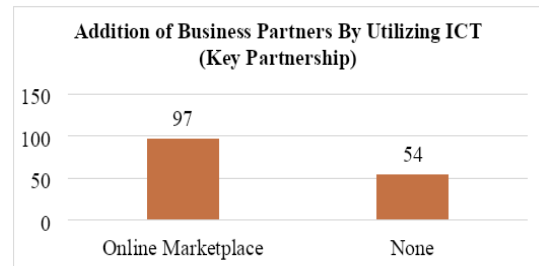


Fig. 6. Addition of business partners by utilizing ICT (Key Partnership)

6) *Key Activities by Utilizing ICT (Key Activities)*

The key activities that are routinely carried out by MSMEs, there are Online Marketing chose by 77 MSMEs, Online Marketing and Buying Raw Materials Online chose by 42 MSMEs, and Buying Raw Materials Online chose by 9 MSMEs.

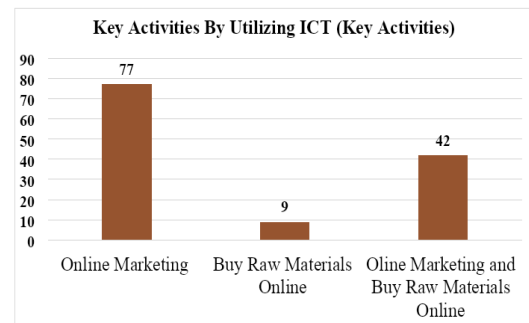


Fig. 7. Key activities by utilizing ICT (Key Activities)

7) *Resources Dwindling Due To The Pandemic (Key Resources)*

Resources dwindling due to the pandemic, there are Customer Database chose by 24 MSMEs, Financial Management Database 15 MSMEs. Customer Database and Cloud Computing same with Financial Management Cloud Computing chose by 6 MSMEs. Customer Database, Financial Management Database and Cloud chose by 5 MSMEs, Customer Database and Financial Management chose by 2 MSMEs, and Customer Database and Financial Management Cloud chose by 1 MSME.

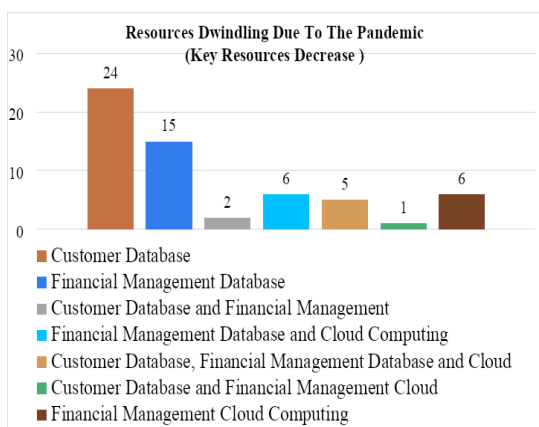


Fig. 8. Resources dwindling due to the pandemic (Key Resources)

8) Adding Resources by Utilizing ICT (Key Resources)

The addition of resources by utilizing ICT, there are Customer Database chose by 28 MSMEs, Financial Management Database chose by 16 MSMEs, Partnership Database chose by 14 MSMEs, Partnership and Customer Database 12 MSMEs. Partnership, Customer, Financial Management Database and Financial Management Cloud Computing 5 MSMEs. Partnership and Financial Management Database, Customer and Financial Management Database, Customer Database and Financial Management and Financial Management Cloud, also Partnership, Customer, Financial Management Database and Financial Management Cloud Computing were each chose by 3 MSMEs. Customer Financial Management Database and Cloud, and Financial Management Cloud Computing were each chose by 2 MSMEs. Partnership Database and Financial Management Cloud Computing, Partnership, Financial Management Database and Cloud Computing, and Customer, Partnership Database and Financial Management Cloud Computing were each chose by 1 MSME.

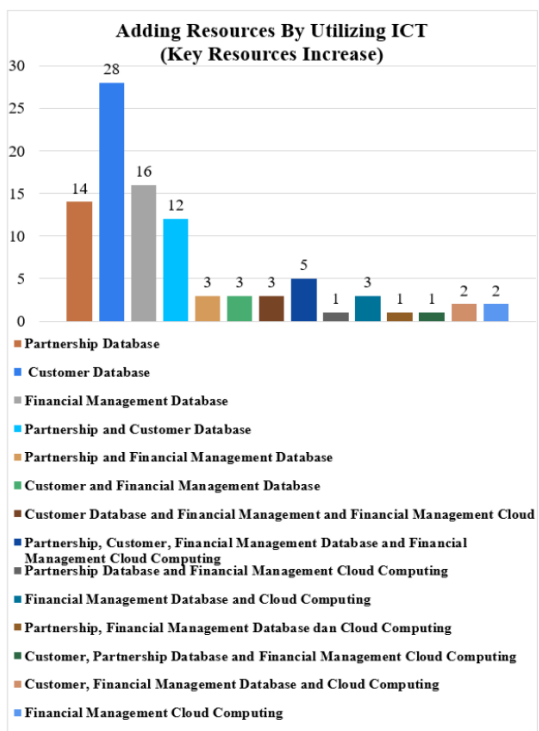


Fig. 9. Adding resources by utilizing ICT (Key Resources)

9) Cost To Be Incurred by Utilizing ICT (Cost Structure)

Cost to be incurred by utilizing ICT used for Online Advertising chose by 45 MSMEs, Online Advertising and Hosting chose by 15 MSMEs, and Hosting chose by 5 MSMEs.

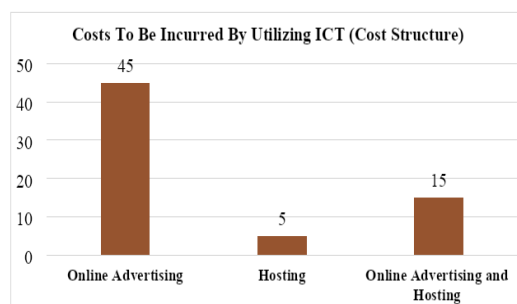


Fig. 10. Cost to be incurred by utilizing ICT (Cost Structure)

B. Distribution Of Maturity Level of ICT Utilization

1) Distribution Of The Maturity Level of ICT Utilization On East Java's MSMEs

Distribution of maturity level of ICT utilization on East Java's MSMEs, at Level 0 there are 1 MSME, at Level 1 47 MSMEs. At Level 2 43 MSMEs, at Level 3 46 MSMEs, at Level 4 11 MSMEs and 3 MSMEs at Level 5.

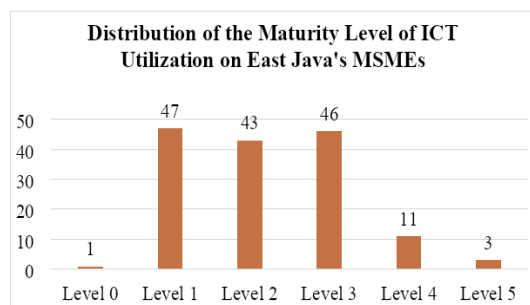


Fig. 11. Distribution of The Maturity Level of ICT Utilization In East Java's MSMEs

2) Based On Business Location

Distribution of maturity level of ICT utilization based on business location at Level 1 are Jember there are 12 MSMEs, Tulungagung there are 8 MSMEs. Sidoarjo, Gresik, Mojokerto each there are 7 MSMEs. Bondowoso, Situbondo, Banyuwangi each there are 2 MSMEs. At Level 2 are Sidoarjo there are 14 MSMEs, Jember there are 9 MSMEs. Tulungagung, Gresik each there are 7 MSMEs.

At Level 3 are Gresik there are 19 MSMEs, Jember there are 17 MSMEs, Mojokerto there are 5 MSMEs, Sidoarjo there are 4 MSMEs, Tulungagung, Jombang there are 3 MSMEs, Ponorogo there is 1 MSMEs. At Level 4 are Jember there are 4 MSMEs, Sidoarjo, Mojokerto each there are 2 MSMEs, Gresik, Tulungagung each there is 1 MSME. While at Level 5 there are Tulungagung, Gresik, Malang each there is 1 MSME.

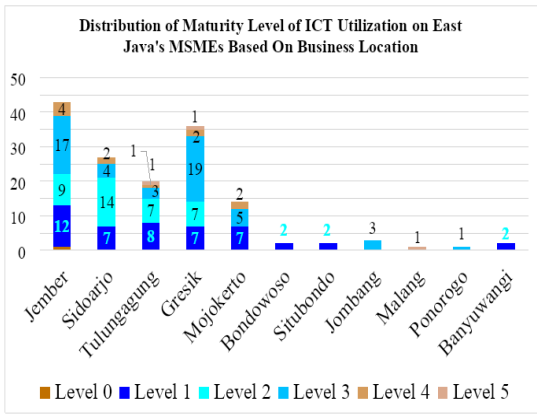


Fig. 12. Distribution of maturity level of ICT utilization based on business location

3) Based On Product Type

Distribution of maturity level of ICT utilization based on type of product, on Level 1 are Culinary there are 21 MSMEs. Fashion there are 10 MSMEs. Digital there are 7 MSMEs. Agribusiness/Agriculture and Farm there are 6 MSMEs. Beauty and Health, Handicrafts each there are 4 MSMEs. Printing, Service, Carpentry/Construction, Automotive each there are 2 MSMEs. At Level 2 are Culinary there are 24 MSMEs. Fashion there are 11 MSMEs. Digital there are 9 MSMEs. Handicrafts there are 6 MSMEs. Beauty and Health there are 5 MSMEs. Agribusiness/Agriculture and Farm there are 4 MSMEs. Printing, Service, Automotive each there are 2 MSMEs.

At Level 3 are Culinary there are 33 MSMEs. Digital there are 8 MSMEs. Fashion, Handicrafts each there are 7 MSMEs. Printing there are 4 MSMEs. Agribusiness/Agriculture and Farm there are 3 MSMEs. Automotive, Services each there are 2 MSMEs. At Level 4 are Culinary there are 6 MSMEs. Fashion there are 5 MSMEs. Digital there are 4 MSMEs. Handicrafts there are 3 MSMEs. Agribusiness/Agriculture and Farm, Beauty and Health, printing each there are 1 MSME. At Level 5 there are 3 MSMEs which are engaged in the Digital sector.

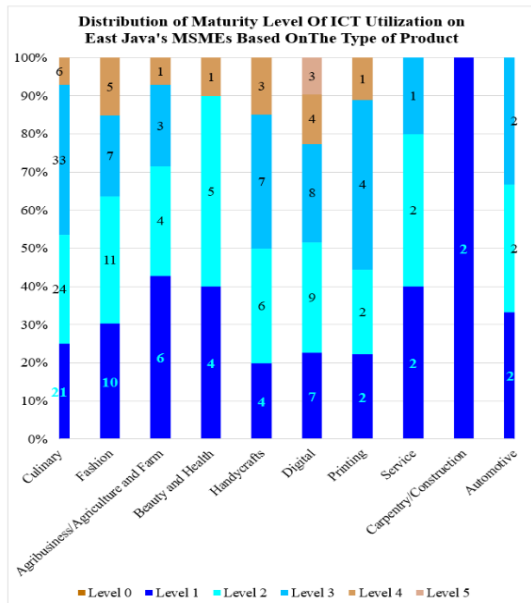


Fig. 13. Distribution of maturity level of ICT utilization in MSMEs based on the type of product

4) Based On Business Classification

Distribution of the maturity level of ICT utilization based on business classification, there are at Level 0 there is 1 micro-enterprise. At Level 1 there are 44 micro-enterprises, 1 small business 3-enterprise, and 1 medium-enterprises.

At Level 2 there are 41 micro-enterprises and 1 small business 1-enterprise. At Level 3 there are 43 micro-enterprises, 1 small 1-enterprise and 1 small business 2 enterprise. At Level 4 there are 11 micro-enterprises. At Level 5, there are 1 micro-enterprise and 1 small business 3-enterprise.

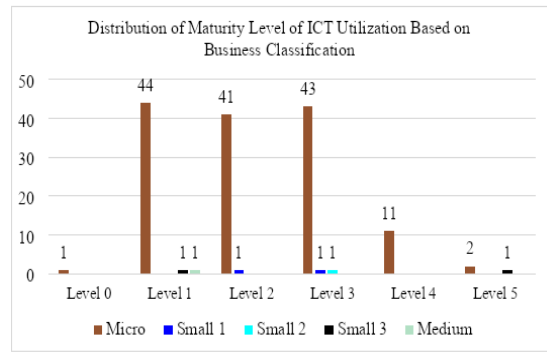


Fig. 14. Distribution of maturity level of ICT utilization based on business classification

C. Evaluation

To determine maturity average value, the author had set 9 ICT utilization on 9 Questions (Q) which selected on questionnaire and 151 Respondents (R), so obtained that:

$$\text{Current Maturity (CM) on each ICT utilization} = \frac{\sum \text{score of Q} : \sum R}$$

The result of CM is in table IV as follows:

TABLE IV. MATURITY AVERAGE VALUE OF ICT UTILIZATION

No	ICT Utilization Based On BMC Approach	$\sum \text{score of Q} : \sum R$	CM
1	Customer Segment	109 : 151	0,73
2	Channels	305 : 151	2
3	Customer Relationship	117 : 151	0,78
4	Revenue Streams	140 : 151	0,93
5	Key Partnership	98 : 151	0,65
6	Key Activities	147 : 151	0,98
7	Key Resources (Dwindling)	78 : 151	0,52
8	Key Resources (Adding)	88 : 151	0,59
9	Cost Structure	88 : 151	0,59
Maturity Average Value = $\sum \text{CM} : \sum Q = 0,86$ (Level 1/Initial)			

Next the author had set the expected maturity (EM) is at Level 3 (Defined Process). To determine gap maturity (GM) = EM – CM. Furthermore, to determine the gap average value (GAV) is in table V as follows:

TABLE V. GAP AVERAGE VALUE OF ICT UTILIZATION

No	ICT Utilization Based on BMC approach	CM	EM	GM
1	Customer Segment	0,73	3	2,27
2	Channels	2	3	1
3	Customer Relationship	0,78	3	2,22
4	Revenue Streams	0,93	3	2,07
5	Key Partnership	0,65	3	2,35
6	Key Activities	0,98	3	2,02
7	Key Resources (Dwindling)	0,52	3	2,48
8	Key Resources (Adding)	0,59	3	2,41
9	Cost Structure	0,59	3	2,41
GAV = $\sum GM : \sum$ ICT utilization = 2,13				

Then, to determine the category of gap maturity value (GMV), the author had set 3 categories of ICT utilization; there are small, medium, large.

According to the Table V. gap average value of ICT utilization, the author had set the GMV = Highest Score of CM – Lowest Score of CM = 2 – 0,5 = 1,5. Next to determine the GMV range, the author had set that GMV : 3 = 0,5. So every multiple of 0.5 indicates the respective category is in table VI as follows:

TABLE VI. THE CATEGORY OF GMV

No	GMV	Category
1	0,1 – 0,50	Small
2	0,51 – 1,00	Medium
3	<b>1,01 – 1,5</b>	<b>Large</b>

#### IV. CONCLUSION

The conclusion obtained can be mentioned, namely:

1. MSMEs in East Java on average are still at level 1 (Initial) of utilize ICT to develop their businesses., so it needs hard work from stakeholders and Kemenkominfo to make better strategy to support MSMEs on East Java to go digital at least at level 3 (Defined Process).
2. The gap average of ICT utilization is 2,13, it is mean many of MSMEs on East Java have not mastered ICT for business process.
3. The gap maturity value is 1,5 included in large category. It is necessary for stakeholder and Kemenkominfo to eliminate that gap (large) by provides better training and facilities for MSMEs in East Java.

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