International Journal of Computer Applications Technology and Research
Volume 10–Issue 03, 51-54, 2021, ISSN:-2319–8656

A Review of Natural Language Processing Techniques: Application to Afan Oromo

Bekele Abera Hordofa
Computer Science Department, College of Science and Technology, Oromia State University, Batu, Oromia
Ethiopia

Shambel Dechasa Degefa
Computer Science Department, College of Science and Technology, Oromia State University
Batu, Oromia
Ethiopia

Abstract: Language is a means of communication and a symbol of national identity. Afan Oromo is one of written and spoken indigenous language in Ethiopia which uses a writing system called Qubee. Natural language processing is automatic or semi-automatic processing of human language that helps computers to understand and process language. NLP techniques involve various linguistic levels to understand and use language. Linguistic levels are an explanatory method for presenting what actually happens within a natural language processing system. This is very important to develop appropriate and desired NLP applications at both higher and lower levels. In this paper, we present a review of techniques, current trends and challenges in NLP application to Afan Oromo.

Keywords: Afan Oromo; Qubee; NLP; NLP Application; Linguistic Level

1. INTRODUCTION

Language is a means of communication and a symbol of national identity [1]. Natural language processing (NLP) is automatic or semi-automatic processing of human language that helps computers to understand and process natural language. It has big role in computer science, because many aspects of the field deal with linguistic features of computation [2].

Afan Oromo is an indigenous Afro-Asiatic language spoken in many parts of Ethiopia and neighboring countries like Kenya, Djibouti and Somalia, which have horn of Africa coverage [3]. Afan Oromo is the second largest Cushitic language in African content next to Hausa. It is spoken and used by 34.5% of the total population of Ethiopia [4]. It is also working language of Oromia regional state, which is one of the largest regional states in Ethiopia.

A number of scholars made huge efforts to transform Afan Oromo from spoken language to a written language [5]. During the Dergue regime writing Afan Oromo in any alphabet, except the Sabean was illegal. Afan Oromo uses a writing system called Qubee. The writing system of Qubee (Latin-based alphabet) has been started since 1842 [3]. The Qubee was accepted unanimously and the first congress of Caffee Oromiyaa put it into a law in 1991 [5]. Since then, Afan Oromo has been a written language, a school language, public media, social issues, religion, political affairs, technology and a working language. Like English, Qubee use constants and vowels (a, e, i, o and u). Every alphabet is pronounced in a clear short/quick or long/stretched sounds. In addition to 26 English alphabets, Qubee uses combination of characters (Qubee dachaa), which is pronounced as single character with the tongue curled back slightly. Examples of Qubee dachaa are ‘ch’, ‘dh’, ‘ny’, ‘ph’, ‘sh’ and ‘ts’. Some examples of words formed from Qubee dachaa, water (bishaan), food (nyaata), butter (dhadhaa), shoe (kophee) and etc.

2. LEVELS OF NATURAL LANGUAGE PROCESSING

Level of natural language processing is the most explanatory method for presenting what actually happens within a natural language processing system. A. Chopra and et al [1] classify phases of linguistic analysis into higher level which corresponds to speech recognition and lower level which corresponds to natural language processing. Linguistics in the science of language classifies level of NLP as shown in Figure 1 [1][2].

Phonology refers to sounds [1]. There are three types of rules used in phonological analysis[1]: phonetic rules, phonemic rules and prosodic rules. Phonetic rules are used for sounds within words. Phonemic rules are used for variations of pronunciation when words are spoken together. Prosodic rules are used for fluctuation in stress and intonation across a sentence. NLP system accepts spoken input, sound waves, analyze it and encode into a digitized signal for interpretation.

Morphology refers to word formation [1] [2]. It is mainly useful for identifying the parts of speech in a sentence and words that interact together. It also describes a set of relations between words’ surface forms and lexical forms [2]. The information gathered at the morphological stage prepares the data for the syntactical stage which looks more directly at the target language’s grammatical structure [2]. Like many local and African languages, Afan Oromo is very rich in morphology. Afan Oromo verbs are highly inflected for gender, person, number and tenses [6]. Both Afan Oromo nouns and adjectives are highly inflected for number and gender [6]. Words can be formed from morphemes in two ways: Derivational Morphology and Inflectional Morphology. Derivational Morphology is concerned with the way words are derived from morphemes through processes such as affixation or compounding while inflectional morphology deals with the combination of a word with a morpheme. Table 1 shows some examples of Afan Oromo morphology.

Table 1: Afan Oromo Morphology (Examples)

Afan Oromo Words	Morphology
Kitaaboota (Books)	Kitaaba[oota]
Alseeruummaa(illegal)	Alseeraa[uummaa]
Namicha (the man)	Nama[icha]
Namoota (men)	Nama[oota]

Syntax refers to the study of structural relationships between words in a sentence [7]. Syntax involves applying the rules of Afan Oromo grammar. It involves analysis of the words in a sentence to depict the grammatical structure of the sentence[2]. In Afan Oromo, a sentence consists of a noun phrase, a verb phrase, and in some cases a prepositional phrase. A noun phrase represents a subject that can be identified by a noun. A verb phrase represents an action. A prepositional phrase modifies a verb or a noun.

Parser is used to convert a sentence into a tree that represents the sentence's syntactic structure. Here words are transformed into structure that shows how the words are related to each other. For example: Chala gave letter to Bontu (Caalaan Boontuudhaf xalayaa kenne). The parser breaks it into noun phrase and verb phrase to determine whether a sentence is valid in relation to the language's grammar rules. This sentence consist of noun phrase: "Caalaan" and verb phrase: "Boontuudhaf xalayaa kenne".

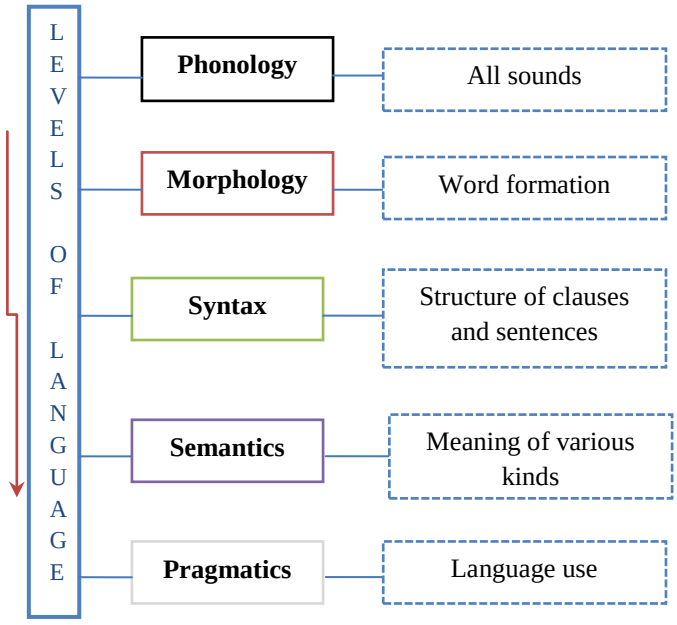

Figure 1: Levels of Natural Language Processing

Semantics are the examination of the meaning of words, phrases and sentences [2][8]. Semantic processing determines the possible meanings of a sentence by focusing on the interactions among word-level meanings in the sentence [1]. All the linguistic levels contribute to determine meaning. Semantic processing includes disambiguation of words with multiple senses. For example: "Bilisumman garaa laafadha". Direct meaning, Bilisumma is kind. Other meaning Bilisumman's stomach is soft. Sense of words and modifiers are used to determine the meaning.

Pragmatics is the analysis of the real meaning of an utterance in a human language, by disambiguating and contextualizing the utterance[9]. This is accomplished by identifying ambiguities encountered by the system and resolving them using one or more types of disambiguation techniques [10][11].

3. NATURAL LANGUAGE PROCESSING TECHNIQUES

Natural language processing has various application areas in different domains. Prakash M. Nadkarni and et al. [8], classified NLP applications into low level and high level tasks. Here in this article, we consider research work done on NLP applications that are important for Afan Oromo.

3.1 Low level NLP Applications

NLP systems need to implement modules to accomplish mainly the lower levels of processing. The lower level application may not require interpretation of the higher levels and relatively more researched and attempted. The lower levels deal with smaller units of analysis like characters, tokens, morphemes, words, and sentences, which are rule-governed. Some of lower level NLP applications are:

Tokenizer: Most text processing works with word and sentence based unit therefore larger blocks of text is split into single words and sentences [12]. Tokenization involves word and sentence boundary detection, and problem specific segmentation. It starts with a sequence of characters to identify the elementary parts of natural language such as words, punctuation marks and separators. In Afan Oromo, like English white space is used to separate words. An end of a statement is marked with full stop (.), while comma (,) is used to separate lists or ideas just like the comma in English.

Morphological Analyzer: Morphological analyzer is a process of returning one or more surface forms from a sequence of morpheme glosses [13]. The most common and widely used approaches for automatic morphological synthesizer are: rule based, machine learning and hybrid approaches. Abebe Abishu [13] designed a rule based morphological synthesizer for Afan Oromo particularly for verbs and nouns.

Part of Speech Tagger (POST): Part-of-speech tagging is the act of assigning each word in sentences a tag that describes how that word is used in the sentences [14]. That means POS tagging assigns whether a given word is used as a noun, adjective, verb, and etc. There are two known approaches that are used to develop part-speech-tagger: Rule based Approach and Stochastic Approach [14]. Getachew Mamo and Million Meshesha [14] attempted Afan Oromo part of speech tagger using Hidden Markov model.

3.2 High Level NLP Applications

Higher level NLP applications are built on bases of the low-level tasks and are usually problem specific.

Spelling and Grammatical Checker: Afan Oromo is written in the way it is spoken, this makes more vulnerable to spelling error [15]. Afan Oromo is morphologically rich language, each root word can combine with multiple morphemes to generate huge number of word forms [15]. Because of these and other reasons explained in Table 2 development of Afan Oromo spell checker is a challenging task.

Grammar checker determines the syntactical correctness of a sentence which is mostly used in word processors and compilers. There are three popular approaches used for grammar checking; syntax-based checking, statistics-based checking and rule-based checking. Debela Tesfaye [6], attempted rule based Afan Oromo grammar checker.

Named Entity Recognition (NER): Named Entity Recognition is an information extraction task aimed at identifying and classifying words of a sentence, a paragraph or a document into predefined categories of named entities [16]. Named entities are categorized into different class of named entity like people, organization, place, time etc. NER is very essential in almost all NLP applications like information extraction, search engines, machine translation and question-answering, etc. N.Kannaiya Raja and et al.[16], attempted a rule based named entity recognition.

Table 2: Afan Oromo spell and grammar checker (cases and examples)

Reasons(cases)	Description	Example(s)
Single consonant (jecha laafaa) vs Double consonant (jecha jabaa)	Single consonant: the sounds are less emphasized. Double consonant: the sounds are more emphasized.	Bad(badaa), highland(badda a), etc.
Single vowels (jecha gabaabaa) vs Double vowels (jecha dheeraa)	Single vowels: the sounds are less stretched or elongated. Double vowels: the sounds are less stretched or elongated.	Earth(lafa), weak(laafaa), etc.
Consonant followed by other consonant (CC), (Jecha irra butaa)	Sound pronounced the air drawn in so that a glottal stop is heard before the following constant begins.	Hand(harka), bag(boorsaa), etc.
Use of ‘ (Jecha hudhaa)	Sound pronounced the air drawn in so that a glottal stop is heard before the following vowel begins.	Month(ji’a), goat(re’ee), etc.
Compound word(Jecha tishoo)	Words formed from two words	Saba + lammii = sablammii or sab-lammii
Morphology	A number of words can be derived or inflated from single root.	deemi, deeme, deema, deemte, deemteetti, etc.

Information Extraction (IE): Information Extraction concerned with the automatic extraction of facts from text and stores them in a database for easy use and management of the data [17]. Most IE systems are domain specific which involves extracting meaningful information from unstructured text data and presenting it in a structured format. There are different approaches to IE; rule-based, supervised machine learning and semi-supervised approach. Sisay Abera and Tesfa Tegegne[17] attempted news domain supervised machine learning Afan Oromo IE model.

Machine Translation (MT): Machine translation is an automatic translation of text from a source language to its counterpart in a target language [18]. Machine translation has its own challenges like translation of low-resource language pairs, translation across domains, translation of informal text and translation form/to morphologically rich languages. Machine translation gives a quick and comprehensive understanding of a text or document written by another language. MT has different approaches, including rule based, corpus based and hybrid approach. Million Meshesha and Yitayew Solomon [18], attempted English-Afan Oromo statistical machine translation.

4. CURRENT TRENDS AND CHALLENGES IN NLP

Currently NLP is hot research areas. More over for under resourced language like Afan Oromo, it is highly realistic to conduct research on NLP applications. An NLP applications demand is growing in an exponential manner. The reason behind this growth is transfer of technology from manual to automated and many other tasks which are required to be automated and involve language at some point. A number of researches in natural language processing have been done or going on Afan Oromo, but applications don’t available publicly. Alongside these researches some prototype were developed to demonstrate the effectiveness of particular applications, but still real implementations of these applications are rare.

Even though there is massive production of raw data on web, the availability of quantity and free dataset is rare for Afan Oromo. This implies that more effort has to be done on preparing corpus.

Text processing, writing is the basic fundamental unit of NLP applications. NLP applications revolves around language’s which refers to words in its basic raw form. The performance of NLP applications is also another issue. This challenge is improved through time. In the future these applications will turn from human-computer interaction to human computer conversation. To accomplish these, there is a necessity of integration of many modern-day technologies such as recognition of human users, sentiment analysis, recommendation analysis and techniques with the engagement in conversations is possible in a dynamic manner.

Another challenge in natural language processing involves speech recognition, natural language understanding, and natural language generation.

NLP researchers are now developing next generation NLP systems that deal reasonably well with general text and account for a good portion of the variability and ambiguity of language. Human level or human readable natural language processing is an AI-complete problem[1]. This challenge is highly tied with advancement of artificial intelligence. Some NLP applications at both lower level and higher level need cloud sourcing.

5. CONCLUSION

Natural language is any ordinary language that is spoken or written by humans for general purpose communication. Natural language processing (NLP) is processing of human language that helps computers to understand and process human language. NLP is a relatively recent area of research and application, as compared to others. With the help NLP applications, we can develop beneficial and successful NLP systems. As lower NLP applications mature it minimize challenges in language use and further it can be embedded into higher level applications. NLP applications will continue to be a major area of research and development in information systems now and far in a future.

6. REFERENCES

[1] Y. Wilks, "Natural Language Processing," Commun. ACM, vol. 39, no. 1, pp. 60–62, 1996, doi: 10.1145/234173.234180.

[2] D. M. P. P. Alpa Reshamwala, "Review on Natural Language Processing," Eng. Sci. Technol. An Int. J., vol. 3, no. 1, pp. 2250–3498.

[3] I. Bedane, "The Origin of Afan Oromo : Mother Language," Glob. J. Hum. Soc. Sci. G Linguist. Educ., vol. 15, no. 12, 2015.

[4] E. C. S. A. (ECSA), "Population and Housing Census of Ethiopia," 2007.

[5] Https://oromiaacademy.wordpress.com/, Oromia Language & Cultural Academy. .

[6] D. Tesfaye, "A rule-based Afan Oromo Grammar Checker," Int. J. Adv. Comput. Sci. Appl., vol. 2, no. 8, pp. 126–130, 2011, doi: 10.14569/ijacsa.2011.020823.

[7] M. Synthesizer and A. Abeshu, "Analysis of Rule Based Approach for Afan Oromo Automatic," vol. 7522, no. 4, pp. 94–97, 2013.

[8] P. M. Nadkarni, L. Ohno-Machado, and W. W. Chapman, "Natural language processing: An introduction," J. Am. Med. Informatics Assoc., vol. 18, no. 5, pp. 544–551, 2011, doi: 10.1136/amiajnl-2011-000464.

[9] D. Khurana, A. Koli, K. Khatter, and S. Singh, "Natural Language Processing: State of The Art, Current Trends and Challenges," no. Figure 1, 2017, [Online]. Available: http://arxiv.org/abs/1708.05148.

[10] W. Tesema, D. Tesfaye, and T. Kibebew, "Designing a Rule Based Disambiguator for Afan Oromo Words," Am. J. Comput. Sci. Inf. Technol., vol. 05, no. 02, pp. 3–6, 2017, doi: 10.21767/2349-3917.100003.

[11] W. Tesema, D. Tesfaye, and T. Kibebew, "Towards the sense disambiguation of Afan Oromo words using hybrid approach (unsupervised machine learning and rule based)," Ethiop. J. Educ. Sci., vol. 12, no. 1, pp. 61-77–77, 2016.

[12] B. A. Hordofa, "Event Extraction and Representation Model from News Articles," vol. 16, no. 3, pp. 1–8, 2020.

[13] A. Abeshu, "Analysis of Rule Based Approach for Afan Oromo Automatic Morphological Synthesizer," Sci. Technol. Arts Res. Journal, ISSN 2226-7522(Print) 2305-3327, vol. V–2, no. I–4, pp. 94–97.

[14] G. Mamo and M. Meshesha, "Parts of Speech Tagging for Afan Oromo," Int. J. Adv. Comput. Sci. Appl., vol. 1, no. 3, pp. 1–5, 2011, doi: 10.14569/special issue. 2011.010301.

[15] G. O. Ganfure and D. Midekso, "Design And Implementation Of Morphology Based Spell Checker," Int. J. Sci. Technol. Res., vol. 3, no. 12, pp. 118–125, 2014.

[16] S. S. N.Kannaiya Raja, Naol Bakala, "NLP: Rule Based Name Entity Recognition," Int. J. Innov. Technol. Explor. Eng. ISSN 2278-3075, vol. Volume-8, no. Issue-11.

[17] T. T. Sisay Abera, "Information Extraction Model for Afan Oromo News Text," in International Conference on Information and Communication Technology for Development for Africa, p. pp 327-340.

[18] M. Meshesha and Y. Solomon, "English-Afan Oromo Statistical Machine Translation," no. 9, pp. 26–31, 2018.

International Journal of Computer Applications Technology and Research
Volume 10–Issue 03, 55-63, 2021, ISSN:-2319–8656

E-commerce Application Based on Android Smartphone to Promote Banten Typical Food

Aan Hendrayana
Universitas Sultan Ageng Tirtayasa Indonesia
Serang, Indonesia

Anwar Mutaqin
Universitas Sultan Ageng Tirtayasa Indonesia
Serang, Indonesia

Heni Pujiastuti
Universitas Sultan Ageng Tirtayasa Indonesia
Serang, Indonesia

Syamsuri
Universitas Sultan Ageng Tirtayasa Indonesia
Serang, Indonesia

Cecep Anwar HF Santosa
Universitas Sultan Ageng Tirtayasa Indonesia
Serang, Indonesia

Abstract: The objectives of this research are: (1) to create an e-commerce application in promoting Banten local specialties by using Android-based smartphone; (2) to determine the eligibility and quality of the developed e-commerce application; and (3) to describe the profile of Banten typical food from small business by using e-commerce in Banten, Indonesia. It is a developmental research. The result of developed product was validated by media experts, small business, and potential customers. In addition, the developed application was completed through a limited testing. The data were obtained by using questionnaire and interview. The eligibility and the quality of the developed product were analyzed descriptively. The results show that: (1) The developed e-commerce product is an Android application that can be used to promote Banten local food; (2) This application is suitable to be used as a medium of information and has excellent quality; (3) Small business of Banten typical food has a great potential to be developed by using e-commerce.

Keywords: e-commerce, small business, local specialties, android based application

1. INTRODUCTION

The development of information and communication technology has increased significantly in developing countries, including Indonesia. Information and communication technology, especially the internet, has already been used in banking, education, economics, and government for years. Lim [1] stated that the internet entered Indonesia around the 1990s and had major impact especially on the economy. In 2015, some national newspapers stated that there were about 128 million of Indonesians connected to the internet. The internet users in urban areas are more numerous than in rural communities. Today, the internet is an integral part of the activities of most Indonesians.

The development of technology has enormous impacts on people's living behaviors. Communities are easily able to obtain informations either locally or internationally, and people can communicate freely through the internet. The more open the information and communication, the more the impacts on culture and social economy [2]. However, one of the negative impacts worried about is the less influence of ancestral cultures of the people such as the local specialties that is sometimes ignored due to the large varieties of food imported from other parts of region in Indonesia, or even from other countries that enter Indonesian market. Besides having the cultural values, typical local foods also have economic values. It is because many Banten's people are still producing and selling the products to the market until now. Thus, it becomes one of the potentials of the community economic empowerments. The results of the culture as well as the ability of the community are mutually beneficial if the information media is fast and accurate, and can be utilized for disseminating the information. It is expected that information media encourages the economic transactions that is empowering people started from the producers, distributors, traders, including other supporting elements. Therefore, there should be an information system which is then able to promote the works of Banten's people and can be accessed by large communities, especially those from the big cities as well as local communities. Eventually, the process of economic empowerment of Banten community is accomplished.

Furthermore, an information system is expected to encourage the development of micro, small and medium businesses in accordance with the cultural results of society, one of which is a typical food product of Banten. Banten community has the potential of food that is favorable for the people from the big cities as well as the foreigners who came to Banten as tourists. Some favorite foods produced by Banten community are: sate bandeng, as a typical of Serang, kue balok from Menes Pandeglang, durian soup from Serang City, green shells from Tangerang, fresh fish and emping from Labuan Pendeglang, palm sugar from Lebak, etc. Unfortunately, the information about those kinds of food products has not been widely exposed. One of which because of the lack of information resources available for and can be accessed by the expected consumers.

Accordingly, in the case of the accessibility of the internet and concerning to the problems stated above, there should be any information system which is able to introduce and promote these Banten's food products. Using an accessible information system, consumers have a chance to search on the information about the food products including the specifications such as; nutritional contents, community preferences, even the location of where the products are produced, distributed or marketed. In addition, consumers from both inside and outside Banten can quickly access the information. The information system is based on the Information and Communication Technology (ICT), so that the information is easier to be managed and accessed both by producers and consumers. One form of ICT

applications is e-commerce. E-commerce is a very promising medium for marketing products to audiences [3]. Based on the data obtained from the Ministry of Communications and Information of the Republic of Indonesia, e-commerce in Indonesia has increased sharply in recent years. Thus, the e-commerce which is able to expose Banten local food products is potentially grown, because Banten is one of the tourist destination which is close to the capital city of Indonesia and easy to access.

Based on the data obtained from the Ministry of Communications and Information of the Republic of Indonesia, the number of internet users in Indonesia were about 88.1 million by the end of 2014. About 85% of these potential users access the internet via cellular phone [4]. The survey conducted by the Association of Internet Service Providers of Indonesia/ Asosiasi Penyelenggara Jasa Internet Indonesia (APJII) shows that the number of internet users in Indonesia were 132.7 million or equal to 51.7% of the Indonesian population in 2016 [5]. This has increased approximately 34.9% of the total amount in 2014. Thus, it can be assumed that the potential use of e-commerce in Indonesia is very promising.

The crisis that occurred in Indonesia since the mid of 1997 has yet to show sign of ending. Given the facts, that SMEs in Indonesian have ability to survive Indonesian economic crisis [6]. One of the economic empowerment is the struggle on increasing the volume of trades, and economic transactions between producers, sellers and consumers.

In bridging the needs between producers, sellers, and consumers, the information system that can provide easy access for parties related to local products (local), is required to be developed. The development of the system is carried out through a research development for the sake of optimum results. Accordingly, this research aims to: 1) develop e-commerce android-based application to promote the Banten typical foods, 2) determine the accuracy and quality of the e-commerce application developed, and 3) describe the typical foods profile of small and medium businesses in Banten community by using e-commerce. By knowing the profile, it is expected that the government or e-commerce provider is capable to prepare the right steps so that the e-commerce can be optimaly used in community empowerment.

2. LITERATURE REVIEW

Research on e-commerce has been conducted by many researchers. E-commerce has an impact on three major stakeholders, namely society, organizations and customers. There are a number of advantages, which include cost savings, increased efficiency, customization and global marketplaces [7]. Although e-commerce has many advantages, the implementation of e-commerce, especially in developing countries are still experiencing difficulties. Developing countries face many obstacles that affect the successful implementation of e-commerce compared to developed countries. When the internet cost cheaper then the e-commerce will flourish easily and will make many of traditional business to run out of their business [8]. The implementation of e-commerce in Tanzania shows that Tanzanian SMEs enact three major ecommerce structural practices [8]: (1) Marketing and image-building by the use of websites; (2) Transactions through extensive use of mobile technology; (3) Technical problem-solving through establishing partnerships [9]. In addition, some factors were surveyed in Pretoria East to determine the current adoption status and assess whether SMEs understand the concept and perceived benefits/ advantages of adopting e-commerce. The factors include: relative advantage, competitive pressure, IT knowledge, security and government support [10].

Other research reveals that the development of ICT is interrelated with community resources. The basis of ICT development is composed of ICT infrastructure, ICT hardware, software & information system, and people [11]. Therefore, An educational program is needed to make the public aware about the benefits of e-commerce. According to [12], facilitating factors include access to educational programs and awareness of e-commerce, government support and assistance for ecommerce, trustworthy and secure online payment options provision of sample e-commerce software to trial.

Before implementing a public educational program related to the benefits of using e-commerce, the attitude and behavior of the e-commerce user community should be known in advance. It is based on the assumptions that the advantages of using e-commerce must be supported with the knowledge, interest and skills of the user communities, either the sellers or buyers. It aims to use e-commerce to benefit both parties optimally.

Research suggests that the behavior of e-commerce users is one of the successful implementation of e-commerce. Article of [13] state that e-commerce needs the habits of its users in using electronic mail (email). In addition, [14] state that internet-based entrepreneurial activities, in the case of grassroots developments, enacts online social networking mechanisms of peer-to-peer and vendor customer interactions, and heavily depends on a corporate service provider, as well as the historically developed community infrastructure for commerce.

In addition, the systems built in e-commerce must be tailored to the knowledge and skills of the user community. According to [15], the evaluation of the user interface with the target users was conducted, and the technology acceptance model was used to measure users' perception of the shop-owner user interface. The statistics analysis of the data shows that users perceive the application and interface as useful, easy to use and intend to use the systems. It is supported by [16] which states that if technology is to be adopted successfully by its intended users, it is critical that an approach to software development should be used that enhances users' perceptions of its trustworthiness. Thus, knowing the behavior of e-commerce users is necessary in preparing the development of e-commerce applications, especially in developing countries.

3. METHOD

3.1 Type of Research

This type of the research is known as R&D (Research & Development). It was chosen because the objective was to develop an e-commerce application to promote Banten typical foods by using the Android smartphone as a basis. The application product developed in the research took the form of a piece of software with an Android-based operating system that could be operated in an Android-based smartphone with the (apk) extension, the initiation of an Android application program.

3.2 Model of Development

The developing model used was the result of adaptation of and collaboration with the research and development model of Borg and Gall [17], and the multimedia development model of Lee and Owens [18]. The adaptation was done to acquire a development model that fits into the characteristics of the e-commerce application research and development.

The procedure of development in this research consists of several stages adapted with the model of development. The stages include activities of analysis, design and development, validation, and product evaluation. Need analysis was completed through the observations and interviews with actors of small enterprises and candidate of consumers. The objective of the needs analysis was to obtain data that would be useful for developing the e-commerce application in accordance with the information media about Banten typical food and their needed of that. After conducting the needs analysis, the stage of design and development was conducted. The result was then evaluated in terms of its appropriateness and quality through the stage of product validation. The validation was done by media experts. Evaluation was also done by the researchers' colleagues, actors of small enterprises, and candidates of consumers. The result of the validation was analyzed to get information of the quality and to come up with suggestions for product improvement. Besides validation by experts, researcher's colleagues, actors of small enterprises, and candidates of consumers, product evaluation was also completed. The evaluation was carried out through the individual (or one-to-one) and restricted testings. The respondents of the individual testing were five actors of small enterprises. It was done to obtain their preliminary response to the original product resulted from the development phases. The restricted testing was conducted with about 89 actors of Banten typical foods' small enterprises. The testing result was then analyzed. After further possible improvements, the product can be used in the field of testing. The restricted testing was also carried out with 90 candidates of consumers. It was done to obtain their preliminary responses towards the original product resulted from the development process

3.3 Data Collection Instruments

The research data were collected by using questionnaires and interviews. The questionnaires were used in the evaluation by colleagues. It was used to get data related to acceptance of an e-commerce application of Banten typical food. This study was conducted through a survey on 89 small and medium local foods which are typical in Banten. Respondents were interviewed based on a questionnaire prepared with consideration of their knowledge of e-commerce, the availability of technological tools used in e-commerce, and their interest in e-commerce. Knowledge of e-commerce consists of their knowledge of internet and online shopping. The availability of e-commerce support tools consists of the availability of computers, smartphones, and accounts. Then, their interest in using e-commerce includes their willingness to participate in a training as well as to use the e-commerce.

The media assessment instrument in this research is questionnaires. Questionnaires were provided to the respondents in order to find out the validity of e-commerce apps based on the judgments from the media experts. The design of media assessment questionnaires was developed based on the theory of assessment criteria of multimedia learning according to some experts discussed in the theories. Questionnaire validation was developed in the form of a grid that contains of aspects and indicators of data characteristics required in this study.

Questionnaire of e-commerce apps application is validated by media experts that includes three aspects of visual display, layout, and software engineering. Assessment was developed using a likert scale of 1-4 Likert scale that has been modified by omitting the middle value of a scale of 1-5 in order to avoid ambiguity during the analysis.

The e-commerce application response instrument by users that includes experts, researcher's colleagues, actors of small enterprises, and candidates of consumers is developed to find out responses from app users after attempting to use the app in learning activities. Aspects of user responses developed consist of aspects of visual display, usefulness, and interest. The results of the analysis of this user response were used as a reference for improvement before e-commerce application is tested in the field.

4. RESULT AND DISCUSSION

4.1 Information About Small Enterprise in Banten, Indonesia

The first step in developing this e-commerce application is to perform need analysis about the features required in the application. Need analysis was conducted through focus group discussions (FGD) of the researchers. Based on FGD results, it is necessary to examine data on: producer demography, producer promotion media in marketing its products, initial knowledge of business actors toward e-commerce, knowledge of availability of e-commerce support tools, use and interest of business actors toward e-commerce; information distribution, and types of Banten typical foods.

Table 1. Demographics of Respondents

No	Demographics	Frequency (Percentage)
1.	Gender	
	Male	51 (57 %)
	Female	38 (43 %)
2.	Age	
	Unknown	3 (3 %)
	15-25 years old	9 (10 %)
	26-40 years old	25 (29 %)
	More than 40 years old	52 (58 %)
3.	Duration of business	
	Unknown	2 (2 %)
	Less than 5 years	28 (31 %)
	5-10 years	30 (34 %)
	More than 10 years	29 (33 %)
4.	Business turnover per month	
	(IDR)	12 (12%)
	Unknow	34 (38 %)
	Less than 10 million	35 (40 %)
	10 – 100 million	8 (10 %)
	More than 100 million	

Based on the results of interviews with producers, respondents' demographics were obtained in the form of sex, age, business duration, and omset, as can be seen in Table 1. The table gives an illustration that most of the food business operators in Banten area are male (57%). In terms of age, the oldest is about 40 years old and over (58%), between 25-40 years old (29%) and the rest under the age of 25 years old. The length of business is in the range of 5-10 years, or even more. Most of their business turnover is about 10-100 million per month. Based on this information, it can be considered that the category of Banten typical foods business is small business [19].

Based on Table 2, small businesses in Banten province are still marketing their products traditionally, that is word of mouth (79%). Only a small percentage of the products are sold through the internet (9%). It means that the potential of marketing by using internet media has not been seriously done. However, the use of internet for marketing is very

potential and profitable. This is stated by [20] that the advantages of using the internet to market products are in the aspect of efficiency. Marketing through the internet will save a lot of time and money. It is because internet can be accessed widely and unlimitedly by space and time, anytime, and wherever people can easily access the products using the media. Thus, small business actors need to increase their interest and ability in using the internet, so that the potential to market their products can be well achieved.

Table 2. How SME's Actors Promote Their Products

No	Way of Marketing	Number of SME (Percentage)
1.	Word of mouth	78 (79 %)
2.	Ads on the radio	1 (1 %)
3.	Cooperation of travel agency	2 (3 %)
4.	Internet	4 (9 %)
5.	Banner	1 (1 %)
6.	Work with multiple stores	2 (2 %)
7.	Others	1 (4 %)

Table 3. Knowledge and Use Practices of E-commerce Business Actor

No	Description	Internet Literation		Online Shopping		Online Shopping via Smartphone	
		Yes	No	Yes	No	Yes	No
1.	Gender Male Female	 35 (40 %) 47 (53 %)	 2 (2 %) 4 (5 %)	 29 (33 %) 41 (47 %)	 8 (9 %) 10 (11 %)	 29 (33 %) 38 (43 %)	 8 (9 %) 13 (15 %)
2.	Age 15-25 years old 26-40 years old More than 40 years old	 9 (11 %) 23 (27 %) 47 (55 %)	 - (0 %) 2 (2 %) 4 (5 %)	 8 (9 %) 21 (25 %) 38 (45 %)	 1 (1 %) 4 (5 %) 13 (15 %)	 8 (9 %) 21 (25 %) 35 (41 %)	 1 (1 %) 4 (5 %) 16 (19 %)
3.	Duration of business Less than 5 years 5-10 years More than 10 years	 26 (30 %) 27 (31 %) 27 (31 %)	 2 (3 %) 3 (4 %) 1 (1 %)	 22 (26 %) 23 (27 %) 23 (27 %)	 6 (6 %) 7 (8 %) 5 (6 %)	 22 (26 %) 22 (26 %) 21 (24 %)	 6 (6 %) 8 (10 %) 7 (8 %)
4.	Business turnover per month (IDR) Less than 10 million 10 – 100 million More than 100 million	 31 (41 %) 31 (41 %) 8 (10 %)	 3 (4 %) 3 (4 %) - (0 %)	 24 (32 %) 28 (37 %) 8 (10 %)	 10 (13 %) 6 (8 %) - (0 %)	 22 (29 %) 27 (36 %) 8 (10 %)	 12 (16 %) 7 (9 %) - (0 %)

From the aspect of internet knowledge, Table 3 shows that Banten business people have sufficient knowledge to do e-commerce. Even from the aspect of online shopping experience, about 92.15% of 40 years old above respondents are internet literate which means that they have the same proportion with 26-40 years old respondents. In terms of online shopping experience, the proportion of respondents who have online shopping experience is 78.8%, that consists of 74.5% of 40 years old above respondents, 84% are between 26-40 years old respondents, and 100% are between 15 -25 years old respondents.

Furthermore, the percentage of respondents who have done online shopping via smartphone is 75%, with the proportion of 68.6% are 40 years old respondents, 84% are between 15-25 years old respondents, and 88.9% are age between 15-25 years old. Based on these data, the potential use of the internet as a media for marketing is very large. Respondents are able to switch directly their way of selling products to the online mode. Thus, it is proved that small business actors have actually been ready to adopt the way of selling their products online. This is a big asset for the successful implementation of online sales [21].

Table 4. Test of freedom between the knowledge of e-commerce of business actors with demographic characteristics.

Variables		χ^2 score	χ^2 table
Knowledge of e-commerce	Gender	0.093	3.841
Knowledge of e-commerce	Age	4.527	5.991
Knowledge of e-commerce	Duration of business	0.669	5.991
Knowledge of e-commerce	Business turnover per month	8.573*	5.991

Independent test by using khi-square statistic was applied in order to find out the relationship between respondents' knowledge and demographic characteristics. The result of the test is shown in Table 4. Based on Table 4 it is known that knowledge of e-commerce is significantly different from business turnover variable. Knowledge of e-commerce is more widely obtained by small bussiness with an asset under 100 million per month. This indicates that small businesses in

Banten Province have the potential to be empowered through e-commerce. The producers' current knowledge shows that they need to be educated and assisted in e-commerce issues so that they can grow their businesses into the medium or large trading competition.

Table 5. The Avaibility of Technology Tools of SMEs Actors Toward E-Commerce

No	Description	Smartphone		Personal Computer		Bank Account	
		Yes	No	Yes	No	Yes	No
1.	Gender						
	Male	35 (40 %)	2 (2 %)	20 (23 %)	17 (19 %)	23 (27 %)	13 (15 %)
	Female	44 (50 %)	7 (8 %)	14 (16 %)	36 (41 %)	29 (34 %)	20 (24 %)
2.	Age						
	15-25 years old	9 (11 %)	- (0 %)	5 (6 %)	4 (5 %)	6 (7 %)	3 (4 %)
	26-40 years old	22 (26 %)	3 (3 %)	8 (10 %)	17 (20 %)	15 (18 %)	10 (12 %)
	More than 40 years old	45 (53 %)	6 (7 %)	19 (22 %)	31 (37 %)	28 (35 %)	20 (24 %)
3.	Duration of business						
	Less than 5 years	26 (30 %)	2 (3 %)	13 (15 %)	15 (17 %)	16 (19 %)	12 (15 %)
	5-10 years	25 (29 %)	5 (6 %)	9 (11 %)	21 (25 %)	18 (22 %)	10 (12 %)
	More than 10 years	27 (31 %)	1 (1 %)	11 (13 %)	16 (19 %)	17 (20 %)	10 (12 %)
4.	Business turnover per month (IDR)						
	Less than 10 million	27 (36 %)	7 (9 %)	10 (13 %)	24 (32 %)	18 (25 %)	15 (21 %)
	10 – 100 million	33 (43 %)	1 (1 %)	14 (19 %)	16 (21 %)	21 (29 %)	11 (14 %)
	More than 100 Million	8 (11 %)	- (0 %)	6 (8 %)	5 (7 %)	7 (10 %)	1 (1 %)

Based on Table 5, it is found that Banten business people have the availability of tools to conduct e-commerce, especially by using mobile phones. From 90% of respondents that own mobile phones, it was found that 82% of respondents used their phones for texting, 82% for making phone calls, 38% for browsing activities, and 4% for other activities. The 39% respondents that own desktop computer, it is noted that 82% of them used the computer for typing/ office works, 9% for browsing activities, and 9% for other activities. In addition, information obtained from 61% of respondents that have bank accounts, 24% of them took the facilities of internet banking. Thus, referring to the device ownership, small business actors in Banten are ready to adopt Android-based applications that installed on their smartphones.

Table 6. Test of independency between variables of e-commerce tools of business actors and demographic characteristics.

Variables		χ^2 score	χ^2 table
Avaibility of technology tools	Gender	4.561*	3.841
Avaibility of technology tools	Age	1.780	5.991
Avaibility of technology tools	Duration of business	1.327	5.991
Avaibility of technology tools	Business turnover per month	10.719*	5.991

Based on Table 6 it is found that e-commerce tools significantly different on gender variables and business turnover. E-commerce tools are mostly obtained by male business actors with a minimum turnover under 100 million per month. It indicates that small businesses in Banten Province have the potential to be empowered through e-commerce. Provided with adequate tools education about e-commerce and mentoring on how to develop their business into a medium or a large business, are required. Folllowed is an independent test in finding out whether there is a relationship between the availability of e-commerce tools and demographic properties.

Table 7. Interest of SMEs to e-commerce

No	Description	Want to Joint Online Business	
		Yes	No
1.	Gender		
	Male	12 (21 %)	8 (14 %)
	Female	29 (51 %)	8 (14 %)
	Missing : 1		
2.	Age		
	15-25 years old	3 (5 %)	- (%)
	26-40 years old	12 (21 %)	4 (7 %)
	More than 40 years old	25 (45 %)	12 (21 %)
	Missing : 4		
3.	Duration of business		
	Less than 5 years	11 (20 %)	4 (7 %)
	5-10 years	16 (29 %)	6 (11 %)
	More than 10 years	13 (23 %)	6 (11 %)
	Missing : 3		
4.	Business turnover per month (IDR)	21 (43 %)	5 (10 %)
	Less than 10 million	15 (35 %)	6 (12 %)
	10 – 100 million	1 (2 %)	2 (4 %)
	More than 100 million		
	Missing : 13		

Based on Table 7 it is found that Banten business actors are interested to implement e-commerce for their businesses, especially SMEs with small turnover. Of the 80% respondents who have willingness to sell their products online, it is traced that 71.43% of them are ready to be trained in using e-commerce. As for the respondent experience on e-commerce it is stated that 13.80% respondents think that e-commerce is difficult, and the rest stated that e-commerce is easy to be

implemented. Their motivation to implement e-commerce is increased because of the conveniency experienced by most business actors [22]. As mentioned by Deci motivation is an essential capital for achieving success [23].

Below is an independent test for figuring out the relationship between the availability of e-commerce tools with demographic properties.

Table 8. Reason Why SME's Actor Want to Use e-commerce

No	Reason	Frequency (Percentage)
1.	It is increasingly recognized by the wider community	21 (24 %)
2.	In order for people who know themselves	1 (1 %)
3.	Increase sales and visitors	13 (15 %)
4.	Marketing will be faster and easier	3 (4 %)
5.	Facilitate promotion	27 (30 %)

Based on Table 8, online sales promotion activities have the potential for further development. Through promotion, it is expected that correct and adequate informations related to the Banten typical foods, both the forms and the way to get the products, are provided. The developed information system is expected to meet these expectations.

Similarly, the reluctance of SMEs in Banten to do online sales generally assumes that online sales will not affect the turnover achieved. Therefore, the need for efforts to disseminate information systems potential food of Banten food so as to be able to convince that with the information system will provide great benefits in the advancement of marketing of this typical Banten food.

Table 9. The Reason Why the SME's Actors Do Not Want to Use e-commerce

No	Reason	Frequency (Percentage)
1.	Already believe in selling itself	1 (1 %)
2.	So that buyer comes directly	1 (1 %)
3.	Items sold are not durable	4 (5 %)
4.	Enough with conventional promotions	1 (1 %)
5.	Too many orders	1 (1 %)

The information system to promote Banten food products is in line with the opinion of [24] that the information system serves as the provision of food information in the region. In addition, the development of information technology on the types of food found in the area can foster the activities of e-commerce transactions that can generate community's economy. This is in line with the opinion on the Workshop on Mobile technologies for food security, agriculture and rural development. Role of the public sector that "Information technology supports this interconnectivity by providing the foundation for implementing business processes". Thus, food-related information technology greatly contributes to the role of government in the development of national food security.

Table 10. Freedom Test between the Interest Variable of E-Commerce Business Actors with Demographic Characteristics

Variables		$\chi 2$ score	$\chi 2$ table
Interest	Gender	0.730	3.841
Interest	Age	4.032	5.991
Interest	Duration of business	0.935	5.991
Interest	Business turnover per month	3.849	5.991

Based on Table 10 it is found that there is no significant different in interest and demographic variables. However, there is a tendency that over 40 years of age and less than 100 million SMEs have a high interest in implementing e-commerce. This indicates that SMEs in Banten Province have a willingness to develop by utilizing e-commerce. Therefore, there needs education about e-commerce as well as assistance in running this e-commerce.

4.2 Types and Design of E-commerce Application

Application developed in this study is based on Android operating system which is called "Kuliner Banten" and has already been available to be downloaded in Playstore using this keyword. This operating system is selected because it is a fast-growing app and more than 30% of smartphones currently use it [25]. Furthermore, [25] states that based on market share and the number of applications available, Android is a successful application base until now.

E-commerce application that has been developed serves as an information media for promoting the typical foods of Banten. This application is very useful for Banten typical foods manufacturers in marketing their products and facilitating consumers to obtain information about the products they are looking for. On the first page of the menu (Figure 1), consumers can choose the name of the city in which the various types of food available. The selected food profile displays information about the foods including the location (Figure 2). In addition, the application is integrated with google map and some online transport applications. Thus, consumers can easily reach the typical food sales area.

There are several stages of the application development. Those are: the study of analysis, design and development, validation and evaluation of the product. These steps are in accordance with that conducted by [26] namely, needs analysis, system analysis, system design, implementation and testing. The application that have been developed are shown in Figures 1 and 2.

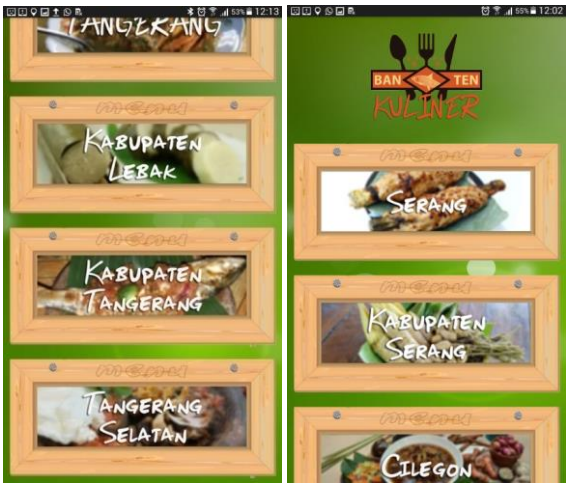

Figure 1. E-commerce application initial appearance

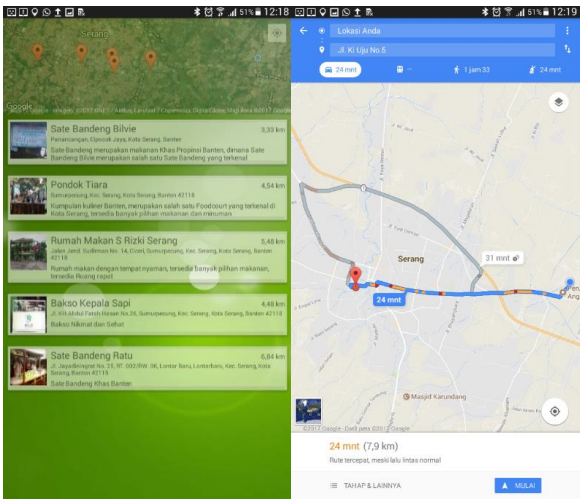

Figure 2.List of small enterprises of Banten typical food and their location

4.3 Appropriateness and Quality of the Banten Kuliner Application

The levels of appropriateness and quality of the product resulting from the development as media were measured. The validation of application appearance and programming was completed by media experts. The validation by media experts covered the following aspects: audio-visual matters, layout and navigations, and software engineering. The validation was conducted by using a questionnaire with a 1-4 Likert scale. The results of validation can be seen in Table 11.

Table 11. Media validation results

No	Aspect	Score	Max Score	Category
1.	Audio- Visual Matter	37	40	Very Appropriate
2.	Layout and Navigation	20	20	Very Appropriate
3.	RPL	27	28	Very Appropriate
4.	Total	84	88	Very Appropriate

Results of validation given by media experts indicated that all of the evaluated aspects are valid. Based on these results it is expected that the number of producers who are interested to register their food products are increased. The entire aspects of the validated application are considered as very appropriate with the total score of 84, that is 95.45% of the maximum score. Based on the results of these tests, it can be concluded that the developed application can be used in accordance with the purpose of manufacture.

4.4 User Responses in Restricted Testing

Table 12 shows a limited test of ten users. There are four aspects that are assessed related to the developed application, i.e. the visual appearance, usability, and user interest toward the application. Based on the test, the usefulness aspect has a maximum score (20), which means that all users stated that this app provides a huge benefit to them. Based on the aspect of display the score obtained was 37, that the maximum value is 92.5%. While from the aspect of interest, the score obtained was 84, which is 95.45% of its maximum value. All the scores obtained are very well categorized. In conclusion, this application has a great prospect to be successfully marketed to the public.

Table 12. Evaluation by Users

No	Aspect	Score	Max Score	Category
1.	Visual display	37	40	Very Good
2.	Usefull	20	20	Very Good
3.	Interest	27	28	Very Good
4.	Total	84	88	Very Good

4.5 Potential of Small Business Development in Banten

Related to small businesses, the Indonesian government has great expectation for this type of business. This is because small businesses have the potential to create jobs, generate currency values through export activities, and their potential to grow into larger companies [27].

However, there are some problems associated with small businesses. Some of them are access to formal finances [28], business competition [29], and access for marketing the products. difficulties in accessing finances have been anticipated by the Indonesian government through the People's Business Credit Program/ Kredit Usaha Rakyat (KUR). KUR provides conveniences for small businesses in obtaining business capitals to formal financial institutions. While the business competition and access in marketing the product still received less attention from the government. Therefore, the efforts to overcome the problem is by encouraging the small businesses to be more creative in marketing their products.

The use of internet in e-commerce is one of the right solutions. The use of e-commerce will increase networking, competence, sales and even exports [30]. The results of this research showed that small business actors in Banten province are actually ready to adopt the e-commerce. Among them are the readiness of tools, internet network, knowledge, experience, and motivation in the use of e-commerce. According to [31] the factors that influence the use of e-

commerce involves perception, tool price, compatibility, perception of usability, and convenience. Thus, business actors in Banten have met the requirements in the use of e-commerce especially to market their products.

In addition to the e-commerce readiness aspect, one of the important things is that Banten is a strategic province in Indonesia. Its position is very close to the capital city of Indonesia (Jakarta), is also as a cross path connecting the two densest islands in Indonesia, namely Sumatra and Java. Thus, geographically, Banten will be passed by the flow of community migration in Indonesia which is an important factor in the success of the business, especially in marketing the products typical of Banten.

5. CONCLUSION

Based on the discussion presented above, it is generally accepted that typical SMEs have the potential to implement e-commerce. The potential use of e-commerce is likely to be applied by SMEs with a turnover below 100 million per month. In addition, the age of entrepreneurs who enthusiast in implementing this e-commerce is about 40 and above years old. This information indicates that business actors have already been waiting to find alternative ways of expanding and developing typical Banten food businesses. The results of the study indicate that: (1) Manufacturers and consumers welcomed a typical food-related information system in Banten, (2) Android-based e-commerce applications can be applied to promote Banten food; (3) This application is suitable for use as an information medium and has excellent quality; (4) Small business typical food in Banten has great potential to be developed using e-commerce.

6. ACKNOWLEDGMENTS

This research was supported by Universitas Sultan Ageng Tirtayasa through the IsDB (Islamic Development Bank) program. We would like to thank all parties who have supported this research.

7. REFERENCES

[1] Lim, M. 2003. The Internet, social networks, and reform in Indonesia. Contesting media power: Alternative media in a networked world, 273-288.

[2] Ekasari, P., & Dharmawan, A. H. 2012. Socio-Economic Impacts by the Internet Usage of Teenagers in Villages. Sodality: JurnalSosiologiPedesaan, 6(1).

[3] Kula, V., & Tatoglu, E. 2003. An exploratory study of Internet adoption by SMEs in an emerging market economy. European Business Review, 15(5), 324-333.

[4] Tangkary, S. 2018. Siap menjadi raja digital ASEAN? Retrieved from https://web.kominfo.go.id/sites/default/files/Ekonomi%20Digital.pdf

[5] APJII. 2018. Saatnya jadi pokok perhatian pemerintah dan industri. Retrieved from https://apjii.or.id/downfile/file/BULETINAPJIIEDISI05November2016.pdf

[6] Triandini, E., Djunaidy, A. &Siahaan, D. 2013. E-commerce adoption by SME's in Indonesia : A literature review. International Conference Electronic, Information and Communication, ICEIC 2013, at 30 Januari -2 Februari 2013, Bali.

[7] Shahriari, S., Shahriari, M. &Ghiji, S. 2015. E-Commerce and It Impacts on Global Trend and Market. International Journal of Research – Granthaalayah, Vol. 3, No. 4, 49-55.

[8] Khan, A.G. 2016. Electronic Commerce: A Study on Benefits and Challenges in an Emerging Economy .Global Journal of Management and Business Research: B Economics and Commerce, 16, 1, 1-5.

[9] Kabanda, S. & Brown, I. 2017. A Structuration Analysis of Small and Medium Enterprise (SME) Adoption of E-commerce: The Case of Tanzania, Telematics and Informatics, doi: http://dx.doi.org/10.1016/j.tele.2017.01.002

[10] Garg, A.K., & Choeu, T. 2015. The Adoption of Electronic Commerce By Small and medium Enterprises in Pretoria East. The Electronic Journal of Information Systems in Developing Countries, 68, 7, 1-23.

[11] Sunthonwutinun, W. & Chooprayoon, V. 2017. A Causal Relationship Model of The Influence of Information Technology Governance Processes on The Benefits Received By Thai Public Companies. The Electronic Journal of Information Systems in Developing Countries, 80, 3, 1-24.

[12] AlGhamdi, R., Drew, S. & Al-Ghaith, W. 2011. Factors Influencing e-Commerce Adoption by Retailers in Saudi Arabia : A Qualitative Analysis. The Electronic Journal on Information Systems in Developing Countries, 47, 7, 1-23.

[13] Hudak, M., Kianickova, E. &Madlenak, R. 2017. The importance of e-mail marketing in e-commerce. Procedia Engineering, 192, 342 – 347.

[14] Avgerou, C., Li, B. &Poulymenakou, A. 2011. Exploring The Socio-Economics Structures of Internet Enabled Development : A Study of Grassroots Netrepreneurs in China. The Electronic Journal on Information Systems in Developing Countries, 49, 4, 1-12.

[15] Emmanuel, E.A. & Hippolyte, M. 2010. A User Interface for Micro-Entrepreneurs in A Rural Community.TheElectronic Journal on Information Systems in Developing Countries, 43, 2, 1-19.

[16] Isabirye, N., Flowerday, S.V., Nanavati, A. & von Solms, R. 2015. Building Technology Trust in A Rural Agricultural E-Market Place : A User Requirements Perspective. The Electronic Journal of Information Systems in Developing Countries, 70, 4, 1-20

[17] Chanyagorn, P. &Kungwannarongkun, B. 2011. ICT Readiness Assessment Model for Public and Private Organizations in Developing Country. International Journal of Information and Education Technology, 1, 2, 99-106.

[18] Cloete, E., Courtney, S. &Frintz, J. 2002. Basis of ICT development is composed of ICT infrastructure, ICT hardware, software & information system, and people. The Electronics Journal on Information Systems in Developing Countries, 10, 4, 1-13.

[19] Kuncoro, M. 2000. Usaha Kecil di Indonesia: Profil, MasalahdanStrategiPemberdayaan. Sumber, 7, 6-8.

[20] Avlonitis, G. J., & Karayanni, D. A. 2000. The impact of internet use on business-to-business marketing: examples from American and European companies. Industrial Marketing Management, 29(5), 441-459.

[21] Dholakia, R. R., & Kshetri, N. 2004. Factors impacting the adoption of the Internet among SMEs. Small Business Economics, 23(4), 311-322.

[22] Teo, T. S., Lim, V. K., & Lai, R. Y. 1999. Intrinsic and extrinsic motivation in Internet usage. Omega, 27(1), 25-37.

[23] Eccles, J. S., &Wigfield, A. 2002. Motivational beliefs, values, and goals. Annual review of psychology, 53(1), 109-132.

[24] Levy, B. 1993. Obstacles to developing indigenous small and medium enterprises: an empirical assessment. The World Bank Economic Review, 7(1), 65-83.

[25] Butler, M. 2011. Android: Changing the mobile landscape. IEEE Pervasive Computing, 10(1), 4-7.

[26] Moertini, V. S., & Nugroho, C. D. 2012. E-commerce mobile marketing model resolving users acceptance criteria. International Journal of Managing Information Technology, 4(4), 23.

[27] Tambunan, T. 2005. Promoting small and medium enterprises with a clustering approach: A policy experience from Indonesia. Journal of Small Business Management, 43(2), 138-154.

[28] Beck, T., & Demirguc-Kunt, A. 2006. Small and medium-size enterprises: Access to finance as a growth constraint. Journal of Banking & finance, 30(11), 2931-2943.

[29] Rundh, B. 2001. International market development: new patterns in SMEs international market behaviour?.Marketing Intelligence & Planning, 19(5), 319-329.

[30] Prasad, V. K., Ramamurthy, K., & Naidu, G. M. 2001. The influence of internet-marketing integration on marketing competencies and export performance. Journal of International Marketing, 9(4), 82-110

[31] Wu, J. H., & Wang, S. C. 2005. What drives mobile commerce?: An empirical evaluation of the revised technology acceptance model. Information & management, 42 (5), 719-729.