The Impact of Mobile Internet Adoption by Cocoa Farmers:
A Case Study in Southern East Java, Indonesia

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ABSTRACT

The objective of this paper is to examine the impact of mobile internet adoption by cocoa farmers into their business performance. The main factors examined in this study are creativity and innovativeness. The study sample consists of 193cocoa farmers with 24% smart phone penetrationin thirteen cocoa farmer centers in southern East Java. Data were analyzed by employing Structural Equation Modeling (SEM). The findings revealed that the business performance is significantly impacted by creativity and innovativeness. Creativity and innovativeness was measured by new product development, new process, and new marketing way; while business performance was measured by sales increase, profitability improvement and market share. This research has a limitation that the generalizability of the findings is limited to the geographical scope of the sample. Based on findings, as the practical implications of this study, to give a meaningful broadband to the farmers, all stake holders need to build a conducive broadband ecosystem for the farmer by providing better access to device, user friendly applications, and better broadband customer experience.

INTRODUCTION

Tidak main-main, sejak 2007 petani kakao di Blitar sudah memanfaatkan kemudahan mendapatkan informasi dengan menjadikan situs ekonomi dunia, Bloomberg sebagai acuan."Kami sudah akses ke Bloomberg. Kalau harga fluktuatif biasanya kami tahan dulu,"kata Mustakim salah seorang petani kakao. - It's a fact that since 2007, cocoa farmers in Blitar have been utilizing the ease of getting information and reference from Bloomberg. "We've been accessing Bloomberg, if the price is fluctuating then we will hold the stocks."said Mustakim, one of the cocoa farmer. ("Blitar", 2015).

"Tak ada system teknologi informasi yang sangat

tinggi yang kami terapkan di sini. Hanya saja di sini 17.271 petani yang tergabung dalam Gapoktan dan koperasi ini kami ajarkan cara melihat harga kakao kering dunia melalui website perdagangan komoditi kakao di bloomberg.com," ucap Kholid Mustofa, Ketua Gapoktan Guyub Santoso - *"There is no sophisticated information technology that we implemented, we thought the 17.271 farmers who are member of our farmer and credit union to check the global cocoa bean price at bloomberg. com," said Kholid Mustafa, Chairmain of Farmer Union Guyub Santoso ("Penentu Harga Kakao", 2015).*

Dari hasil tanaman kakao itu, Kampung Cokelat Blitar kini dikenal sebagai penentu harga kakao nasional – Having produced cocoa, Kampung Cokelat Blitar is known as the national cocoa bean price maker ("Potret Rupiah", 2015).

The emerging growth of mobile phone application and its' utilization are enabled by the convergence of rapid growth of broadband infrastructure development and penetration of mobile phone. Some studies highlighted the positive impact of broadband development to the economic development of a country.

Globalization will accelerate the utilization rate of information and communication technology which will contribute to the economy, for every 10% increase in broadband penetration as a main infrastructure of internet will increase GDP of 1%, and double increase in broadband speed will increase GDP up to 0.3%. This positive impact is due to automation and simplification of the process, increase of productivity, and better access on education and health facility (ADL, 2011).Based on the study by Boston Consulting Group (2010) about economy value of internet in G-20 countries stated that internet penetration in Indonesia contribute 1.3% of total GDP in 2010 and projected to reach 1.5% of GDP in 2016. This number is relatively lower compare to other G-20 countries which is 5.3% of total GDP, and potentially reach a higher rate if we compare to other G-20 countries achievement of average 5.3%.

Indonesia is an agricultural country given the role and contribution of the sector to the economy. The agricultural sector has always been a mainstay in the development of the national economy despite facing greater challenges as the influence of globalization which requires the necessity of building a strong competitiveness (Daryanto, 2009). Gumbira-Said (2010) states that improving the competence in agro-technopreneurship requires more focus and awareness on e-commerce, information technology and application of the latest technology.

One of the seed Indonesia agriculture commodities is cocoa which put Indonesia as a top three global producer country (ICCO, 2013). This commodity plantation is dominated by farmers rather than estates or corporations (Panlibuton, 2004).

USAID (2013), in their study reported that information and communication technology help farmer in expanding their market by finding new buyers, getting the highest price and trading management, compliance, and better production management. Other benefit is access to technology and information which will expand their basic income as part of their sustainability strategy (UNDP, 2012). FAO (2013) states that the role of information and communication technology in agriculture are better production system management, access to the market and financial institution; and cellular phone is the most favorite device use by the farmers in their social networking with other farmers or agriculture expert. A massif existence of ICT is a necessity for both government and private sector to increase the accessibility, content and update information (Sangha*et al.*, 2010).

Nabhani (2015B) states that there is a possibility to explore the massive development of broadband infrastructure to give the benefit to Indonesia

cocoa farmers by giving them access to a wider market and latest technology, it might increase the degree of complexity of production process but on the other hand will give them access to niche markets that appreciate a more sophisticated product type.

This study will analyze the impact of farmer's adoption on mobile internet using the model developed by Nabhani (2015A), a model that predicts that business performance will be impacted by innovativeness and creativity as the intermediary outcome over the adoption of mobile internet applications.

Literature Review

Nabhani (2015) developed a modification of Technology Acceptance Model, a model introduced by Davis (1985) to explain human behavior on accepting new technology. Business environment factors and individual factors were added as the determinant factor of Perceived Usefulness (PeU) and Perceived Ease of Use (PEOU) that finally will impact to user's intention on adopting introduced technology. The conceptual framework extended the impact of technology adoption to creativity, innovativeness and performance over the competition as presented in Figure 1. This study will focus on the technology adoption impact part of the model. This part of the model is a follow up

the recommendation from Swilley (2007) on the necessary to prove that a technology adoption will affect to the organization performance.

Nadjib (2011) states that technology adoption as a part of strategy decision will impact the innovativeness and business performance of the organization, business performance can be measured by improvement in market share, profitability, or revenue. Choi (2002) raises the importance of isolating the innovation from any other variables beside technology adoption; he proposes to use an intermediary outcome to measure the indirect impact of technology adoption to the innovativeness. The technology adoption will impact the innovativeness through the creativity as the intermediary variable (Choi, 2002). On the other hand, creativity is considered as an important variable to understand the effectiveness and sustainability of an organization (Woodman et al., 1993), as well as a seed of innovativeness (Amabile *et al.*, 1996). Creativity improvement will generate new ideas and at the end will improve the innovativeness (Lin and Liu, 2012). Conceptual framework of this research is presented in Figure 2.

METHODS
Research Procedure
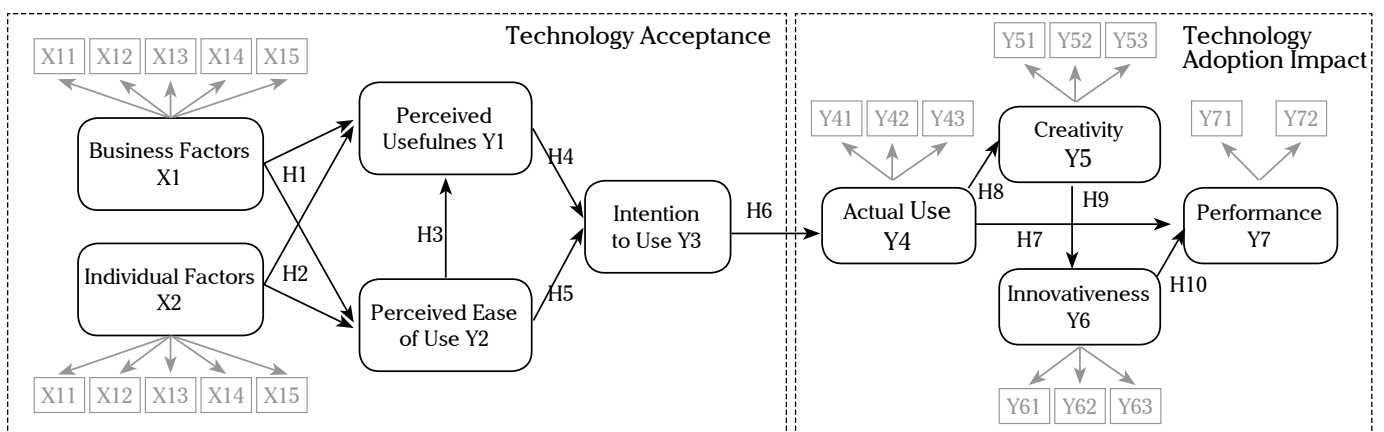This study employed descriptive quantitative

Figure 1. Conceptual framework on technology acceptance and adoption impact (Nabhani, 2015)
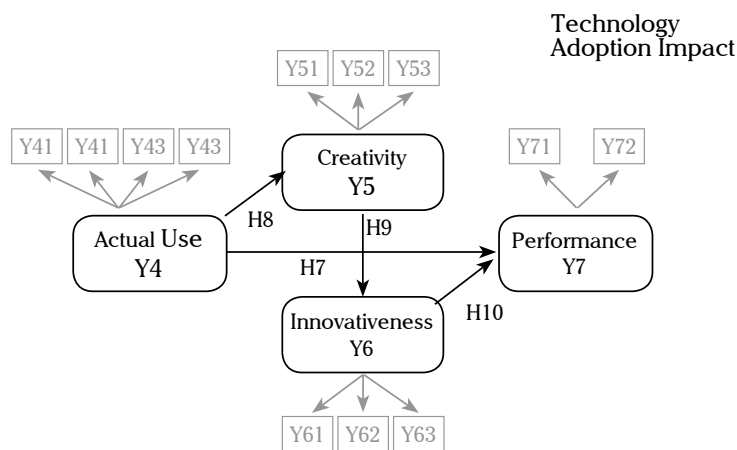
Technology
Adoption Impact

Figure 2. Conceptual framework

data analysis. Hypotheses were developed from theoretical reviews and empirical studies. Subsequently it followed a confirmatory strategy of research in which a process of confirming or disconfirming hypotheses is employed to answer previously identified research questions.

Sampling Procedure

In this study, a non-probability sampling was employed, and the sampling method used was convenience sampling. The sampling frame consisted of farmers in thirteen cocoa centers in southern East Java (Bakung, Gandusari, Kademangan, Kediri, Kesamben, Malang, Ngantang, Selopuro, Selorejo, Srengat, Trenggalek, Tulungagung, and Wonotirto). The survey method used a standardized questionnaire to collect desired information from respondents in the period of Octobersto December 2015 with total respondents of 193 cocoa farmers in those areas.

Operational Variable and Definition

All data was generated from questioners and was designed, based and modified on previous studies.

1. Business Performance

   Business performance is performance improvement after mobile internet adoption which will be measured by revenue increase and profitability improvement of their business

(Nadjib, 2011) (Nabhani, 2015) using Likert scale (1 – 5).

2. Innovativeness

   It is number of new product, new process and new marketing way after adopting m-commerce (Nadjib, 2011) using Likert scale (1 – 5).

3. Creativity

   Creativity is the eagerness of the user to create a new thing based on technology adoption and will be measured by the users' creativity (Choi, 2012) (Nabhani, 2015) using Likert scale (1 – 5).

4. Actual Use

   This variable explain the actual usage on mobile internet application such as product information, technology information, market information, internet marketing, social media marketing, and mobile banking.

Hypotheses

This research examines the following hypothesis:

H1: Mobile internet adoption has a positive impact to users' creativity

H2: Mobile internet adoption has a positive impact to business performance directly and indirectly

H3: Mobile internet adoption has a positive impact to innovativeness directly and indirectly

H4: Creativity has a positive impact to innovativeness

H5: Users' innovativeness has a positive impact to business performance

RESULTS AND DISCUSSION

Based on descriptive analysis on the sample's profile, this paper reveals some high level findings. Firstly, 48% of the age of cocoa farmers is above 55 years old, this mean that Indonesia cocoa is facing problem on farmer regeneration. Most of respondents (60%) have an education level below senior highs school, Zhang (2009) concluded that the lower educational level the lower their technology adoption capability. Based on in-depth interview with cocoa farmers association, the feasibility level of cocoa plantation will meet the scale if the plantation area is above 0.5 hectares

and it is represented by 54% of sample size. Mobile phone penetration is 60% with smart phone user of 24% out of total 193 respondents.

Validity and Reliability Test

The statistic procedures in LISREL were utilized on conducting the validity and reliability test as result presented in the following figures and tables.All the indicators will be considered valid if (SLF ≥ 0.50 and |tcalc| > 1.96) and reliable (CR ≥ 0.70 and VE ≥ 0.50).

Variable Actual Use

Based on the number on table 3, it is concluded that all the variable of Y4 of this model in this path diagram are valid due to SLF ≥ 0,50 and tcalc > 1,96; reliable with CR ≥ 0,70 and VE ≥ 0,50.
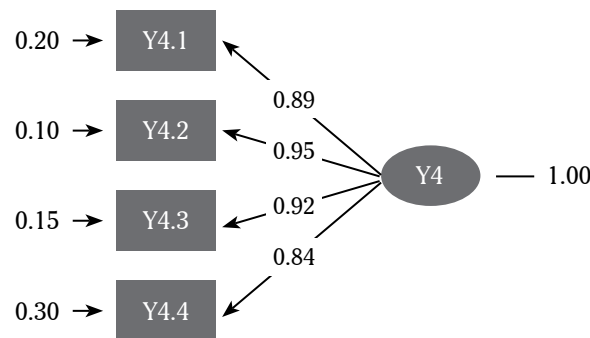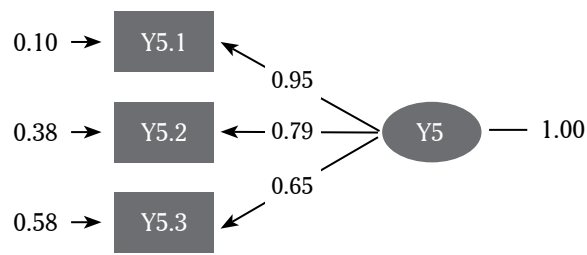

Chi-Square= 0.00, df= 0, P-value= 1.00000, RMSEA= 0.000

Figure 3. SLF Variable Actual Use

Table 3. Validity and Reliability of variable actual use

Variable	Indicator	Loading Factor	ei	T calc	CR	VE
Actual Use	Y4.1	0.89	0.20	7.59	0.945	0.812
	Y4.2	0.95	0.10	8.54		
	Y4.3	0.92	0.15	8.06		
	Y4.4	0.84	0.30	6.64		

Chi-Square= 0.47, df= 1, P-value= 0.49111, RMSEA= 0.000

Figure 4. SLF Variable creativity
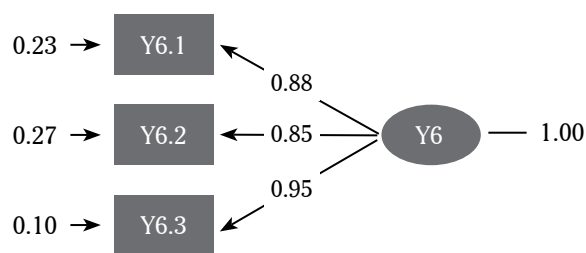
Table 4. Validity and Reliability of variable creativity

Variable	Indicator	Loading Factor	ei	T calc	CR	VE
	Y5.1	0.95	0.10	8.54		
Creativity	Y5.2	0.79	0.38	6.19	0.843	0.648
	Y5.3	0.65	0.58	4.73		

Variable Creativity

Based on the number on table 4, it is concluded that all the variable of Y4 of this model in this path diagram are valid due to SLF ≥ 0,50 and tcalc>1,96; reliable with CR ≥ 0,70 and VE ≥ 0,50.

Variable Innovativeness

Based on the number on table 5, it is concluded that all the variable of Y5 of this model in this path diagram are valid due to SLF ≥ 0,50 and tcalc>1,96; reliable with CR ≥ 0,70 and VE ≥ 0,50.
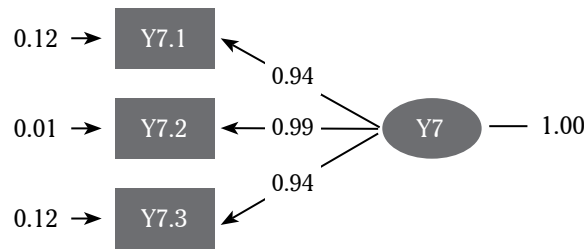

Chi-Square= 0.00, df= 0, P-value= 1.00000, RMSEA= 0.000

Figure 5. SLF Variable Innovativeness

Table 5. Validity and Reliability of variable innovativeness

Variable	Indicator	Loading Factor	ei	T calc	CR	VE
	Y6.1	0.88	0.23	7.32		
Innovativenes	Y6.2	0.85	0.27	6.99	0.923	0.8
	Y6.3	0.95	0.10	8.28		

Chi-Square= 0.00, df= 0, P-value= 1.00000, RMSEA= 0.000

Figure 6. SLF Variable Business performance

Table 6. Validity and Reliability of variable business performance

Variable	Indicator	Loading Factor	ei	T calc	CR	VE
Business Performance	Y7.1	0.94	0.12	8.34		
	Y7.2	0.99	0.01	9.32	0.971	0.917
	Y7.3	0.94	0.12	8.36		

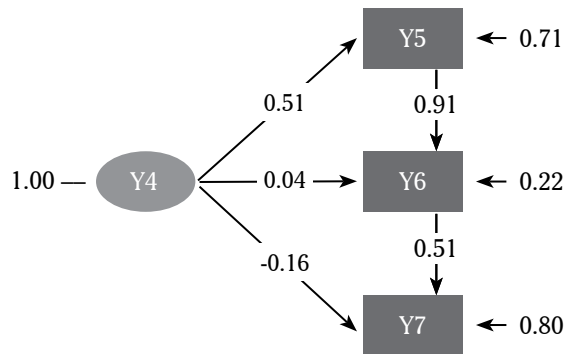Figure 7. Standardized Loading Factor (SLF) of the model

Table 7. Evaluation on path coefficient and t_{calc}

Path		Path Coefficient	T calc	Remark
Y4 ➜ Y5	γ_{54}	0.51	3.10	Signficant
Y4 ➜ Y6	γ_{64}	-0.04	-0.27	Not Signficant
Y5 ➜ Y6	β_{65}	0.91	6.07	Significant
Y4 ➜ Y7	γ_{47}	-0.16	-0.89	Not Significant
Y6 ➜ Y7	β_{76}	0.50	4.76	Signficant

Note: if $|t_{calc}| > 1.96$ ➜ significant

Variable Business Performance

Based on the number on table 6, it is concluded that all the variable of Y4 of this model in this path diagram are valid due to SLF $\geq$ 0,50 and tcalc > 1,96; reliable with CR $\geq$ 0,70 and VE $\geq$ 0,50.

Path Coefficient and T-test

The conceptual structural equation model was tested using LISREL 8.80, as shown in above table, the chi-square ($\chi 2$) is equal to 27.58 with the degree of freedom (df) is equal to 57, so that the $\chi 2/df$ (chi-square to freedom ratio) is 0.45 which is less than the cutoff good fit < 3.0, this indicates a good fit between the model and the collected data (Kline, 2004). As shown in table 7, three out of four hypotheses received significant supports (H1, H2, and H5), while two hypothesis where rejected (H2 and H4).

Goodness of Fit (GOF)

Based on the GOF table calculation result as presented in table 8, all indicators indicates that the model is good and fit. The questionnaire result is able to confirm the developed theory. The model shows a good fit between the conceptual model and the data with RMR= 0.095, RMSEA=0.000, GFI= 0.97, AGFI=0.95, CFI=1.00, NFI=0.96 (Designed cutoffs: RMR $\leq$ 0.05 or $\leq$ 0.1, RMSE RMSEA $\leq$ 0.08, GFI$\geq$0.90, AGFI0.90, CFI$\geq$0.90, and NFI$\geq$0.95, Hair et al., (2010)).

MANAGERIAL IMPLICATIONS

This study is performed to examine the impact of mobile internet adoption especially by the lower of pyramid which was represented by cocoa farmers. It is definitely that cocoa farmers with extensive usage on mobile internet perceive better business performance over mobile internet adoption.

Managerial implications on this study, based on the result of this research and past studies literature review, this paper suggest that the supporting industry along the value chain (infrastructure provider, device manufacturer and retailer, and application developer) should aim to make their services better by creating an ecosystem of mobile internet transaction in general. The three main pillars in internet ecosystem are telecommunication network infrastructure, device penetration, and supported by application. By bringing those together, it will make the internet transaction (m-commerce) become easier and useful. This will increase the awareness about those services and will push their customer loyal to their services in accepting and adopting the m-commerce technology for a long term period. These stakeholders also need to campaign the benefit of m-commerce adoption to increase the customer awareness. Community based approach is another primary consideration in deploying mobile internet service as social influence (social

Table 8. Fittest criteria on the SEM model

Goodness-of-Fit	Cut-off-Value	Result	Remark
RMR(Root Mean Square Residual)	$\leq$ 0,05 or $\leq$0,1	0.095	Good Fit
RMSEA(Root Mean square Error of Approximation)	$\leq$ 0,08	0.000	Good Fit
GFI(Goodness of Fit)	$\geq$ 0,90	0.97	Good Fit
AGFI(Adjusted Goodness of Fit Index)	$\geq$ 0,90	0.95	Good Fit
CFI (Comparative Fit Index)	$\geq$ 0,90	0.92	Good Fit
Normed Fit Index (NFI)	$\geq$ 0,90	0.96	Good Fit
Non-Normed Fit Index (NNFI)	$\geq$ 0,90	0.96	Good Fit
Incremental Fit Index (IFI)	$\geq$ 0,90	0.98	Good Fit
Relative Fit Index (RFI)	$\geq$ 0,90	0.92	Good Fit

media) is significantly affected the acceptance of technology. Individual or organization which has intention to adopt this technology should assess the projected benefit and ease of use of any internet application in their business. Government intervention absolutely is a necessary to push optimum utilization of broadband for the benefit of farmer in Indonesia.

CONCLUSION

This paper examine the impact of adoption to their business performance, existing smartphone users agree that the extend utilization of mobile internet in their business indirectly improves their overall business performance through the improvement of innovativeness and creativity by utilizing mobile internet.

This study employs a non-probability sample of cocoa farmers in southern East Java. The decision to use convenience sampling was chosen due to the respondent's availability during the survey. This method may limit the generalizability of the results of this study. Since this study only examines the mobile phone application usage at farmer level, future research that includesmore sample size on trader (local trader, district trader, and exporter) will enhance our understanding inthis specific industry. Finally, future research in different sub-sectors of agriculture will broaden our perspectives on the importance of broadband/internet adoption, thus could give us better insight of how broadband/internet adoption could have different or the same impacts across different industries. ■

R E F E R E N C E S

Amabile, T. M., ContiR., CoonH., LazenbyJ., &HerronM., (1996).Assessing the Work Environment for Creativity. *Academy of Management Journal.* 39(5): 1154–1184.

Boston Consulting Group. (2010) Socio-economic impact of allocating 700MHz band to mobile in Asia Pacific.

Blitar, Kota penentu harga kakao Indonesia. (2015, April 18). umkmnews.com

Borghini S. (2005) Organizational creativity: breaking equilibrium and order to innovate. *Journal of Knowledge Management.* 9(4):19-33.

Choi B. (2005) Organizational Performance: An Integration and Empirical Examination [dissertation] Seoul (KR). Korea Advanced Institute of Science and Technology.

Daryanto A. (2009) Dinamika Daya Saing Industri Peternakan. Bogor (ID). IPB Pr.

Davis FD.(1985) A Technology Acceptance Model for empirical testing new end-user information system: theory and result [dissertation] Cambridge (US). MIT Sloan School of Management. .

Arthur D. Little (2011) New study quantifies the impact of broadband speed on GDP [Internet]. [Downloaded 2013 Okt 19]. Available at http://www.ericsson.com/ news/ 1550083.

Food and Agricultural Organization of The United Nations (2013) ICT uses for inclusive agricultural value chains. Rome (IT).

Gumbira-Said E. (2010) Wawasan, Tantangan, dan Peluang Agrotechnopreneur Indonesia. Bogor (ID). IPB Pr.

International Cocoa Organization (2012) The Future of the World Cocoa Economy: Boom or Bust? *The World Cocoa Conference.* 2012 Nov 19-23. Abidjan. Cote d'Ivoire.

Khalifa M. & Shen K.N. (2008) Explaining the adoption of transactional B2C mobile commerce. *Journal of Enterprise Information Management.* 21:110-124.

Lin C.Y.Y. & Liu F.C. 2012. A cross-level analysis of organizational creativity climate and perceived innovation. *European Journal of Innovation Management.* 15 (1): 55-76

Nabhani I, Daryanto A, Yassin M, Rifin A. (2015) Can Indonesia Cocoa Farmers Get Benefit on Global Value Chain Inclusion? A Literature Review. *Journal of Asian Social Science.* 11(18): 1-7.

Nabhani I, Daryanto A, Yassin M, Rifin A. (2015) M-Commerce Adoption and Performance Improvement: Proposing a Conceptual Framework. *International Journal of Economics, Commerce and Management.* 3(4).

Najib M, Kiminami A. (2011) Innovation, cooperation and business performance: Some evidence from Indonesian small food processing cluster. *Journal Agribusiness in Developing and Emerging Economies.* 1(1):75-96

Panlibuton H, Meyer M. (2004) Value Chain Assessment: Indonesia Cocoa. *Accelerated Microenterprise Advancement Project.* Report#2

Penentu Harga Kakao Nasional, Coklat Blitar Justru Tak Dikenal. (2015, April 18). beritajatim.com

Potret Rupiah di Kampung Cokelat Blitar. (2015, April 6). antarajatim.com

Swilley E. (2007) An Empirical Examination of the Intent of Firms to Adopt Mobile Commerce as a Marketing Strategy [dissertation]. Florida (US). Florida State University.

United Nations Development Programme (2012) Promoting ICT based agricultural knowledge management.

United States Agency for International Development (2013) ICT Applications And Agricultural Input Supply Companies: Highlights From Africa. Briefing Paper Feb 2013.

-------------------(2013) Using ICT to Enhance Marketing for Small Agricultural Producers, Briefing Paper May 2013.

-------------------- (2013) Market Insights Into The Financial Behaviors And Design Of Mobile Financial Services Products For Cocoa Farmers In Indonesia.

Woodman RW, Sawyer JE, Griffin RW. (1993) Toward a theory of organizational creativity. *Academy of Management Review.* 18(2): 293

Zhang J. 2009. Exploring Drivers in the Adoption of Mobile Commerce in China. *Journal of American Academy of Busines.*15:64-69.