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ICT Adoption, Skill and Use Differences among Small and Medium Enterprises Managers Based on Demographic Factors

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Abstract

The Small and Medium Enterprises in economics are able to develop by Information Communication Technology (ICT) adoption. The adoption is determined by many factors, one of them is demographic. This research purpose is to examine the demographic factor differences (age, gender and education level) in ICT (computer and internet) adoption, skill and use among small and medium enterprises (SMEs) managers at Province Daerah Istimewa Yogyakarta. The research sample is the SMEs that guidance by Tenaga Penyuluh Lapangan (TPL) Badan Diklat Industri Region IV Yogyakarta as 196 SMEs managers. The analysis is using Manova Test to find out the age and education level meanwhile the gender variable is investigated by Independent Sample T-Test. The research evidence found that there is difference of ICT adoption, skill and use based on age and education level. Meantime there is no difference according to the respondent gender.

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1. Introduction

The strength of small medium enterprises was exhibit in report of Kementerian Koperasi dan Usaha Mikro, Kecil, dan Menengah (Data Statistik UMKM, 2011). The report said that in 2011, about 99,99% of Indonesian business is consist of SMEs only about 0,01% is big business. Those SMEs employ about 99,40 million workers that affected for about 57,12% of Indonesian Gross Domestic Product.

The competitiveness of SMEs are able to develop using ICT adoption in order to increase business transformation, information exchange efficiency and effectively (Rahmana, 2009), however the ICT adoption is not simple process. OECD Survey (1993) remarks that the ICT adoptions among SMEs are considered low. Based on research institution AMI Partners, at 2000 only about 20% of Indonesia SMEs have (Roosdhani, Wibowo, and Widiastuti, 2012).

The ICT adoption process is complex, moreover it's determined by many factors one of them is demographic. Kumar, Rose, & D'Silva (2008) said that gender, age, and training were influence the computer and Internet adoption. Study that is conducted by Muinde (2009) found that ICT adoption at Kenya was determined by demographic factor as age, gender, education, welfare, and literacy level.

So that to find the empirical evidence, this research purpose is to find ICT adoption, skill and use differences among SMEs managers at Province of Daerah Istimewa Yogyakarta based on their demographic factors.

2. Literature Review

2.1. *ICT adoption level differences based on demographic factor*

ICT adoption defines as willingness to take the new innovation related to computer and internet. Roger (1995) divide innovation adopter into five categories: (1) innovator, (2) early adopter, (3) early majority, (4) late majority and (5) laggard.

Some of prior research stated that demographic factors such as age, gender and education level determine ICT adoption. The younger people are adopt ICT easily compare to the oldest generation (Budiono, 2004; Nilsson, 2005; Indarti & Rostiani, 2008; Kumar, Rose, & D'Silva, 2008; Harrison & Rainer, 1992; Ongori & Migiro 2011). Not only age, gender variable also important. Earlier research revealed that the males are dominated ICT adoption (Maleka, 2011). According to Olatokun (2009) education level that are related with technology uses gap.

Based on the literature, it can develop some of hypotesis as below.

H1a. There is ICT adoption difference based on age

H1b. There is ICT adoption difference based on gender

H1c. There is ICT adoption difference based on education level.

2.2. *ICT skill differences based on demographic factor*

ICT skill consists of basic, computer and internet skill in term of operating, processing, changing, accessing and using software and hardware of computer and internet devices (Hashim, 2007). Previous study exhibit that age level associated with computer skill. The younger generation more computer skilfull rather than the older (Harrison & Reiner, 1992). In term of gender, women were considered less competence rather than men (Alazam, Bakar, Hamzah, & Asmiran, 2012). As education level represent the ICT skill so that the lower education level has lower ICT skill rather than the higher level (Olatokun, 2009).

Corespond to previous research, some hypothesis were initiated as below.

H2a. There is ICT skill difference based on age

H2b. There is ICT skill difference based on gender

H2c. There is ICT skill difference based on education level.

2.3. ICT actual use differences based on demographic factor

According to Hashim (2007) ICT actual use interpret as the application of computer and internet for working. As stated by World Bank(1998), age, gender, education level has significant effect on ICT use in our daily life. Earlier studies said that there is positive relationship between age and computer use because the older people has limited knowledge and training about computer (Harrison & Reiner, 1992; Lam, 2000; Liang dan Chao, 2002; Elsadaani, 2013). The researcher conducted by Korean Ministry revealed that women and men have different tendency to apply ICT (Sophia & Hafkin, 2007). Preceding investigation found that education level is one determinant factor to predict ICT adoption and actual use (Pijpers, Bemelmans, Heemstra, & van Montfort, 2001 ; Zhu & He, 2000; Valletta & MacDonald, 2003; Olatokun, 2009).

The hypothetical statements were arrange as below.

H3a. There is ICT use difference based on age

H3b. There is ICT use difference based on gender

H3c. There is ICT use difference based on education level.

3. Research Method

3.1. Population and Sample

The population of this research is SMEs that guidance by Tenaga Penyuluh Lapangan Industri Kecil Menengah (TPL IKM) Kementerian Perindustrian as well as 397 SMEs. Based on Bartlet determinat sample size, the researcher choose 196 respondents using simple random sampling method by software SPSS.

3.2. Data Analysis Method

In order to examine the data researcher is using multivariate analysis. The age and education level variables were investigated using Manova Test meanwhile the gender variable was calculated using Independent T-Test (Margono, 2004).

4. Result and Discussion

4.1. Demographic Characteristic

The demographic characteristic of respondent will describe below. The research respondents consist of 151 (77,04%) male and 45 (22,96%) female. Furthermore, the age and education level will exhibit at table 1 and 2 below.

Table 1. Respondent Demographic Characteristic based on Age

Age	Frequency	Percentage
20-30 year	23	11,73%
31-40 year	82	41,84%
41-50 year	69	35,20%
51-60 year	19	9,69%
> 60 year	3	1,53%
	196	100,00%

Table 2. Respondent Demographic Characteristic based on Education Level

Education Level	Frequency	Percentage
Junior High School	34	17,35%
Senior High School	134	68,37%
Diploma 3	4	2,04%
Undergraduate	24	12,24%
	196	100,00%

4.2. *Multivariate Prerequisite Test*

Before conducting multivariate test, it's necessary to having prerequisite test to evaluate data distribution using normality test (Kolmogorov-Smirnov value), covariance among group (Box's Test Equality and Levene Test) and correlation test among dependen variables (Bartlett's Test).

Hypothesis Test Summary

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of TK is normal withmean 2.617 and standard deviation 0.41.	One-Sample Kolmogorov-Smirnov test	.016	Reject the null hypothesis
2	The distribution of ICTS is normal with mean 2.125 and standard deviation 0.77.	One-Sample Kolmogorov-Smirnov test	.024	Reject the null hypothesis
3	The distribution of ICTU is normal with mean 1.848 and standard deviation 0.71.	One-Sample Kolmogorov-Smirnov test	.009	Reject the null hypothesis

Asymptotic significances are displayed. the significance level is .05.

Fig.1. Kolmogorov – Smirnov Value

Figure 1 exhibit Kolmogorov-Smirnov value below 0.05 so that the data is not normally distributed. However, the analysis is still continued because The Assumption of Manova can use equality of covariance test by looking at Box Test Equality and Lavene 'test. Box Test Equality and Lavene 'test showed insignificant as seen at Table 3 and Table 4. Thus H0 stating that there is no difference between groups is accepted. So that Manova analysis can be continued.

Table 3. Box Test Equality of Covariance Matrices^a

Box's M	98.364
F	1.303
df1	60
df2	1980.802
Sig.	.061

Table 4. Levene's Test of Equality of Error Variances^a

	F	df1	df2	Sig.
ICT A	1.220	25	170	.228
ICTS	2.118	25	170	.003
ICTU	.809	25	170	.727

In the Box's Test Equality result shows that overall variation of all groups on the dependent variable is the same. However, when considering at the Lavene' test result shows that the only ICT skills variables are not denote the

same variation. According to Hair, Bill Black, & Rolph (2007), it could be due to the large sample size in each group. Because the overall results (Box’s Test Equality) are the same then the analysis can be continued.

The next step is the correlation between dependent variable testing to see whether each of the dependent variables is different. In this study, the correlation between the dependent variable is done by considering at the results of Bartlett's Test. P value indicates the significance value of less than 0.005, so it can be concluded that the inter-dependent variable relationship does has differences each other as seen at Table 5. So that Manova analysis can be continued.

Table 5. Bartlett's Test of Sphericity^a

Likelihood Ratio	.000
Approx. Chi-Square	201.149
df	5
Sig.	.000

4.3. Multivariate Test

Multivariate test is used to test whether any independent variable affects the dependent variable as a whole, where the dependent variable has two or more factors. The test results can be seen by using the Wilk's lambda value. The test result shows that there is a relationship between the dependent and independent variables which is shown in the Wilk's lambda value on significance below 0.055. Then, Test Between Subject Effects and Post Hoc Test was done to test the effect of univariate ANNOVA for each factor on the dependent variable.

Table 6. Test Between Subject Effect

Independent Variable	Dependent Variable	Test Between Subject Effect	
		F	Sig
Age	ICT A	4,659	0,001
	ICTS	2,996	0,020
	ICTU	3,250	0,013
Education	ICT A	4,615	0,004
	ICTS	9,203	0,000
	ICTU	6,091	0,001
Gender	ICT A	0,384	0,536
	ICTS	0,002	0,969
	ICTU	0,350	0,555

Result of F Value Test (independent variables-age) on the dependent variable (ICT Skill, ICT use, and ICT Adoption) are 2,996; 3,250; and 4, 659. The result of the study also shows that there are differences in ICT Skills, ICT Use, and ICT Adoption in the age factor with a value of (0.020; 0.013; 0.001) with a p value <0.05.

Result of F Value Test (independent variables-education level) on the dependent variable (ICT Skill, ICT Sse, and ICT Adoption) are 9.203; 6.091; 4,615 and overall there are significant differences in terms of ICT skills , ICT use), and ICT Adoption in the category of education (0,000; 0.001 and 0.004) p value <0.05.

Table 7. Post Hoc Test

Dependent Variable	Group Comparison		Statistical Significance of Post Hoc Comparison		
			Tukey HSD	Scheffe	benferonni
ICTA	1	2	0,004	0,010	0,005
		3	0,056	0,093	0,069
	1	4	0,000	0,000	0,000
		2	3	0,600	0,672
	2	4	0,050	0,087	0,063
		3	4	1,000	1,000
ICTS	1	2	0,002	0,004	0,002
	1	3	0,969	0,977	1,000

Dependent Variable	Group Comparison		Statistical Significance of Post Hoc Comparison		
		1	4	0,000	0,000
ICTU	2	3	0,700	0,760	1,000
	2	4	0,001	0,002	0,001
	3	4	0,029	0,053	0,035
	1	2	0,023	0,044	0,027
	1	3	0,488	0,570	0,943
	1	4	0,000	0,000	0,000

The result of Tukey Test, Scheffe and Benferoni shows that there are differences in ICT skills, ICT Use and ICT Adoption for each category of education level: junior high school (category 1), senior high school (category 2), diploma (category 3) and undergraduate (category 4). On the dependent variable (ICT Skill) there are different categories of educational level between (1) and (2), moreover between (2) (4). On the dependent variable of (ICT use) there are different categories of educational level between (1) and (2), (2) and (4). At the ICT Adoption category there are different levels of education between (1) and (2).

4.4. Independent T-Test Analysis

Analysis of T Test is used to test dependent variable which has two group such as gender. Therefore gender variable is tested by using independent sample t-test to find differences between groups (post hoc) will not be visible on the Manova test. The result of the independent sample t-test on gender can be seen by using the t-value equal variance assumed. In this study the value of t for the variable ICT Skill, ICT Use, and ICT adoption with the level of significance (0.447; 0.305 and 0, 138). The data can be interpreted that there is no difference in the gender category of the ICT skills, ICT Use and ICT Adoption with p value <0.05.

Table 8. Independent Sample T Test

		ICT A		ICTS		ICTU		
		Equal variances assumed	Equal variances not assumed	Equal variances assumed	Equal variances not assumed	Equal variances assumed	Equal variances not assumed	
Levene's Test for Equality of Variances	F	2.661		1.640		1.925		
	Sig.	.104		.202		.167		
t-test for Equality of Means	t	-.762	-.868	-1.029	-.992	-1.490	-1.538	
	df	194	90.716	194	68.613	194	75.974	
	Sig. (2-tailed)	.447	.388	.305	.325	.138	.128	
Mean Difference	Mean Difference	-.05261	-.05261	-.13411	-.13411	-.17871	-.17871	
	Std. Error Difference	.06902	.06060	.13038	.13514	.11997	.11617	
	95% Confidence Interval of the Difference	Lower	-.18874	-.17299	-.39126	-.40373	-.41532	-.41008
	Upper	.08352	.06776	.12304	.13551	.05790	.05265	

5. Conclusion and Suggestion

The research intention is to reveal the ICT adoption level, skill and use differences based on demographic factors as age, gender and education level. Manova Test was performed to analyze age and education level variable meanwhile the gender factors was examined using Independent Sample T-Test. The data analysis revealed that there is difference of ICT adoption, skill and use based on age and education level. Meantime there is no difference according to the respondent gender.

The researcher is not yet able to found the degree of differences among each category of age, gender and education level. So that in the future it's urgent to explore more comprehensive research to understand the difference degree among category.

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