

# How Did Women Workers Get Benefit From Revolution 4.0?

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**Abstract**—The development of information and communication technology (ICT) not only raises optimism for economic progress, but also concerns for the increasing level of economic inequality due to the technological nature of capital and skill-biased. There is also fear that the digital revolution will harm women workers. This paper aims to analyze how did women can get benefits from the ICT development in Indonesia's labor market. Using data obtained from the National Bureau of Statistics, we analyze distribution of women in labor forces, based on the type of jobs and employment sectors, to understand whether they are benefited or not from the ICT development. We found that distribution of women workers in the four type of jobs (namely (1) Professionals, Technicians and similar workers, (2) Leadership and Management Personnel, (3) Administrative and similar workers, and (4) Sales Workers) and the three sector of employment (namely (1) Finance, Insurance, Building or Land Rental Business, and Company Services, (2) Large Trade, Retail, Restaurants and Hotels, and (3) Buildings), is higher than men. These are the type of jobs and employment sectors that benefited from ICT development. So, although the level of use of technology (internet and mobile phones) among women is still low, Indonesian women in workforces are more benefited from the ICT development, than men.

**Keywords:** digital technology, inequality, women in workforces, ICT development index

## I. INTRODUCTION

Wider use of digital technology provides hope for a reduction in economic inequality in Indonesia. The development of digital technology produces a new reality in the form of disruption that raises many new players who challenge old players in the economy. The possibility for the entry of new players into the economy fosters optimism for the creation of social inclusiveness. In Indonesia, the development of digital technology is expected, for example, to help Micro, Small and Medium Enterprises (MSMEs) in obtaining credit access facilities, market information, and in connecting between market participants. This is seen as helping the economic growth of MSMEs, so that it can reduce the level of economic inequality which is a big problem, both on a global and national scale in Indonesia. A survey conducted by Deloitte (2018) on executives also showed that they (87 percent) believed that Industry 4.0 would lead to better social and economic equality and stability. Technology is considered an equalizer that will provide more access to education, employment and finance

in a variety of different geographies and social groups [1].

However, there is also pessimism about how the development of digital technology can reduce economic inequality. Although technological developments are expected to eliminate poverty, social inequality and exclusion, the reality of inequality and social exclusion continues to increase [2]. Furthermore, technological developments can actually increase the level of economic inequality. According to IMF research, the main factor driving increased inequality in various countries is technological progress [3]. According to them, technological factors explain most of the increase in the Gini Ratio from the early 1980s. This supports the view that new technologies, in developed and developing countries, increase the value of skills, so there tends to be a replacement of less skilled workers. Interestingly, the study also showed that among developing countries, the effect of technological advancements was stronger in Asia than in Latin America, which might be due to the greater share of technology-intensive manufacturing in Asia.

So far there have been several studies that explicitly show the relation between ICT development and economic inequality ([4];[5]; [6]). Using panel data from 51 countries over a period of 23 years from 1981 to 2003, Jaumotte, Lall, & Papageorgiou (2013) show that compared to trade and financial globalization, technological progress has a greater impact on economic inequality. Hyytinen & Toivanen (2011) show a positive correlation between income inequality and early diffusion of mobile phones in developing countries from 1985 to 1998. Meanwhile, Kim (2012) who used the Schumpeterian analysis showed that technology advances initially reduced the level of inequality, but at a later stage it would increase inequality.

For gender perspective, the nature of technology that is skill-biased is also feared not to provide benefits to women workers. This is due to the many assumptions that women are not very familiar with technology ([7]; [8]; Liff [9]; [10]).

Compared to men, women are considered to be more unfamiliar with ICTs, so women will not benefit from the progress of ICTs as much as the benefits obtained by men. Suwana and Lily (2017), for instances, note that gender digital divide is occurring in Indonesia, and therefore

empowering women through digital media literacy skills is imperative. Liff and Shepherd (2004: 7) show that digital divide exists between men and women in terms of level of use (whether or not using internet), the amount of use and the confidence level. Antonio and Tuffley (2014: 684) notes that 'for a range of social cultural reasons, for example traditional ideas of women in society are domestic, women are being denied or are denying themselves access to technologies[10].' In addition, Brussevich, Dabla-Norris, and Khalid (2019) also note that woman workers have a higher risk of automation compared to male workers across all occupations because of ICT development [11].

Technology, however, also brings positive impact to women. For example, analyzing the socio-economy context of the rising of female local leaders in the 2015 direct local election, Dewi & Fuady (2017) discovers that human development index, poverty rate, and gini ratio of a region did not strongly correlate with the number of female leader candidates, nor with the number of the elected female leaders. Interestingly, they shows that the number of candidate and elected female leaders is concentrated in areas which have large number of universities and high proportion of internet access, such as Java; this indicates that flows of ideas and information through universities and internet access are important keys to the rise and victory of female leaders in local politics [12]. Here we can see the positive impact of technology especially in internet penetration in proliferation issues and practices of gender equality which contributes positively for the rising of female politicians and leaders. In term of labor market, Joyce Burnette (2008) in *Gender, Work and Wages in Industrial Britain Revolution* put forward an interesting conclusion. In a competitive labor market, job selection benefits women, by avoiding jobs that rely on strength, women get higher wages with their innate abilities than they would if they were represented equally across all jobs. Based on the Burnette argument, it is very likely that women will still get higher benefits if they are in employment and the types of jobs that benefit from the level of technological progress.

This paper aims to analyze whether women in Indonesia's labor market can get benefits from ICT development. Indonesian is one of the developing countries, which has different characteristics to developed countries in term of ICT development. This paper argues that although the level of use of technology (internet and mobile phones) among women is still low, Indonesian women in workforces are more benefited from the ICT development, than men. This is because usually women employed in the type of jobs and employment sectors that are benefited by ICT development.

## II. METHODS

This paper is a continuation of Fuady's (2018) paper that analysed the relationship between the progress of digital technology and the inequality between employment sectors, which is based on the assumption that technology is skill-biased [13]. As expressed by Nathalie Greenan,

L'Horty, & Mairesse (2002, 9–10), in developed countries there are concerns about the situation of unskilled workers who are getting worse, both to get jobs like in Europe and to get decent wages like in America. The concept of technological bias was first introduced in economic analysis because of the strong tendency of the production process to become more capital intensive. The new thing in the latest debate about technological bias according to Nathalie Greenan, L'Horty, & Mairesse (2002, 9-10) [15] is its focus on the composition of workforce skills. Technological developments offer higher income to skilled labor, resulting in a greater wage gap between skilled and unskilled labor [5]. Using data obtained from the National Bureau of Statistics (Badan Pusat Statistik, BPS) website, Fuady (2018) carried out a correlation analysis between ICT development index and the average monthly wage of formal workers for eight types of jobs in 34 provinces in Indonesia in the period of 2015-2016. He did also correlation analysis between ICT development index and monthly average net wage for nine employments. With the two correlation analysis, it can be found types of jobs and employment that are benefited from ICT development.

In this paper, we conducted a distribution analysis of women in labor forces (type of jobs and employments), in order to shows whether they are benefited or not from the ICT development. If more women than men employed in the type of jobs and employment sectors that have better wage because of ICT development, then we can say that woman workers are benefited from ICT development.

## III. FINDINGS AND DISCUSSION

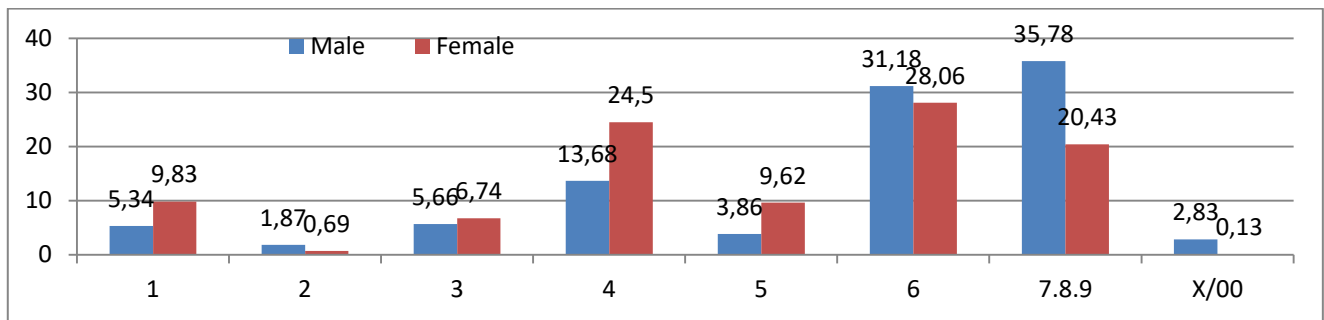
Fuady (2018) shows that ICT development index correlates very strongly with the average wage in four types of jobs, namely (1) Professionals, Technicians and similar workers, (2) Leadership and Management Personnel, (3) Administrative and similar workers, and (4) Sales Workers. The four types of jobs usually require a high level of education and skills [13]. Meanwhile, ICT development index does not have a strong correlation with the average wage in four other types of jobs. The analysis shows that digital technology is more beneficial for those who work in types of work that require high levels of education and skills. This supports the assumption that technology has a bias towards skilled labor. Therefore, the development of digital technology has a strong correlation with the level of income inequality between types of jobs or professions.

It is in line with Brynjolfsson & McAfee (2012) which states that technological advances do not automatically benefit everyone in society, because income and employment opportunities become more uneven. The progress of information and communication technology has favored several groups of skills above others [16]. The McKinsey study shows that high-skilled workers are more likely to be employed and to get wage increases [17]. This finding also corroborates the opinion of Guha (2000, 2729) that the benefits of the ICT revolution are enjoyed more by established groups, skilled workers, professionals, or white-collar workers [18]. The digital age or the

fourth industrial revolution requires workers with a variety of deep knowledge and skills that can easily move to new jobs [14]. Of course this technological progress will be worrying if there is no increase in skills and institutional adjustments in society.

For women workers, this is quite beneficial because of their distribution in labor market. Graph 1 shows that

41.76% of women in workforces are working in the four types of jobs (1-4), with average monthly wages that have strong correlation with ICT development index; meanwhile only 26.55% of men in the workforce are working in the four types of jobs. It shows that women workers get more benefit from the advancement of ICT compared to men in workforces.



Graph 1. Percentage of Working Population by Job Type and Gender (February 2018)

Source: BPS (2018)

Note: (1) Professionals, Technicians and Similar, (2) Leadership and Management Personnel, (3) Administrative and similar workers, (4) Salesperson, (5) Service Businessman, (6) Agriculture, Forestry, Hunting and Fisheries, (7.8.9) Production Workers, Transportation Equipment Operators, and Rough Workers, (X/00) Others

Technological bias is not only related to the difference in wages received by skilled and unskilled workers, but also can be seen in the type of employments. Different types of employments or economic sectors require different technologies, so the income (return) on the technology obtained is also different. Several types of employments require the use and mastery of technology more than other types of employments. In this assumption, technology intensive sectors will obtain greater revenue from technology than other economic sectors.

Fuady (2018) shows that ICT development index show strong correlation with wage rates in three employments,

namely (1) Finance, Insurance, Building or Land Rental Business, and Company Services, (2) Large Trade, Retail, Restaurants and Hotels, and (3) Buildings. Meanwhile, the average wages on other employment do not have a significant correlation with ICT development [13]. The difference in the level of correlation between digital technology and average wages in employment shows that there is a difference in income (return) obtained by people working in the nine employments. This confirms the assumption that ICT development does not correlate evenly with employment in Indonesia.

TABLE 1. Percentage of Aged 15 Years and Over Working by Employment Sectors and Gender (million), 2017-2018

Employment Sector	Men	Women
Agriculture, Forestry, Hunting and Fisheries	33.06	30.47
Mining and excavation	1.74	0.23
Processing industry	13.46	16.95
Electricity, Gas and Water	0.85	0.34
Building	9.43	0.34
Large Trade, Retail, Restaurants and Hotels	20.88	34.38
Transportation, Warehousing and Communication	7.57	1.18
Finance, Insurance, Building or Land Rental Business, and Corporate Services	3.48	2.08
Community, Social and Individual Services	9.54	14.05

Source: BPS (2018)

Further, the analysis also shows that women in workforces get more benefits than men. In 2018, there is 35.79 percent of women work in the three employments

whose wages correlate with ICT development index. Meanwhile, the percentage of men who works in these three employments is 33.79 percent. The largest

percentage of women (34.38%) work in the large trade, retail, restaurant, and hotel jobs whose wage rates has positive strong correlation with the level of ICT development. Again, this shows that female workers benefit more from the level of ICT development.

These findings seems to contradict Brussevich, Dabla-Norris, and Khalid (2019) that automatization because of ICT development will results in the loose of more jobs, which affected more women workers than men; especially unskilled and uneducated women workers, aged more that 40 years working in administration, services and marketing. However, this paper actually shows a different angle to see. For women employed in the type of jobs and employment sectors that are technological intensive, they may face higher risk to automatization [19]. However, it also means that they are in the type of jobs and employments that have better salaries because of ICT development.

#### IV. CONCLUSION

This paper begin with curiosity to un-reveal basic question of how did women can get benefits from the ICT development in the era of digital 4.0. Technological progress is one sign of the progress of human civilization. With the advancement of technology, humans can enjoy an easier way of life. However, technological progress is also considered a threat to those who do not master it. Women have been considered as facing higher risk of automatisation. This paper confirms the existence of skill-biased technology. Development of technology provides more benefits for skilled workers than for unskilled workers. There is a strong positive correlation between ICT development with wages received by workers with higher skills, and not with low skills. A strong positive correlation is also shown between ICT and wages received by workers in employment sectors that require high skills or technology-intensive jobs. Analysis of this paper shows that even though Indonesian women are more unfamiliar with ICT, there is trend that women workers are in the types of jobs and employments that are benefited more from technological advances.

Other possible positive impact from technology especially internet in opening wider opportunities for ordinary women housewives to run their bussines at home as everything can be done online should also be explored. The online business platform is absolutely important in regard to actual challenges of the competition among bussines sectors.

Further implication from this findings is that, there shall be strategy to anticipate the coming trend of changing in picture of women's workers due tu automatization which will impacted unskilled women. In this regard, as the ICT also provides positive opportunity for women to develop their own bussines at home. Thus, the sate throught its apparatuses shall encourages more women to develop small and medium enterprises business and creative industry where they can manage at home. Thus automotization and postential loss of job will create more spaces of entrepreneur women to rise. As long as there is skill, financial and support from the governance.

As the changing feature of women's workers in the 4.0 era is inevitable and affect more women. This issues shall be anticipated by all leaders from national but especially local leaders. Certainly the position of local leaders especially female leaders such as in Surabaya which supported women's entrepreneurship from home is an ideal example. There is also many opportunities to absorb women's workers such as through development of community based tourism which relies on the community's participation and initiative to circulate the economic activities.

In academic field, there is more studies needed to understand the impact and feature of online technology to women's economic role, as well as, women's expectation to traditional gender role of mothering and housewiving. As thr online technology will enable them to perform the dual role together at home at the same time. This is interesting development that shall be anticipated further.

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All authors contribute equally for this paper.

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