

From Pixels to Profits: The Digital Transformation of Indonesia's FMCG Industry

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Abstract. This study examines the relationship between digital adoption and firm efficiency in the Indonesian FMCG sector. Using operating profit margin data from 31 companies for the period 2019 to 2023, the study assesses whether the use of digital technologies is associated with changes in firm efficiency. The data are drawn from companies annual reports, with the frequency of the word digital used as a straightforward measure of digital adoption. The regression results indicate a positive relationship between digital adoption and firm efficiency, although the effect remains still not much, the accounting for around 6 percent of the variation in operating profit margin. In practical terms a one unit increase in digital adoption is associated with an increase of approximately 0.165 units in firm efficiency. Because of tehse finding, the results suggest that while digital adoption is linked to efficiency improvements it does not fully explain differences in firm performance. Efficiency in the FMCG sector appears to be shaped by a combination of operational, managerial, and external factors, with digital initiatives acting more as a supporting element rather than the main driver.

1 Introduction

Business development include many kind of activity such as market analysis lead generation build strategic partnership manage team and also quality improvement [1]. In general it can be said as effort by company to look for growth opportunity related to product process market and also business model. This activity usually need close access to top management and depend on people who have ability to use management tools in practice not only in theory [2]. Over time the focus of business development slowly change, more focus on customer driven project environment, where company use some key tools to support change in modern business model [3]. However business development still face many problem, mainly because limited human resource and financial resource, this condition often make firm difficult to pursue growth opportunity or create strategic alliance [2]. At the same time business challenge now is not only about finance but also about how to improve operational efficiency, handle employee issue, and find new area for growth [4].

Operational efficiency often improve through digitalization, especially by simplify and automate administrative and operational process [5]. Digitalization help company to work in more standard and streamline way, support faster decision making, and in some industry also

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improve safety condition such as in oil and gas sector [6]. In pharmaceutical industry company try to combine operational excellence program with digital technology to reach better operational performance [7]. In general many previous study show that digitalization have important role in improving operational efficiency across industry, even though the result is not always same in every case [8].

In FMCG industry digital adoption is related with change in supply chain management consumer behavior and also firm performance [9] [10] [11] [12] [13]. Innovation firm size and capital ownership often mention as main driver of digital adoption especially in manufacturing based company [9] [14]. Besides that infrastructure availability management quality and worker skill also strongly related with how far digital technology is adopted by firm [15]. On the other side weak management limited ICT skill and restrictive policy that limit market access can slow down digital adoption process [15]. This show that digital adoption in FMCG sector is not only depend on firm internal factor but also broader organizational and institutional condition.

For FMCG company efficient management is closely related to profitability which is very important for survival and growth especially during difficult period such as COVID 19 pandemic or when raw material price increase [16]. Efficient management help firm to optimize supply chain and reduce operational cost so company still can maintain profitability even when market price decline [16]. Evidence from other sector like financial industry in Malaysia also show that better resource utilization lead to better performance [17] [18]. This idea is also relevant for FMCG firm where effective resource management support better financial outcome. In addition organizational efficiency often associated with sustainable growth and ability to attract revenue and investment which help firm deal with market pressure and pursue long term development [19]. In competitive market efficiency also support differentiation and innovation allowing firm to adjust strategy in environment shaped by deregulation globalization and competition from multinational company [20] [21].

Several studies have shown that digital transformation can improve operational efficiency as well as labor investment efficiency, including evidence from China and North America [8], [22]. Research on Austrian SMEs also suggests that adopting digital technologies can improve financial performance through changes in business models [23]. However, the effects of digital adoption are not always straightforward. For example, studies on Korean firms find that the impact of advanced digital technologies on sales growth depends on firm productivity and follows a U shaped pattern [24]. In addition, uncertainty at the macroeconomic or industry level can weaken the positive effects of digitalization on operational efficiency [8]. Given these mixed findings, this study addresses the following research question does digital technology improve efficiency in FMCG companies.

2. Literature Review

2.1 Digital Technology

Digital technology usually understand as the use of digital object that is made from bitstrings and used to do many different function and task. This technology already become important part in modern communication and information system because it allow information to be represent store and share in many form like text symbol language sound image and video [25] [26]. One important part of digital technology is the digital object itself, which work as basic unit and has both physical form and also social function at the same time [26]. Digital technology also focus on how information is transformed, where data is processed and change into useful knowledge by algorithm and automated system [27]. In practice the use of digital technology help industrial change, and many previous study find

positive relation between digital adoption and transformation especially in sector like textile manufacturing and machinery equipment manufacturing [28].

The decision to adopt digital technology is not simple and usually influenced by many factor and different context. From technology side firm need reliable IT infrastructure and also access to digital tools before adoption can happen [29] [30]. Besides that perception about usefulness and ease of use also play important role whether technology is really used or not [31] [32]. Inside organization support from top management is very important because it affect priority and resource allocation [30] [31]. Organization culture that open to change and innovation together with availability of IT skill also support adoption [29] [30]. Financial resource also matter because digital technology need continuous investment not only at the beginning [14] [29]. Outside the firm legal and regulatory environment can encourage or limit digital adoption depends on how supportive the policy is [30] [31]. In many case competitive pressure also push firm to adopt digital technology so they can survive in the market [33].

Digital technology influence many area not only core business activity. In education it change the way learning happen and also improve teaching method especially in science based field [34]. In workplace digital technology shape how work is organized, creating opportunity but also new concern such as how to make sure AI driven system still humane and new work form like gig work does not exclude vulnerable group [35]. At the same time more dependence on digital system also bring risk, like cybercrime, which make cybersecurity become serious issue for organization and government [36]. From economic side digital technology support more efficient supply chain and help firm maintain product quality through digital quality management system [37]. More broadly information and communication technology enable global connection and influence many sector including e commerce e government and healthcare [38]

2.2 Company Efficiency

Efficiency often describe in simple meaning as how firm change input into useful output. One method that often use to see this is Data Envelopment Analysis or DEA which compare weighted input and weighted output between firm to see which one more efficient [18] [39] [40]. Another way to look efficiency is by using productivity ratio where input productivity is compare at industry level [41]. Firm that considered efficient usually able to use their resource fully and produce higher outcome, and sometimes they become benchmark for other firm that less efficient [18] [40]. Efficiency is important because it help continuous improvement and competitiveness, especially in sector like technology and finance where pressure is always high [40] [42]. In financial sector for example DEA is often used to identify firm that can organize and use resource in more effective way [18]. Similar idea also apply in technology sector where efficiency measurement help firm control input and output and improve overall performance [40].

Business efficiency is also influenced by internal factor. Human capital is one of the most important factor, because better skill and employee quality usually lead to better performance [43]. Ownership structure also can affect efficiency. Some study show firm with majority and minority shareholder tend to be more efficient, but the effect depend on who control the firm. In some situation domestic majority owner improve efficiency more than foreign owner when there is no minority shareholder, but this relation change when minority shareholder hold large equity [44]. Business strategy also influence efficiency. Firm that adopt proactive strategy such as prospector or analyzer usually perform better than firm with defensive strategy like defender or reactor [45]. Operational efficiency also matter, better resource management and lower earnings management relate with stronger resilience and performance especially in banking sector [46]. Market condition also play role. Higher market share often

link with better efficiency and moderate competition usually better than very intense competition [44]. Finally economic environment such as uncertainty and competition pressure also influence how internal factor affect business performance [45].

2.3 Hypothesis Development

Based on existing study digital adoption often link with improvement in company efficiency through several channel. Digitalization help firm to improve operational performance and productivity, mainly because digital tool allow company to simplify process and use resource in more effective way, which then lead to better outcome [8] [24] [47]. Some research also show that firm which adopt several digital technology at same time tend to have better performance compared to firm that only rely on one single solution. The use of multiple technology often associate with higher sales growth and stronger export performance, this indicate that wider digital strategy can give more benefit [24]. In addition digitalization also related with better management efficiency and help decision making process by providing information that more timely and relevant. This condition allow manager to take decision in more structured way and based on information, and in the end this can also support improvement in operational efficiency [47].

Ha: There is a significant influence of digital adoption on company efficiency

3. Methodology

3.1 Population and Sample

population for this research comprises all FMCG company listed on the Indonesia Stock Exchange. The sampling criteria for this research are FMCG companies that are public in Indonesia have annual financial reports from 2019 - 2023, and are not in the process of delisting and suspending share trading due to financial or legal problems, so the total number of FMCG companies is 31.

3.2 Data Collection

To clarify the impact of digital adoption on company efficiency within the FMCG sector based on GICS sector classification in Indonesia, this study collected data from company annual reports between 2019 and 2023 obtaine form Indonesia Stock Exchange. Digital adoption was measured by counting the occurrences of the word "digital" in each company's annual report over the specified period [48]. For company efficiency, this study used the operating profit margin ratio, calculated from the companies' annual financial reports for the years 2019 to 2023 [49].

3.3. Data Analysis

This study use secondary data about digital adoption and company efficiency. The data is process using SPSS 26. The sample focus on FMCG companies in Indonesia and the period is from 2019 until 2023. Company efficiency is taken from operating profit margin that come from annual financial report. Digital adoption is measure in simple way by counting how many time the word digital appear in company annual report in the same year. All yearly data is include in regression analysis so there is no data averaging between years.

Table 1 show general description of the data. It present mean standard deviation also minimum and maximum value for operating profit margin and digital adoption frequency.

After that regression analysis is conduct using annual observation. The main purpose is to see whether digital adoption have relation with company efficiency or not. In this model operating profit margin become dependent variable while digital adoption frequency from same year is use as independent variable. Using yearly data allow the analysis to capture difference between year and not only rely on overall average value.

Table 1. Descriptive Statistic

No.	Digital Adoption				Company Efficiency			
	Min	Max	Mean	Standard Deviation	Min	Max	Mean	Standard Deviation
1	4	12	9,4	3,44	16,84	34,98	28,92	7,54
2	0	0	0	0,00	0,52	2,77	1,51	0,85
3	10	53	30,6	16,95	5,50	14,10	9,25	3,56
4	0	2	0,4	0,89	17,18	29,20	22,34	4,75
5	1	6	3,2	2,17	0,66	9,65	4,33	3,54
6	4	10	6,4	2,19	0,14	5,15	3,53	1,98
7	0	2	0,8	1,10	-19,12	16,34	1,86	16,66
8	0	51	22,6	20,51	6,22	8,87	7,88	1,06
9	0	4	2	2,00	14,46	35,69	23,27	8,76
10	18	108	68,6	36,75	16,88	31,80	22,52	6,37
11	28	72	44,8	17,40	33,38	39,23	35,42	2,28
12	17	31	24,4	5,90	4,54	8,10	6,60	1,46
13	0	6	2,2	2,49	-18,14	3,01	-6,60	7,77
14	0	1	0,2	0,45	6,35	13,66	10,44	3,15
15	2	12	5,8	5,22	9,52	16,89	14,17	2,87
16	17	52	28,4	14,57	-0,99	20,84	6,26	8,45
17	3	7	4,4	1,67	7,99	16,20	12,02	2,99
18	0	12	4,4	4,98	6,07	31,21	21,90	9,64
19	0	14	6,6	5,46	3,84	16,56	12,17	5,04
20	9	39	23,4	11,46	8,42	28,88	18,20	9,50
21	4	19	8	6,36	6,51	32,30	21,20	11,80
22	0	3	1,2	1,64	2,05	3,47	2,47	0,58
23	6	14	8,2	3,35	5,68	7,51	6,21	0,76
24	0	2	1,6	0,89	-33,93	2,60	-14,27	13,55
25	0	0	0	0,00	14,74	21,82	18,51	2,80
26	3	28	13,8	10,28	2,23	8,80	5,31	2,72
27	0	29	16,8	11,17	-0,09	5,06	2,35	2,28

28	0	0	0	0,00	-2,48	1,53	-0,42	1,84
29	0	0	0	0,00	12,26	16,80	14,26	2,21
30	0	4	1,6	2,19	16,10	24,90	20,49	3,50
31	0	14	8,8	5,76	2,06	12,63	8,14	3,94

Data Availability The datasets generated and analyzed during the current study are not publicly available due to restrictions, such as privacy, commercials and ethics, but they are available from the corresponding author upon reasonable request.

4. Result

4.1 Classic Assumption Test

4.1.1 Linear Test

ANOVA Table

			Sum of Squares	df	Mean Square	F	Sig.
Company_Efficiency * Digital_Adoption	Between Groups	(Combined)	7131.663	39	182.863	1.414	.081
		Linearity	1313.433	1	1313.433	10.156	.002
		Deviation from Linearity	5818.230	38	153.111	1.184	.245
	Within Groups		14872.395	115	129.325		
	Total		22004.058	154			

Measures of Association

	R	R Squared	Eta	Eta Squared
Company_Efficiency * Digital_Adoption	.244	.060	.569	.324

Figure 1. SPSS Ouput Linearity Test

In Figure 1 the linearity test results show that the relationship between *Digital Adoption* and *Company Efficiency* is significantly linear, with an F value of 10.156 and a p-value of 0.002. Since the p-value is less than 0.05, this indicates that there is a statistically significant linear relationship between the two variables. This suggests that *Digital Adoption* and *Company Efficiency* are positively correlated in a linear manner. Furthermore, the deviation from linearity test shows an F value of 1.184 with a p-value of 0.245, which is greater than 0.05. This indicates that there is no significant deviation from linearity, meaning that the relationship between *Digital Adoption* and *Company Efficiency* follows a linear pattern, and there is no evidence of a non-linear relationship between these variables.

4.1.2. Heteroskedasticity

Correlations

			Digital_Adopt ion	Unstandardiz ed Residual
Spearman's rho	Digital_Adoption	Correlation Coefficient	1.000	-.072
		Sig. (2-tailed)	.	.372
		N	155	155
	Unstandardized Residual	Correlation Coefficient	-.072	1.000
		Sig. (2-tailed)	.372	.
		N	155	155

Figure 2. Heteroskedasticity Test

In Figure 2 the Spearman correlation table, the relationship between *Digital Adoption* and the unstandardized residuals shows a correlation coefficient of -0.072 with a p-value of 0.372. Since the p-value is greater than 0.05, there is no significant correlation between *Digital Adoption* and the unstandardized residuals. This indicates that there is no evidence of heteroskedasticity, as the residuals are not correlated with the independent variable, *Digital Adoption*. Therefore, the assumption of homoskedasticity is met in this model.

4.1.3. Autocorrelation

Runs Test

	Unstandardiz ed Residual
Test Value ^a	-2.76678
Cases < Test Value	77
Cases >= Test Value	78
Total Cases	155
Number of Runs	79
Z	.081
Asymp. Sig. (2-tailed)	.935

a. Median

Figure 3. Autocorrelation Test

In Figure 3 the p-value (Asymp. Sig.) of 0.935 is greater than 0.05, indicating that there is no significant autocorrelation present in the residuals. This result suggests that the order of the residuals does not display any pattern that would indicate autocorrelation. Therefore, the assumption of independence of residuals is satisfied in this model.

4.2 Regression Test

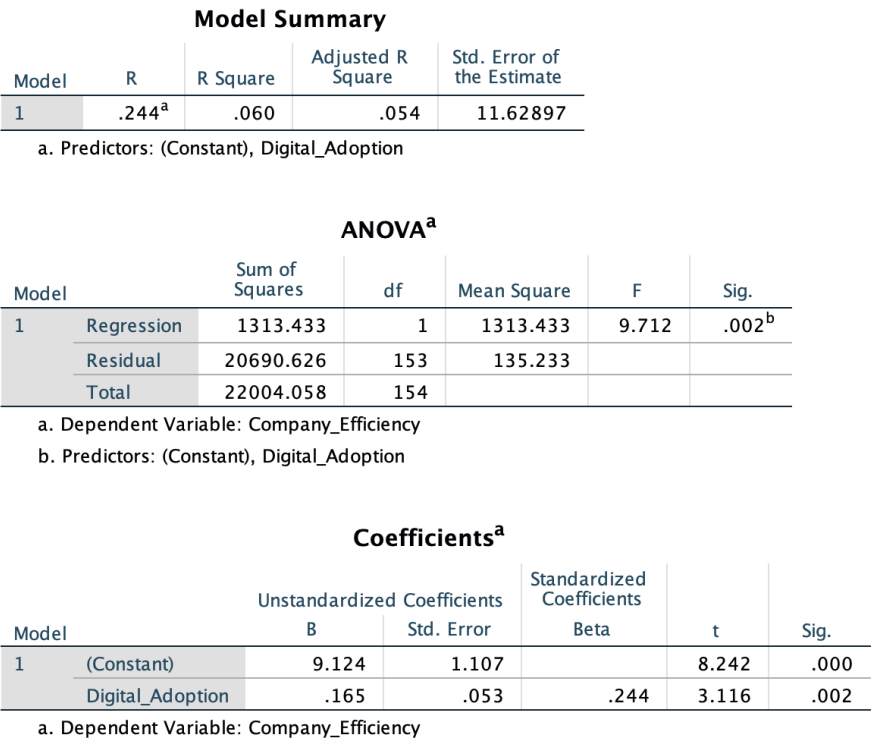


Figure 4. SPSS Output Regression Test

The regression analysis reveals a weak positive relationship between Digital Adoption and Company Efficiency, with an R value of 0.244. The R² value of 0.060 suggests that Digital Adoption explains approximately 6% of the variance in Company Efficiency, while the remaining 94% is attributable to other factors not included in the model. Although the contribution of Digital Adoption is modest, the ANOVA results (F = 9.712, p = 0.002) confirm that the overall model is statistically significant, indicating that Digital Adoption has a meaningful effect on Company Efficiency.

The coefficient for Digital Adoption (0.165, p = 0.002) demonstrates that for every unit increase in Digital Adoption, Company Efficiency increases by 0.165 units. Additionally, the constant (9.124, p < 0.001) indicates that when Digital Adoption is zero, the predicted Company Efficiency value is 9.124 units. Given the statistical significance of the coefficient (p < 0.05), the null hypothesis, which posits no effect of Digital Adoption on Company Efficiency, can be rejected. Therefore, the alternative hypothesis, which proposes that Digital Adoption positively influences Company Efficiency, is accepted. This study was align with research result from [8] digitalization improves operational efficiency, although this effect can be moderated by various levels of uncertainty

5. Conclusion, Implication, and Further Research

5.1 Conclusion

This study shows that digital adoption is positive related with efficiency of FMCG companies in Indonesia although the effect is not really strong. Based on operating profit

margin data from 2019 to 2023 companies with higher digital adoption usually show better efficiency compared with companies that use less digital. The regression result shows R squared value 0.060 which means digital adoption only explain about 6 percent of variation in company efficiency and the rest come from other factors outside this study. Even if the contribution is small the result still indicate that digital technology has some role to support operational efficiency in FMCG sector but not as the main driver.

5.2 Implication

The findings of this study give some practical implication especially for FMCG companies in Indonesia and also other emerging markets. The positive relationship between digital adoption and efficiency means companies still need to consider digital initiatives in their daily operation even though the impact is not very big or fast. Digital tools can help improve process reduce cost and support overall performance in long run. From policy side the result also show government role is important to encourage digital adoption through better digital infrastructure regulation and incentives. At company level attention also should be given to employee training and skill development because digital technology will not be effective if employees cannot use it properly in practice.

5.3 Further Research

Despite the contribution of this study there are still several limitation that can be considered for future research. First this study only focus on FMCG sector so future research can explore other industry such as manufacturing or service to see if the result is similar or not. Second this study only use operating profit margin as main indicator for efficiency, while future study can add other performance measure like return on equity or asset utilization ratio to see efficiency from different side. Finally the time period in this study is still limited, using longer period and longitudinal data may give better understanding about how digital adoption affect firm efficiency over time because digital transformation usually happen slowly and not directly.

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