Profitability analysis of mobile payment companies in Ghana: A comparative study in the pre-pandemic period

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Abstract

The application of emerging payment methods such as mobile payment (m-payment) was not common in Ghana until recently when these emerged through major service providers who have penetrated Ghanaian markets. These major providers have created many opportunities and innovations for small entrepreneurs in Ghana who are now discovering business opportunities in m-payments. This study uses secondary data from the global consolidated financial statements to compare the profitability, investor confidence, and efficiency of operation of the four m-payment providers operating in Ghana. The one–sample *T*-Test, One-way ANOVA, reliability test, parametric and nonparametric correlations tests were performed on the financial data. The study revealed that MTN (a mobile payment company in Africa) portrays better profitability than the other three competitors do within the 10 years of measurement. Cronbach's Alpha indicates positive internal reliability. The study recommends that the management of Vodaphone, Airtel and Tigo must engage in stakeholder consultations to unearth the reasons behind low profitability and performance.

Keywords: Financial inclusion, mobile payment, pre-pandemic period, profitability;

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1. Introduction

Most Ghanaian citizens are of the view that mobile payment (m-payment) companies hardly make a profit since the industry faces a high degree of uncertainty. Critics, on the other hand, assume that the industry players are enriching themselves at the expense of merchants, customers and their investors. This is because major players in the industry have ignored the primary objective of the corporate existence of maximising shareholders' wealth. Investors often see market share prices continuously declining or receive little to no dividends at the end of the financial year.

It is, however, necessary to find out the actual profits between the competing firms to increase the confidence level of investors and restore financial trust in the users, merchants and providers. This research aims at comparing the profitability of the four major m-payment companies that have subsidiaries around the globe and assess the level of trust and confidence of their investors in the company as well as their efficiency of operations.

Although m-payment is an emerging method in Ghana and worldwide, there are many problems encountered by merchants, companies, and customers (Dehnert, 2020). Even though these problems might have received the attention of researchers in the Western world, it has not received much critical attention from researchers in Ghana. A review of the extant literature on m-payment indicates that most of the research was conducted within the context of developed economies (Xia et al., 2023). The few studies conducted within developing countries context focused only on the customer adoption of m-payment and were very skeptical in relating their research to financial performance. This has created a vacuum of knowledge about how profitability, investor trust and efficiency can be compared between Ghana m-payment companies. This study seeks to fill this research gap by examining the operations of m-payment companies in terms of their profitability, efficiency and investors' confidence and trust in the industry. Besides, the recent happenings in m-payment in Ghana are worrying and have reduced many customers' and investors' confidence and trust in using the payment method (Koghut & Al-Tabbaa, 2021). Therefore, this research aims to investigate the financial performance of m-payment companies in terms of the extent of the achievement of management objectives of maximising profitability, improving investor trust and assessing the efficiency of operations (Fierro et al., 2014).

1.1. Purpose of study

The general objective of the study is to fill the gap in the literature and contribute to the general body of knowledge and research work in the area of m-payment profitability in Ghana to support financial transactions. To achieve the general objective, specific objectives have been developed to drive the research. The study seeks to achieve the general objective through the accomplishment of the following three specific objectives;

1. To examine how m-payment profitability differs from each other in the same industry.

2. To investigate the level of investors' confidence in m-payment companies.

3. To ascertain ways m-payment companies operate more efficiently than each other in the same industry?

The major questions that will be addressed in this study are: what is the profit comparability among m-payment companies? To achieve the research objectives, this study adopts the approach used by Havrylchyk and Jurzyk (2006) by investigating research questions instead of research hypotheses. The specific questions that will be posed to achieve the research objectives include the following;

i. To what extent does m-payment profitability differ from each other in the same industry?
ii. What is the level of confidence of investors in m-payment companies?

iii. In what ways can m-payment companies operate more efficiently than each other in the same industry?

1.2. Conceptual background

The research field for this study is finance and the subject area of study is profitability measurement. The study seeks to add more unique contributions to the field. Finance is very important to the growth of every organisation. It is, therefore, necessary to undertake research in this area on key and emerging issues that need attention for the benefit of the m-payment companies, Merchants, and their customers in Ghana. The study explores theoretical and practical ideas in the field of finance and makes significant contributions to expand the frontiers of knowledge. The subject area is the focus of the study. Merritt (2011) considered m-payment as the next phase in the evolution of person-to-person financial transactions. In this, the study hopes to explore the phenomenon, which is very important in Ghana from a financial perspective, and relate these to the companies' performance. Devinney (2009) argued out that, first, corporations exist to generate economic returns, not to solve societal problems. However, understanding the practice concept of the m-payment situation in Ghanaian society and its associated profitability is essential for m-payment companies and agents to assess the financial performance of their businesses.

According to Klein and Mayor (2011), m-payment is growing at a remarkable speed around the world; in the process, it is creating considerable uncertainty which requires an appropriate regulatory response to this newly emerging service. Since m-payment lies at the interface between financial services and telecommunications, it has raised interoperability issues that affect their profitability. This study examines their profitability and assesses how mobile companies operate efficiently to build investors' confidence. It assesses the relationship between the profit margin among the companies throughout 6 to 10 years trend in Ghana. m-payments are financial transactions undertaken using a mobile device such as a mobile phone. Consumers may initiate and authorise electronic payments through several other electronic channels such as the Internet or card and phones.

1.3. Significance of the study

There is a need to fill the gap in the literature as far as this important study is concerned. The research will have theoretical, practical, and policy implications. Theoretically, findings on the research objective, which deals with examining the profitability of m-payment companies, can contribute to the body of knowledge on ways of measuring profitability for their inclusion in future theories and models and provide further insight into the ongoing debate on m-payment interoperability issues. The findings can also encourage the adoption of a multiple-theoretical approach to research in profitability and efficiency and call for further research into the area. Theoretically, the results of this study contribute to the adoption of m-payment companies as financial intermediation within the framework of the neoclassical growth model.

In terms of practice, the findings of research objective two, which deals with investigating the level of investors' trust in m-payments companies, can encourage organisational managers to play strategic roles in increasing share prices. It will also encourage financial intermediaries to bring out innovations that will promote shareholder wealth maximisation. The findings will also encourage managers to provide relevant educational training programmes to more competent staff in managing share prices to build investors' trust and confidence in the organisation.

In terms of policy, the findings on the research objective which shows how efficiently m-payment companies operate can contribute to practice guidelines on attracting foreign direct investment and institutional investors. The findings can also serve as a signal to practice-makers, market operators, and regulators in the m-payment industry to engage in effective dialogue with government agencies to

shape policy formulation and implementation. The research will advance the frontiers of knowledge and lead to a new way of thinking about the financial situation of m-payment companies as well as paving the way for further research in the field of m-payment in Ghana.

1.4. Literature review

The review considers the theoretical premises for measuring financial performance and elaborates on how the research gap was identified from the existing literature and the need to fill the gap. It also spells out the key assumptions underlying the study and the definitions of key terms in finance used in the study. The conceptual framework (Figure 1) for the study is pointed out to establish a focus for the study and its linkage to the existing knowledge.

Figure 1

Conceptual Framework
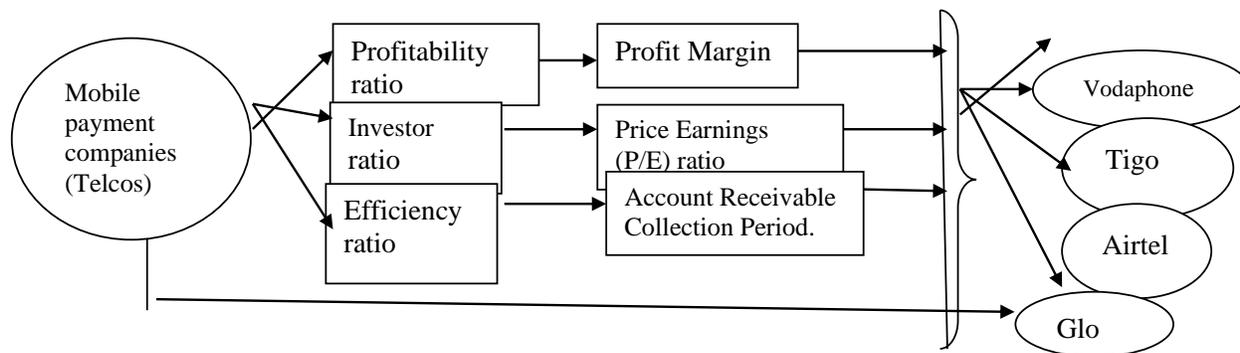
Source: Author's construct (2020).

The framework focuses on the key sub-ratios used for the study. Each of these sub-ratios of measurement applies to each m-payment company and thus making easy comparability between them except Glo whose consolidated financial statements were very difficult to come by thus, cannot be compared with the other four companies in the sector. The importance of the framework is that it helps to set the direction and focus for the research while allowing future researchers to identify areas that the current research fails to cover for inclusion in their future studies.

1.4.1. Related literature on empirical perspectives of measuring financial performance

Financial measures are intended to help companies to analyse their activities from a financial standpoint and provide useful information needed to make good management decisions. By themselves, the financial measures do not provide the answers they need unless reviewed with each other to be used to make financial and non-financial decisions. Decision-making can be improved by using available financial information and through effective financial planning and analysis. Different methods have been used by researchers to determine financial performance. However, these measures can be broadly categorised into four ways: market-based analysis, horizontal analysis, vertical analysis and ratio analysis. Shareholder value is now widely accepted as an appropriate standard for performance in U.S. businesses. It is said that the primary goal of a company's existence is the maximisation of shareholders' value.

1.4.1.1. Market-based analysis: theoretical perspectives

This measure creatively links the firm's accounting data to its stock market performance. The search for the best financial performance measure has made some researchers refine economic value added (REVA) to provide an analytical framework for evaluating operating performance measures in the context of shareholder value creation. Others are of the view that economic value added performs quite well in terms of its correlation with shareholder value creation, but REVA is a theoretically superior measure for assessing whether a firm's operating performance is adequate from the standpoint of compensating the firm's financiers for the risk to their capital. Market-based measures of assessing financial performance can be useful for comparing large multinationals' market and share-based information for traded companies. However, the perspective has been criticised as it is not useful to non-listed companies. The perspective is adopted in this study to help explain how the result of price earnings ratios helps to determine the level of investors' confidence in m-payment companies.

1.4.1.2. Horizontal analysis

Wing et al. (2008) proposed horizontal analysis. Horizontal analysis involves calculating the percentage change of the categories of the company's financial statement over time to assess the trend of the company's expenses. By examining the percentage change from year to year in operating expenses, it can determine whether costs are shrinking or growing. However, horizontal analysis has been criticised as the technique does not take into account the changing size of the company's business. Horizontal analyses (also known as trend analysis) are a financial statement analysis technique that shows changes in the amounts of corresponding financial statement items over some time. It is a useful tool to evaluate trend situations. For example, this analysis can be performed on ratios such as the price earnings ratio chosen in this study as well as other investor-related ratios. It enables analysts to assess relative changes in different line items over time and project them. Horizontal analysis also makes it easier to compare growth rates and profitability among different companies.

A common problem with horizontal analysis is that the aggregation of information in the financial statements may have changed over time, so that revenues, expenses, assets or liabilities may shift between different accounts and therefore appear to cause variances when comparing account balances from one period to the next. The theory is adopted to explain both the first objective on profit margin as well as the second objective on investor ratios using the price earnings ratio for the four m-payment companies in Ghana.

1.4.1.3. Vertical analysis

The vertical analysis perspective is the process of reporting each item on a set of financial statements as a percentage of larger items. However, a single vertical analysis has been criticised because it is not very useful to most managers. Vertical analysis is a method of financial statement analysis in which each line item is listed as a percentage of a base figure within the statement. Thus, line items on an income statement can be stated as a percentage of gross sales, while line items on a balance sheet can be stated as a percentage of total assets or liabilities, and vertical analysis of a cash flow statement shows each cash inflow or outflow as a percentage of the total cash inflows.

Vertical analysis makes it much easier to compare the financial statements of one company with another, and across industries – because one can see the relative proportions of account balances. It also makes it easier to compare previous periods for time series analysis, in which quarterly and annual

figures are compared over several years to gain a picture of whether performance metrics are improving or deteriorating. These types of financial statements, including detailed vertical analysis, are also known as common-size financial statements and are used by many companies to provide greater detail on a company's financial position. The perspective is adopted to help explain industry benchmarks on revenue changes in current assets concerning the account receivable collection period for 10 years.

1.4.1.4. Ratio analysis

The most commonly used technique proposed by White et al. (2005) is the ratio analysis. Ratio analysis is a family of techniques that involves computing common ratios of different items on the income statement and statement of financial position categories and comparing these ratios to those of other companies. This perspective is mostly preferred in investigating specific financial concerns. However, it has been criticised for a situation where the industry is new and has no comparative years. The reliability of ratio analysis in the analysis of financial performance naturally depends on the reliability of the accounting information on which it is based. Another problem is that there is no underlying theory to help us identify which items or ratios to look at and to guide us in establishing benchmarks. While there are numerous financial ratios, ratio analysis can be categorised into main groups: liquidity ratios which measure a company's ability to pay off its short-term debts as they come due using the company's current or quick assets, and working capital ratio.

Solvency ratios, also called financial leverage ratios, compare a company's debt levels with its assets, equity, and earnings to evaluate whether a company can stay afloat in the long term by paying its long-term debt and interest on the debt. Profitability ratios show how well a company can generate profits from its operations. Efficiency ratios also called activity ratios, evaluate how well a company uses its assets and liabilities to generate sales and maximise profits. Gearing ratios measure a company's ability to make interest payments and other obligations associated with its debts. These are the most commonly used ratios in fundamental analysis. The perspective is adopted to help explain common bases used for computing the ratios among the m-payment financial performance.

1.4.1.5. Measuring profitability ratio

Profitability measures the extent to which a business generates a profit from the factors of production: labour, management and capital. Profitability analysis focuses on the relationship between revenues and expenses and on the level of profits relative to the size of investment in the business. Four useful measures of firm profitability are the rate of return on firm assets, the rate of return on firm equity (ROE), gross profit margin and net profit margin. The two ways a firm can increase profits are by increasing the profit per unit produced or by increasing the volume of production while maintaining the per unit profit. The gross profit margin focuses on the per unit produced component of earning profit. Net profit margin comes directly off the income statement and is calculated by matching firm revenues with the expenses incurred to create those revenues, plus the gain or loss on the sale of firm capital assets. In general, profitability ratios measure the efficiency with which the company turns business activity into profits. This study uses profit margin as a profitability measure as it uses operating margins. Profit margins assess the ability to turn revenue into profits. Operating margins are calculated by dividing operating profit by capital employed. Capital employed is also computed by subtracting current liabilities from total assets. A high-profit margin is important because it shows how investment in net total assets is used to generate operating profit. It shows how efficiently the company uses investments in assets to earn profits.

1.4.1.6. Measuring financial efficiency

Financial efficiency measures the degree of efficiency on how efficiently a company has managed short-term assets and liabilities, (working capital,). Three measures of financial efficiency that are important in

the management of working capital are the account receivable collection period, the account payable payment period and the inventory turnover period. With each ratio, the average value for the year is used but it is common for the year-end value to be used to obtain figures for comparative purposes. This study uses the account receivable collection period as a measure of efficiency. The account receivable collection period gives the average period of credit being taken by customers. The lower the ratio, the more efficiently assets are being used to generate revenue. The account receivable ratio is a very important measurement of efficiency for m-payment companies as m-payment companies are now expanding the types of services they offer to customers in the form of data and various financial services. It is important to measure how many average days it takes customers to pay for the services they use their mobile phones to purchase from the companies.

1.4.1.7. Measuring investor ratios

Investor ratios are used in corporate finance for a variety of purposes, including assessing the effects of proposed financing [earnings per share (EPS)]; valuing a target company in a takeover (using the price/earnings ratio), analysing dividend practice (using the payout ratio) and predicting the effect of a rights issue (using dividend yield) such as EPS. The price earnings ratio is seen as a key ratio by stock market investors. It shows how much an investor is prepared to pay for a company's shares, given its current EPS. The ratio can therefore indicate the confidence of investors in the expected future performance of a company. The higher the P/E ratio relative to other companies, the more confident the market is that future earnings will increase. The payout ratio is often used in the analysis of dividend practice. For example, some companies may choose to pay out a fixed percentage of earnings every year and finance any investment needs not covered by retained earnings from external sources. For this reason, this study uses price earnings ratio to compare the share performance of the m-payment companies as a basis to assess investors' confidence in their companies.

1.4.2.   Variable definitions

This research uses finance-specific variables. This section defines these variables and theoretically establishes their measurement for the study (Table 1).

Table 1

Variable Definitions

Variable	Definition	Measurement
Profitability ratios:		
ROCE	Return on capital employed	Profit before interest and tax (PBIT) as a percentage of capital employed
ROE	Return on equity	PBIT as a percentage of equity shareholders' funds
**Profit margin	The efficiency with which costs have been controlled in generating profit from sales	PBIT as a percentage of capital employed
Efficiency ratios:		
**Account receivable collection period	The average period for payment of credit taken by customers.	Trade account receivables expressed over credit sales for several days in a year.
Account payable payment period	The average period for payment of credit taken by the firm	Trade account payables expressed over credit purchases for several days in a year.
Inventory turnover period.	Several times inventories are sold within the year.	Inventory expresses the cost of sales for several days in a year.
Investor ratio:		

**Price earnings ratio	Indicates investors' confidence in the expected future performance of the company.	Expressed as a percentage of the market price of a share over the earning per share.

**Represent sub-ratios used for this study.

Source: Author's construct.

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1.4.3. *The rationale for the study and its linkage to the existing knowledge*

The rationale for this study on m-payment is to depict the major changes in profitability that have taken place in the industry for the last 10 years which the previous study did not cover. The existing knowledge on m-payment focused mostly on consumer adoption without considering profit measurement and comparability that may occur among m-payment companies in the future (Abdullah & Naved Khan, 2021; Alhassan et al., 2020). Also, critics argued out that the methods of analysis used by previous researchers were very limited in customer adoption. This study extends their research by adopting contemporary methods of analysis such as ANOVA, Cronbach alpha, correlation test, and One-Sample Test of Statistics to explain the findings of the result of secondary data for the past 10 years of companies' existence. Filling the gap therefore will establish a solid linkage between previous investigations and contemporary practice.

2. Materials and Methods

2.1. *Research design*

The study uses a mixed research method (that is both quantitative and qualitative research methods) by the use of a simple financial matrix to first collect the required secondary data of interest. The collected data are then arranged according to the basis or the formula of the variable used for the analysis. The secondary method used involves the collection of large amounts of financial data from four m-payment companies' consolidated financial statements. The purpose of using the mixed method is useful because of the following obvious reasons: first, both quantitative and qualitative data together will provide a better understanding of the research problem than either of them. Second, either quantitative or qualitative will not be enough to answer all the research questions that the two together can answer (Kerlinger & Lee, 2000).

2.2. *Data collection method*

The secondary data were collected using a financial matrix of formulas. Descriptive statistics were first used as basic analysis followed by easy-to-understand complex statistical tests which the previous researchers did not use. The secondary data collection was done through the consolidated financial statements which covers all the operations of the m-payment companies around the globe.

The study is in effect based on the descriptive and uses the comparative method. The format helps to test the research questions developed on the premise that the financial performance of the m-payment companies can be compared and the reason for their differences sought out. This research follows philosophical and epistemological approaches, namely positivism and constructivism which have dominated the search for knowledge. The positivist approach emerged following questions raised concerning the approach employed by researchers which was described as speculative, without empirical stance. In the thinking of proponents of positivism, as espoused by Sarantakos (1993), the methods of research ought to be scientific, in the study of society and people; as it was seen rather than as they were interpreted by philosophers and theologians.

The study employs secondary data based on the objectives of the study which were related to the research questions. The secondary data collection is justifiable because much work has already been done to provide financial records of mobile companies for public use. Secondary data are data that have already been collected elsewhere, for some other purpose, but which can be used or adapted for the study being conducted. Such secondary data is information obtained mostly from different published sources like audited financial reports by companies or statistics published by private and government agencies.

Audited annual financial reports of the various m-payment companies showing the financial performance of all the m-payment companies in Ghana were collected. The annual financial reports of m-payment companies provide information on total income earned by the m-payment companies for the year, EPS, value of current assets, total liabilities and shares outstanding at the end of the year. The financial matrix was designed to collect the financial information for each variable of interest and then computed according to the conventional formula to obtain a single figure for the variable being measured.

2.3. Population and sampling

Theoretically, Parahoo (1997) defines population as 'the total number of units from which data can be collected', such as individuals, artifacts, events or organisations. Burns and Grove (2003) described the population as all the elements that meet the criteria for inclusion in a study. Population data are data arising as a result of investigating the population. A population is a group of people or objects of interest to the data collector. The populations of this study are the five m-payment companies (MTN, Vodaphone, Glo and Airtel/Tigo) registered in Ghana and their branches around the world. The study adopted a non-probability sampling because of the intention to include all five companies. Non-probability sampling does not follow the guidelines of mathematical probability. In adopting the non-probability sampling, the quota sampling method was used. In quota sampling, the researcher targets a certain quantity up to a desired quota. The reason for using quota sampling in this study is that it is the only possible approach in this situation that would yield enough accurate information as all the five registered companies are used in the study.

Polite et al. (2001) define a sample as 'a proportion of a population'. In quota sampling, no sampling frame is necessary because the researcher aims to cover a particular sample up to the desired quota. However, the study aims to gather information from all five m-payments in Ghana and their branches abroad except Glo which information was very hard to come by. Therefore, the sample size of this study is the four chosen m-payments companies in Ghana (MTN, Vodaphone, Airtel, and Tigo) and their branches abroad. The sampling excludes Glo which financial statements were very hard to come by. Airtel/Tigo information was collected and treated as separate financial information but the two firms have recently merged.

2.4. Data analysis

The data collected were analysed using a statistical package for social sciences (SPSS) version 21, the latest version to describe the variables collected. Statistical analysis can be conducted using two main methods. One is simply by using a generalised spreadsheet or data management program such as MS Excel or through using a specialised statistical package such as SPSS. The use of SPSS provides the result in the form of a panel data framework. Panel data can be described as data containing time series observations of several variables. With panel data, the study can provide answers to all the research questions for the achievement of the research objectives. This is because panel data have the capabilities that enable a researcher to analyse several data over serial years. The research analyses financial data over the last 10 years from 2010 to 2019.

2.5. Ethical considerations

According to Bell (2005), research is considered ethical when it satisfies the demands of justice, respect and protection for those involved. Hence, ethical issues ought to be considered whenever research would be associated with the collection of data from human participants. Further, individuals' anonymity and confidentiality of the companies were assured and maintained, and every finding would be treated with the utmost confidentiality and would be for this research only. This assurance would be the way for the research protocols to be operationalised (DeRenzo & Moss, 2005). This research protects the m-payment companies because the raw data used for the analysis were the same information provided by the companies on their audited consolidated financial statements which were published for public use.

3. Results

Table 2

*Profitability Ratio (Profit Margin) PBIT/Sales * 10*

Year	Mtn	Vodaphone	Airtel	Tigo	Ranking
2010	0.28	0.21	0.25	0.27	MTN
2011	0.32	0.12	0.16	0.28	Tigo
2012	0.28	0.24	0.15	0.20	MTN
2013	0.29	0.11	0.17	0.13	MTN
2014	0.27	0.10	0.15	0.15	MTN
2015	0.28	0.05	0.18	0.13	MTN
2016	0.32	0.03	0.35	0.11	Airtel
2017	0.24	0.08	0.37	0.15	Airtel
2018	0.33	0.09	0.37	0.16	Airtel
2019	0.35	0.02	0.32	0.13	MTN

Within 10 years, MTN can be ranked as the highest profit-making m-payment company for 6 years while Airtel is the next viable company for 3 years (Table 2). Tigo and Vodafone are the low profitable companies with one or no better years of profitability when compared to their competitors**.**

Table 3
*Profitability (Profit Margin) PBIT/sales * 100*

	Descriptive statistics				
	N = years	Minimum	Maximum	Mean	Std. deviation
MTN	11	0.20	10.00	1.1709	2.92859
VODAPHONE	11	0.02	10.00	1.0045	2.98423
AIRTEL	10	0.16	10.00	1.3620	3.05869
TIGO	11	0.11	10.00	1.0645	2.96410
Valid N (listwise)	10				

Table 3 depicts the mean and SDs for the competing companies. Airtel portrays high better mean of 1.36 but a wider spread of 3.06 which is not a good indicator. MTN portrays the next better mean of 1.17 but the lowest spread of 2.93. Tigo and Vodaphone have the lowest mean of 1.065 and 1.005, respectively.

Table 4
One–Sample T-Test

	One-sample statistics			
	N of years	Mean	Std. deviation	Std. error mean
MTN	10	1.2610	3.07089	0.97110

VODAPHONE	10	1.0950	3.12972	0.98970
AIRTEL	10	1.3620	3.05869	0.96724
TIGO	10	1.1560	3.10803	0.98285

One-sample test						
			Test value = 0			
					95% Confidence interval of the difference	
	t	Df -years	Sig. (2-tailed)	Mean difference	Lower	Upper
MTN	1.299	9	0.226	1.26100	−0.9358	3.4578
VODAPHONE	1.106	9	0.297	1.09500	−1.1439	3.3339
AIRTEL	1.408	9	0.193	1.36200	−0.8261	3.5501
TIGO	1.176	9	0.270	1.15600	−1.0674	3.3794

The Sig(two-tailed) item in Table 4 is the two-tailed *p*-value. The smaller the *p*-value, the strong the evidence that the researcher should reject the null research question or hypothesis. If the *p*-value is not small, then there is no difference in means and the researcher cannot reject the null research question or hypothesis. The *t*-test value in Table 4 indicates a *t*-value of 1.299 for MTN; this falls in the right-hand rejection region for any commonly used α, and the *p*-value is 0.226. The *p*-value of 0.226 implies that the difference between the two means is statistically significantly different from zero at the 5% level of significance. However, there is therefore sufficient evidence (p = 0.226) to suggest that MTN's profit margin differs and impacts its financial performance. One can conclude that the positive difference in mean between the MTN and other competing companies is statistically significant. Based on a confidence level of 95% and a confidence interval of [−0.936, 3.46], one can say that MTN's mean profit margin significantly impacts its financial performance. The same conclusion can be drawn for the three competing firms considering their positive *p*-values. The *p*-value for Vodaphone is 0.297, Airtel's *p*-value is 0.193 and Tigo's *p*-value is 0.270. These results are bigger than the commonly used α of 0.05. These suggest that there is sufficient evidence for one to conclude that the profit margins of the three competing firms differ and do impact their financial performance. Therefore, the research question of how m-payment profitability differs from each other is a matter of how each *p*-value is statistically significant and this confirms how each result influences their performance and makes one company distinct from the other in profit margin.

Table 5

One-Way ANOVA

		Sum of squares	df	Mean square
MTN	Between groups	85.766	10	8.577
	Within groups	0.000	0	.
	Total	85.766	10	
VODAPHONE	Between groups	89.056	10	8.906
	Within groups	0.000	0	.
	Total	89.056	10	
AIRTEL	Between groups	84.200	9	9.356
	Within groups	0.000	0	.
	Total	84.200	9	
TIGO	Between groups	87.859	10	8.786
	Within groups	0.000	0	.
	Total	87.859	10	

The ANOVA output in Table 5 provides an estimate of how much variation in the dependent variable can be explained by the independent variable. The column that displays the sum of squares is also known as the total variation between the group means and the overall mean explained by that variable. If any of the group means is significantly different from the overall mean, then the null hypothesis or research question is rejected. The one-way ANOVA depicted indicates a close total variation ranging between 84.2 from Airtel to 89.06 from Vodaphone. MTN predicts the lowest mean square of 8.58 between the groups while Airtel predicts the highest mean square between the groups with 9.36. One can conclude that the variation of profitability between the competing firms is very close to each other. The differences in profit margin made by MTN and its three competing firms or vice versa are not very much significant.

Table 6
Investor Ratio (Price Earnings Ratio) = P/E = Market Price/EPS

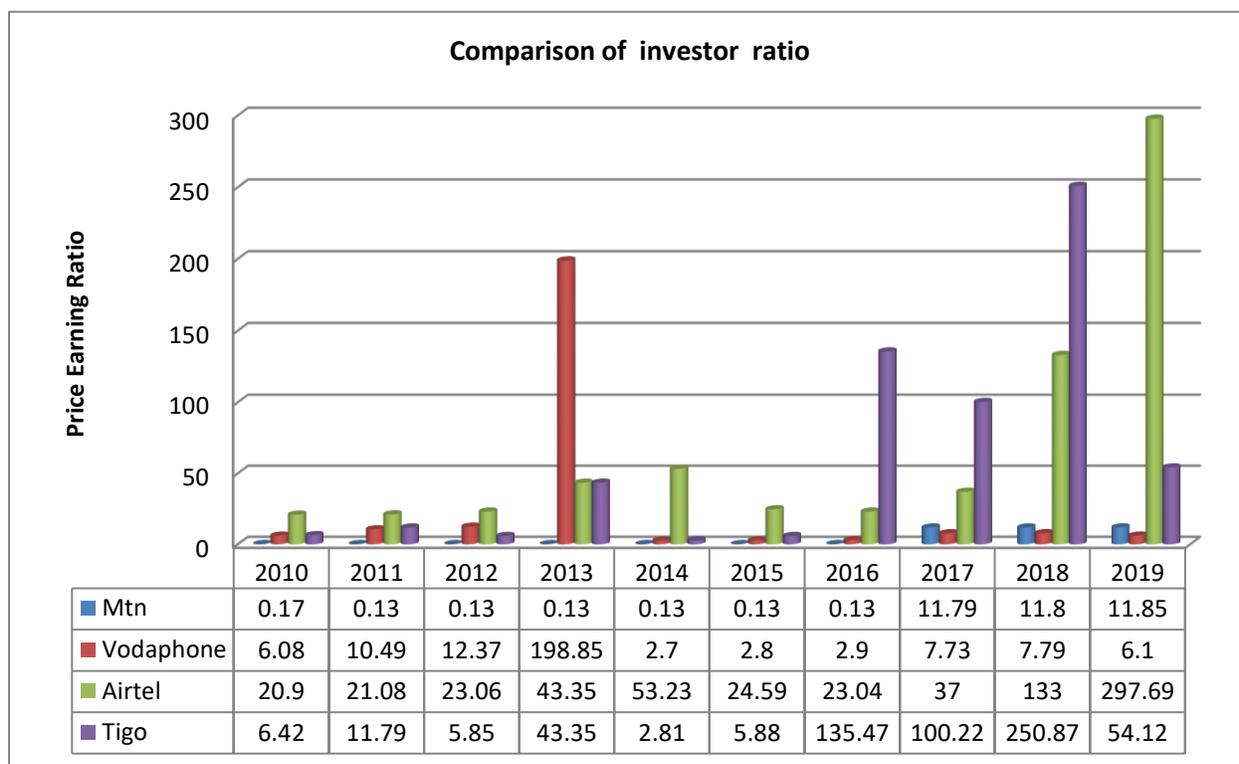|	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
■ Mtn	0.17	0.13	0.13	0.13	0.13	0.13	0.13	11.79	11.8	11.85
■ Vodaphone	6.08	10.49	12.37	198.85	2.7	2.8	2.9	7.73	7.79	6.1
■ Airtel	20.9	21.08	23.06	43.35	53.23	24.59	23.04	37	133	297.69
■ Tigo	6.42	11.79	5.85	43.35	2.81	5.88	135.47	100.22	250.87	54.12

Table 6 portrays the price earnings ratio for the four competing firms from 2010 to 2019. Airtel emerges as the best firm to boost investors' confidence with a very small margin for the first 3 years until 2013 when Vodaphone became the highest among its three competitors. In 2016, 2017 and 2018, Tigo was the leading competitor in the global market to increase investors' confidence in terms of the price earnings ratio. Airtel again became the leading company in 2019 to boost investors' confidence. MTN on average has been the least company with the lowest price earnings ratio for the past 10 years to boost investors' confidence in the company.

Table 7
Investment Decision Table of Intent

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019

Mtn	DNI	DNI	DNI	DNI	DNI	DNI	DNI	MI	DNI	DNI
Vodaphone	DNI	MI	MI	DI	DNI	DNI	DNI	DNI	DNI	DNI
Airtel	DI	DI	DI	MI	DI	DI	MI	MI	MI	DI
Tigo	DNI	MI	DNI	MI	DNI	DNI	DNI	DI	DNI	MI

DNI = Do not invest   DI = Do invest   MI = May invest

Intent variable	MTN	Vodaphone	Airtel	Tigo
DNI	9	7	0	6
DI	0	1	6	1
MI	1	2	4	3

Maximisation of investors' wealth is of prime importance to every investor. Investors take bold and positive decisions to invest if they realise or foresee an increase in their share prices to realise a capital gain. The investor is faced with three scenarios either to invest or not to invest or may interest. The decision table indicates that investors are not supposed to invest in MTN for 10 years as their share prices are very low to discourage investment.

From Table 7, a rational investor will not invest in MTN and Vodaphone as they have a high number of warning indicators on Do not invest (DNIs). A new investor will be strongly advised to invest with Airtel as well as encourage others who may be searching for investment opportunities. Airtel has the highest number of good indicators of Do invest (Dis) and May invest (MIs). Tigo follows next after Airtel with the next possible DI and MIs.

Table 8

Reliability Test

Case processing summary

		N	%
Cases	Valid	10	100.0
	Excluded	0	0.0
	Total	10	100.0

a. Listwise deletion based on all variables in the procedure.

Reliability statistics

Cronbach's alpha	N of Items
0.193	4

Cronbach's alpha, α (or coefficient alpha), developed by Cronbach (1951), measures reliability, or internal consistency (Table 8). 'Reliability' is how well a test measures what it should. While high reliability is preferred over low reliability, Cronbach's Alpha of 0.193 indicates reliability between the variables being tested.
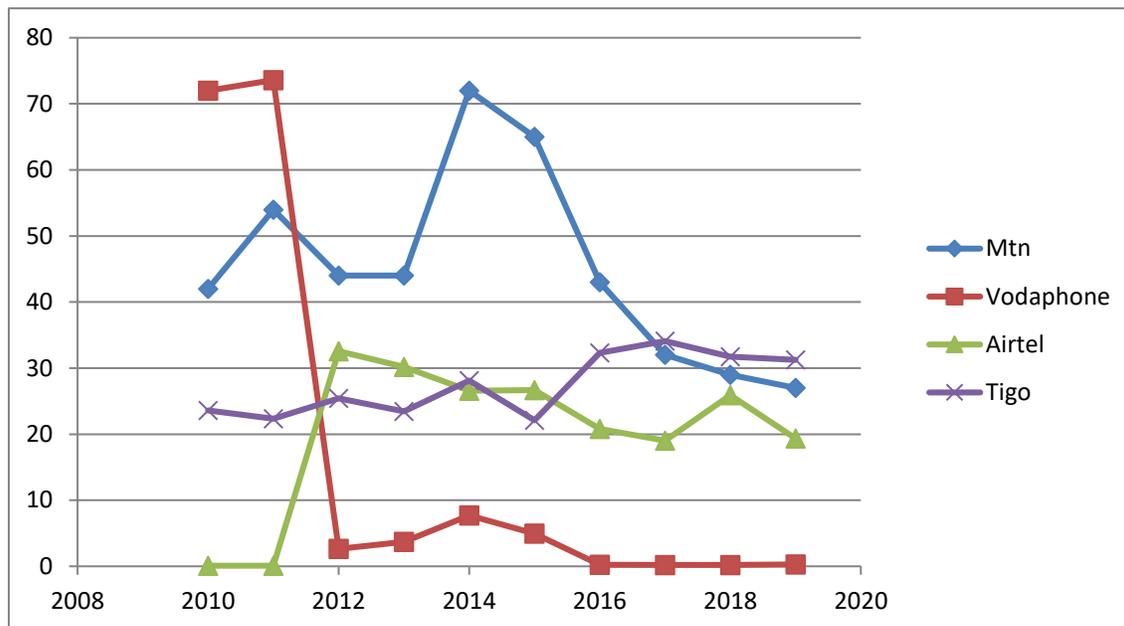
Table 9

*Efficiency Ratio (Receivable Collection Period) Trade Receivables/Sales *365*

Year	Mtn	Vodaphone	Airtel	Tigo
2010	42	72	0.09	23.58
2011	54	73.6	0.09	22.32
2012	44	2.63	32.56	25.42
2013	44	3.71	30.19	23.45

2014	72	7.69	26.58	28.12
2015	65	4.97	26.67	22.1
2016	43	0.23	20.79	32.29
2017	32	0.21	19.03	34.09
2018	29	0.21	25.91	31.73
2019	27	0.28	19.36	31.23

Figure 2

Competition Among Mobile Network Providers in Ghana

The account receivable collection period for Vodaphone was initially higher for 2010 and 2011 than competitors in the industry, which was not a good indicator (Table 9). However, through a strong aggressive strategy, Vodaphone recorded the lowest account receivable for eight continuous years from 2012 TO 2019 to become the most efficient company (Figure 2). This means that Vodaphone took few days to collect its debt from customers than the other three competitors on the market. Airtel and Tigo on average competed equally but MTN on average portrays a higher collection period.

Table 10

Correlations

		MTN	VODAPHONE	AIRTEL	TIGO
MTN	Pearson correlation	1	0.177	0.063	−0.571
	Sig. (2-tailed)		0.624	0.862	0.085
	The sum of squares and cross-products	1973.600	702.394	96.586	−349.926
	Covariance	219.289	78.044	10.732	−38.881
	N	10	10	10	10
VODAPHONE	Pearson correlation	0.177	1	−0.902[**]	−0.560
	Sig. (2-tailed)	0.624		0.000	0.092
	The sum of squares and cross-products	702.394	7965.679	−2764.291	−690.545
	Covariance	78.044	885.075	−307.143	−76.727
	N	10	10	10	10

AIRTEL	Pearson correlation	0.063	−0.902[**]	1	0.215
	Sig. (2-tailed)	0.862	0.000		0.551
	The sum of squares and cross-products	96.586	−2764.291	1178.933	101.937
	Covariance	10.732	−307.143	130.993	11.326
	N	10	10	10	10
TIGO	Pearson correlation	−0.571	−0.560	0.215	1
	Sig. (2-tailed)	0.085	0.092	0.551	
	The sum of squares and cross-products	−349.926	−690.545	101.937	190.605
	Covariance	−38.881	−76.727	11.326	21.178
	N	10	10	10	10

**Correlation is significant at the 0.01 level (2-tailed).

Pearson's correlation coefficient (r) is a measure of the strength of the association between the two variables. Pearson correlation in Table 10 depicted MTN as showing a positive relationship of 0.624, and 0.862 with Vodafone and Airtel but the weak association of 0.085 with Tigo, respectively. Vodaphone portrays a positive relationship of 0.624 with MTN, but a weak relationship of 0.092 with Tigo and no relationship with Airtel. Similarly, Airtel depicted a strong positive relationship with MTN and Tigo with correlations of 0.862 and 0.551, respectively, but with no relationship with Vodaphone. Tigo likewise portrays a weak relationship with MTN and Vodaphone but the higher relationship with Tigo with correlations of 0.085, 0.092 and 0.551, respectively.

Table 11
Nonparametric Correlations

			MTN	VODAPHONE	AIRTEL	TIGO
				Correlations		
Spearman's rho	MTN	Correlation coefficient	1.000	0.665[*]	0.378	−0.626
		Sig. (2-tailed)	0.0	0.036	0.281	0.053
		N	10	10	10	10
	VODAPHONE	Correlation coefficient	0.665[*]	1.000	−0.165	−0.809[**]
		Sig. (2-tailed)	0.036	0.0	0.649	0.005
		N	10	10	10	10
	AIRTEL	Correlation coefficient	0.378	−0.165	1.000	−0.188
		Sig. (2-tailed)	0.281	0.649	0.0	0.602
		N	10	10	10	10
	TIGO	Correlation coefficient	−0.626	−0.809[**]	−0.188	1.000
		Sig. (2-tailed)	0.053	0.005	0.602	0.0
		N	10	10	10	10

*Correlation is significant at the 0.05 level (2-tailed).

**Correlation is significant at the 0.01 level (2-tailed).

Spearman correlations are always between −1 and +1; Spearman correlations indicate monotonous rather than linear relations. There is a positive monotonous relation between MTN with Vodaphone, Airtel and Tigo with 0.036 0.281 and 0.053, respectively. Vodaphone, however, has strong monotonous relation of 0.649 with Airtel but weak monotonous relation of 0.036 and 0.005 with MTN and Tigo, respectively. Airtel portrays strong monotonous relation of 0.649 and 0.602 with Vodaphone and Tigo, respectively but weak monotonous relation of 0.28 with MTN. Moreover, Tigo depicted a strong

monotonous of 0.602 with Airtel but a weak monotonous of 0.005 and 0.053 with MTN and Vodaphone, respectively.

4. Discussion

The research identifies the profitability of the m-payment industry in terms of profit margin, investor confidence and efficiency. To ascertain the pattern for the period of 10 years of operation from 2010 to 2019, specific ratios were used. In terms of profitability measurement, profit margin was used with a basis of PBIT divided by capital employed where capital employed was defined as total assets fewer current liabilities (Rivadeneyra et al., 2022). In terms of investor ratio, it is strongly recommended that using the price earnings ratio depicts the true level of investors' confidence and trust in the company than other measures. Price earnings ratio takes into account the market price of shares divided by EPS. In the case of the efficiency ratio, the account receivable collection period was used as a basis to compare the performance of these four companies. The account receivable collection period was obtained by dividing account receivables by turnover multiplied by 365 which makes the number of days within the year.

The profit margin for Airtel was very encouraging for 3 years after MTN made a profit for 6 years. Overall, Airtel and MTN are the two m-payment companies that have shown high-profit performance over the last 10 years. Airtel took a strategic move with Tigo recently and if that works well, it will lead the industry in the next few years. The *t*-statistics gave the *p*-values of 0.225, 0.297, 0.193 and 0.270 for MTN, Vodaphone, Airtel and Tigo, respectively. These values are of interest to researchers and stakeholders. These *p*-values being higher than the commonly used alpha of 0.05 indicate that there is sufficient evidence to confirm that profit margin impacts the performance of the m-payment companies. Identifying the trend in profit margin will enable various stakeholders to come out with innovative strategies to improve their firms' performance. Ondrus and Pigneur (2007), and Neelam and Bhattacharya (2023) posit that the mobile phone can be used as a contactless card while guaranteeing confidentiality, integrity, non-repudiation and authentication should be guaranteed by the m-payment services emphasised by Misra and Wickamasinghe (2004). This result will guide managers to improve the management of operational expenses in the m-payment industry while improving the training of staff and field merchants in increasing sales and revenues. Learning and innovations will result to improve financial transactions.

Moreover, the second research question looks at the investors' confidence in the m-payment companies, which are listed on stock exchanges in their respective countries; therefore, managers are expected to ensure the maximisation of shareholders' wealth by ensuring stable and appreciable prices for the share prices so that capital gains can bē realised by every investor. Cronbach's Alpha of 0.193 shows the extent of reliability of the variables tested. Vodaphone portrayed a high price earnings ratio followed by Tigo while Airtel came third among the competing firms. It is quite surprising that even though MTN shows a high-profit margin in the first analysis, its price earnings ratio was the least among the competing firms. This call for attention among the shareholders of MTN to question the primary goals of the companies' existence and suggest various ways by which investors' confidence in the company can be raised. If this continues, MTN share prices will fall and shareholders will prefer selling their shares to purchase shares in Vodaphone or Airtel and Tigo companies as their share prices are attractive on the exchange markets. Karnouskos and Fokus (2004) emphasised that the realisation of m-payments will make possible new and unforeseen ways of convenience and commerce; therefore, management must consider various ways to maintain shareholders' wealth.

Furthermore, the third analysis focuses on the account receivable collection period to assess the days that the companies take to collect inventories sold to customers in a way of measuring efficiency. MTN again lacks behind the three competing firms in terms of the days the company uses to collect its

debts from customers making the company the least efficient among its competitors. Vodaphone proves to be operating at the highest efficiency while Airtel and Tigo operate at the same level of efficiency. It also suggests that MTN's main motive is profitability without either paying attention to the overriding goal of maximising shareholders' wealth or operating efficiently. Correlations and nonparametric correlations using Pearson and Spearman's were performed, and the results showed a strong or weak relationship between the four competing terms. The correlation was performed with a conventional 0.05 significant level and 95% confidence level. The results of the two analyses were mixed. For instance, under Pearson correlation, MTN showed a strong relationship with Vodafone and Airtel with 0.624, and 0.862, respectively. However, Spearman's correlations indicated a weak association between MTNs and Vodaphone and Tigo with 0.036 and 0.28 correlation, respectively. Similar mixed patterns were observed for Airtel and Tigo when related to each other in the industry. These mixed patterns may be due to both informational and transactional inefficiencies in the types of service delivery to customers. For instance, Valcourt et al. (2005) stated that SMS messages channel can be used by mobile companies to provide information about the status of customers' accounts with the bank (informational) or can be used to transmit payment instructions from the phone (transactional), while Zheng and Chen (2003) reiterate that customers may make payment to merchants using their mobile phones, and this may be charged to the mobile phone bills of the customer. The customer then settles the bill with the telecommunication company. These innovative services are rarely used by most m-payment companies in Ghana and hence, the mixed results.

This research is global and very unique because consolidated financial statements used were prepared to cover all the subsidiaries of the competing companies around the globe. Therefore, this study is one of its kind where the result can be generalised for all the subsidiaries in the industry. It therefore fills a significant knowledge gap in literature as such a study does not exist in prior literature with the same method of analysis, especially in developing economies such as Ghana.

5. Conclusion

The existing literature on m-payment is on customer adoption of the service without giving attention to profitability, investors or efficiency measurement among the competing companies in the industry. This research attempted to address these shortcomings by extending the scope of the methodology to embrace correlation and ratio analysis, instead of limiting it to only the descriptive analysis which has always been the case. There will be specific theoretical and policy practice implications of the study results. In terms of theory, the findings will fill the existing knowledge gap and encourage academic citation on the subject. Researchers will adopt these findings to develop multiple theories and concepts on m-payment companies. In terms of practice, the study will unearth the weaknesses of companies that do not pay attention to shareholder wealth maximisation. Best companies that boost investor confidence will realise an increase in foreign direct investment. Top-level managers of m-payment companies will play strategic roles to ensure that investors' interests are maintained.

In terms of policy, the Central Bank and other policymakers can use the findings in the formulation and implementation of policies to regulate the m-payment industries in Ghana. The efficiency of operations can be monitored to ensure that firms operate more efficiently to benefit shareholders, the government and customers.

The methodological approach in this research is quite different from the general approach in previous research works. Future researchers can adopt these methodologies and build upon them using different modern tools. Since this research is global, future researchers in their respective countries where m-payment subsidiaries are located can build upon these results with primary data from their countries to know exactly the contribution of the subsidiaries in the total results.

Mobile companies are constantly seeking unique ways of offering services to customers. The willingness and the ability of managers to respond to changes in the industry would determine their success in the industry. The results of this research provide superior insights to managers by analysing the ratio analysis. Future researchers must also focus on researching more of the policy, theory and practical implication of the companies' existence in the countries where there are free–trade agreements and political stability and whether these are assisting mobile companies to operate more efficiently.

Some assumptions underlie this study. First, the study assumes that the top management team of the m-payment companies can influence the financial performance of their respective companies if proper controls are put in place. Second, it is also assumed that top management emphasis on efficiency can also help reduce the severity of share price loss which will translate into better profit performance. Finally, the use of trend analysis is based on the premise that the financial statements preparation of mobile companies shows a true and fair view of the actual performance as approved by auditors.

The major limitation of this study would have to be data availability and accessibility. Some of the mobile companies have just been listed on the Ghana stock exchange. Therefore, information about them would be public and easily accessible on the stock exchange. The other mobile companies that may not be listed would not share sensitive financial information if not required by regulation to do so. This study was limited by the data collected by the secondary method. For effective generalisation, this study would be more robust if data was collected from the Glo which financial statements were very difficult to come by. The study uses specific ratios to meet the research objectives. Other ratios were not used as they are not relevant to the study objectives.

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