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Original Research

Corporate Governance Characteristics and Discretionary Accruals Among Non-Financial Firms Listed in Nairobi Securities Exchange

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Abstract

This study explores the relationship between corporate governance traits and discretionary accruals among non-financial firms listed in NSE. Our study discovered that the board size has a relatively insignificant negative impact on the discretionary accruals of non-financial firms listed in the NSE using a sample of 44 publicly traded non-financial firms based on 2012-2021 data. The findings on board independence indicate a significant positive relationship at 10% significance. The results suggest that board independence doesn't reduce discretionary accruals in non-financial firms listed in NSE Kenya. The CEO duality, on the other hand, revealed a statistically positive insignificant effect on discretionary accruals, contrary to expectations. The research findings also pointed to income-decreasing accruals earnings management as depicted by a mean of -.083 discretionary accruals in the descriptive statistics. On the effects of board meetings on discretionary accruals, the study found an insignificant negative relationship. The findings of this study may be useful for regulators to re-evaluate their laws and mandates regarding firms and their corporate governance structure, as well as for legislators who have the power to nominate board members to select competent and knowledgeable personnel.

Keywords: Board Size, Board Meetings, Board independence, Corporate Governance, discretionary accruals.

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Introduction

Corporate governance has generated many changes in the business environment and the accounting and auditing profession. In the past few years, there has been an interest and focus on audit committees' role as it is a tool of corporate governance to increase the questioning of management and increase auditors' independence (Hamdan & Mushtaha, 2011). In recent years, the interest in audit committees' role has expanded in terms of their role in preparing financial statements. Bédard and Gendron (2010) found that an audit committee is more dynamic in reviewing financial statements and decreasing differences between managers and external auditors. This lessens the likelihood of a firm having qualified opinions from the external auditor resulting from accounting errors and non-commitment to accounting standards. Audit committees have a role in monitoring internal control systems through associations with internal auditors, as external auditors complete external reporting and compliance. Audit committees have a crucial role in all relationships between internal auditors, external auditors, and the board of directors (Saibaba & Ansari, 2013).

For many years, internal auditing's primary role has been to assist organizations in safeguarding assets and checking established control procedures. As a subcommittee of the governing body, an audit committee seeks to ensure financial and compliance issues through increased scrutiny, accountability, and the efficient use of resources. An audit committee may also serve as an advisory function aimed at performance improvement within the organization. Audits serve a vital economic purpose and play an essential role in helping the public interest to strengthen accountability and reinforce trust and confidence in financial reporting (Asare, 2009). However, in recent years, and considering corporate scandals, there is growing global demand for improving audit quality.

In Kenya, CMA issued guidelines on good CG practices by public listed companies in Kenya in 2002. The guidelines were prepared in recognition of the role of good CG in corporate performance, capital formation and maximization of shareholders' value as well as the protection of investor's rights (CMA, 2002). According to these guidelines, all listed companies should establish at least an audit and nominating board committee. The AC is charged with the responsibility of overseeing the internal and external audit functions and reviewing of quarterly, half yearly and year-end financial statements of the company. The AC should have at least three independent and non-executive directors, one of who should have basic financial accounting knowledge (CMA, 2002).

General conclusions from prior research show that corporate governance facets like the composition of the board of directors, CEO duality, the composition of the audit committee, and auditor independence have an impact on discretionary accruals (Al-Haddad & Whittington, 2019; Asogwa, Ofoegbu, Nnam, & Chukwunwike, 2019; Gulzar, 2011; Man, 2013). There are several ways to measure board characteristics. The characteristics are determined by the board's composition, including the size of the board, the number of independent directors, the dual role of CEO, and the tenure of the board (Nugroho & Eko, 2012).

Statement of the Problem

Although GAAP mandates that businesses use accrual accounting, this also gives management the ability to manage the timing of accrual expenditures (Xie, Davidson III, & DaDalt, 2003). Unfortunately, non-executive directors may not be effective monitors if they have a substantial financial interest in the company (Luan & Tang, 2007; Peasnell, Pope, & Young, 2005; Tosi, Shen, & Gentry, 2003). A large board may have several independent directors, but this could also mean that the board functions less effectively than a board with a smaller number of members. However, a large board with more independent directors is better positioned to prevent earnings management (Xie, Davidson III, & DaDalt, 2003).

The non-financial firms listed in the NSE Kenya are critical drivers considered to accelerate the future economy. However, these firms have been experiencing challenges leading to buy-outs, restructuring, and poor performance. Thus, it is pertinent to gauge the effectiveness of board members in these firms concerning their oversight activities in promoting good corporate governance. However, more empirical evidence needs to examine how corporate governance characteristics influence the financial reporting quality of these firms. As a result, corporate governance practices are designed to enhance earnings quality and reduce the incentive for earnings manipulation.

However, the quality of financial reporting has been impacted by cases of bankruptcy, distress, and fraud that have been accurately reported (Olowokure et al., 2016). A strong financial reporting process, according to Cohen et al. (2017), includes preparation and oversight by parties like the Audit Committee (AC) and auditors to provide accurate and transparent financial reports and related disclosures. Most empirical studies on corporate governance and reporting quality, according to Zoysa and Rudkin (2010), have been carried out in nations with developed capital markets, and studies in nations with emerging capital markets are incredibly rare. Theoretically, this study contributes to prior research by placing these relationships into a particular context: the corporate governance act 2002 within the listed non-financial firms in the Nairobi securities exchange.

Literature Review and Hypothesis Development

Corporate governance lies at the top of the control system of the board of directors and its committees. They are entrusted by owners (shareholders) to approve and oversee important decisions made by top managers who initiate and implement them, ensuring that decision management and decision control are kept apart. The expenses related to the board of directors' and its committees' monitoring obligations as well as the hiring of external auditors are a portion of the monitoring agency costs incurred by shareholders "to limit the abnormal activities of managers" (Meckling & Jensen, 1976). The board's and its audit committee's role is to oversee management decisions and make sure they are consistent with the interests of the shareholders from an agency perspective. An effective board of directors must be part of any good governance mechanism. As in earlier studies, the size of the board of directors is determined by this study using the number of directors as a proxy for board characteristics (Neifar, Halioui, & Abdelaziz, 2016; Xie, Davidson, & DaDalt, 2003). The Board of Directors is a team of individuals chosen to oversee, direct, and conduct business in accordance with the company objectives. Larger boards

are associated with more earnings management behavior, according to research on the relationship between corporate governance and earnings management (Swastika, 2013).

Empirical evidence revealed that a large board-size vision failed the board advisory and monitoring role and negatively influenced firm performance (Guest, 2009). A positive relationship between board size and earnings management appears as board members increase up to seven members (Geraldés Alves, 2011). By categorizing board size, the research found that a board size of nine to twelve members involves higher earnings management behavior (Epps & Ismail, 2009). These findings suggest that a smaller board provides a more effective monitoring role than a large board. An unduly large board will cause the monitoring mechanism to become ineffective (Veronica Siregar & Bachtiar, 2010).

Gulzar (2011) investigated the effectiveness of board size in mitigating and reducing EM behavior in Chinese publicly traded companies. He concluded that a smaller board is associated with a low EM level. According to other studies by Beasley, Carcillo, Hermanson, and Neal (2009); Man (2013); Sáenz González and García-Meca (2014), a big board causes coordination issues that make it harder to monitor management. Hence, it is hypothesized that:

Hypothesis 1 (H01): There is no significant effect between board size and discretionary accruals among listed non-financial firms in NSE, Kenya.

Board independence is a fundamental factor for sound corporate governance practices. By minimizing managerial self-interest and overseeing and controlling management's production of financial statements, independent directors on the board may improve earnings quality. As a result, boards with more independent directors tend to monitor companies more closely and demand higher-quality earnings (Alves, 2014). Alves (2014) found evidence that independent board members increase earnings quality by reducing earnings management in a sample of 33 Euronext Lisbon non-financial firms over an eight-year period (2003 to 2010). As a result, independent board members efficiently oversee the management of earnings in Portuguese-listed companies.

In their analysis of 434 publicly traded Australian companies, Davidson, Goodwin, and Kent (2005) contend that most non-executive directors on the board and the audit committee are successful in minimizing earnings manipulation. Hence, it is hypothesized that:

Hypothesis 2 (H02): There is no significant effect between board independence and discretionary accruals of non-financial firms listed in NSE Kenya.

CEO duality—where the CEO also serves as the board of directors' chair—creates a setting that supports independent judgment in managing earnings. The CEO's dual role disrupts the board's power dynamic and may limit the board's ability to effectively oversee managerial decisions and actions (Arslan, Zaman, Malik, & Mehmood, 2014). According to proponents of the agency theory, separating the two responsibilities is essential for ensuring that the board has control over management by providing evidence that can be compared to any potential for the CEO to have overly ambitious plans. Because they are

more likely to pursue strategies that advance their own personal interests over those of the business when a single person holds two crucial positions.

Due to the separation of ownership and control, agency theory contends that managers use firm resources to further their own interests rather than maximizing shareholder wealth (Meckling & Jensen, 1976). Since the same person will be overseeing his actions, CEO duality is bad for the company. Since it is unlikely that CEOs can directly affect stock market performance, they may try to influence accounting-based measures. Prior research has shown a connection between duality and more managerial discretion (Asogwa, Ofoegbu, Nnam, & Chukwunwike, 2019; Chakroun & Amar, 2021; Chatterjee, 2020). Additionally, CEO-dominated boards are less likely to reliably identify reporting process flaws and are more likely to overlook internal control weaknesses. However, the level of board independence is likely to be a determining factor in how much CEO duality could rule a board (Alves, 2021). Hence, it is hypothesized that:

Hypothesis 3 (H03): There is no significant effect between CEO Duality and the discretionary accruals of listed non-financial firms listed in NS, Kenya.

According to Beasley et al. (2009), board members committed to meaningful and substantive meetings result in better monitoring and improved financial reporting processes, which is in line with agency theory. According to agency theory, good monitoring can make agents less opportunistic and more inclined to act in their principals' best interests. When board members get together frequently and regularly, monitoring may become more effective. Board members will benefit from regularly scheduled meetings as they monitor accounting records and internal control systems (Abbadi, Hijazi, & Al-Rahahleh, 2016). According to Hoque, Islam, and Azam (2013), frequent meetings help the directors monitor the internal control system and financial reporting procedure more successfully and raise the caliber of the accounting data and audit. Compared to directors who do not regularly meet, those who do so perform better in their supervisory duties for financial reporting. (Hoque, Islam, & Azam, 2013; Munro & Buckby, 2008)

The number of board meetings required annually is outlined in the Kenyan Code of Corporate Governance. In order for the board to effectively perform its duties, it is required that the members meet at least four times annually or once every three months. Gulzar (2011) discovered that as board meeting frequency increases, the value of discretionary accruals decreases; they claimed that increased board meeting frequency would enhance board oversight. Hence, it is hypothesized that:

Hypothesis 4 (H04): There is no significant effect between board meeting frequency and the discretionary accruals of non-financial firms listed in NSE, Kenya.

Data and Methods

The 44 non-financial firms listed at the NSE, Kenya, were selected from the total of 62 companies listed in the NSE for this study. Bank and insurance companies were excluded from this study because of the additional distinct regulations and disclosures and the complexity of determining accruals (Klein, 2002).

Variables and Measures

Variable	Measure	Data	Source
Discretionary Accruals	Determining coefficient from accrual regression. Discretionary accrual is the difference between total accrual (TACC) and non-discretionary accrual (NDACC). Modified Jones modified by Dechow et al. (1995)	<ul style="list-style-type: none"> Total assets at each year end Annual sales Current Assets Book Values of plant property and equipment. 	-Annual Company statement of financial position -Annual Company statement of comprehensive income -Annual Company statement of cash flows.
Board size	0 if the board directors are not between three and seven members and otherwise 1 (Garcia et al., 2012 - Davidson et al. 2005 – Ghosh et al., 2010)	<ul style="list-style-type: none"> Number of Board directors 	Annual corporate reports
CEO Duality	0 where the CEO has this dual role, 1 otherwise	<ul style="list-style-type: none"> Role of CEO and chair of Board 	Annual corporate reports
Board Independence	0 if the board members are not controlled by more than 50% independent outside members, and 1 otherwise (Abbott et al., 2004; Davidson et.al, 2005 – Garcia et.al, 2012)	<ul style="list-style-type: none"> Number of independent board members 	Annual corporate reports
Board meetings	0 if the board members meet fewer than five times in a year and 1 otherwise	<ul style="list-style-type: none"> Number of meetings held by the board members 	Annual corporate reports

To measure the value of discretionary accruals, the modified Jones modified by Dechow et al. (1995) will be adopted using the following regression:

a. Determine Normal Accruals (Total Accruals)

Discretionary accrual is the difference between total accrual (TACC) and non-discretionary accrual (NDACC). Determining non-discretionary accrual by doing this regression:

$$\frac{TACC_{i,t}}{TA_{i,t-1}} = \beta_1 \frac{1}{TA_{i,t-1}} + \beta_2 \frac{\Delta Rev_{i,t}}{TA_{i,t-1}} + \beta_3 \frac{PPE_{i,t}}{TA_{i,t-1}} + \varepsilon_{i,t}$$

Where;

$TACC_{i,t}$ = Total accrual of the company i in year t

$TA_{i,t-1}$ = Total asset of the company i in the end year t-1

$\Delta Rev_{i,t}$ = Change in sales revenue of the sales company i in year t -1

$PPE_{i,t}$ = Property, plant, equipment of company i in year t

= Change in net receivable company i in year t -1

$\varepsilon_{i,t}$ = Error

b. Determining Non-discretionary accrual.

Equation (2) regression resulted from coefficients β_1 , β_2 , dan β_3 . Those

the coefficient is used to predict non-discretionary accrual through the Equation:

$$NDACC_{i,t} = \beta_1 \frac{1}{TA_{i,t-1}} + \beta_2 \frac{\Delta Rev_{i,t} - \Delta Rec_{i,t}}{TA_{i,t-1}} + \beta_3 \frac{PPE_{i,t}}{TA_{i,t-1}} + \varepsilon_{i,t}$$

c. **Determining discretionary accrual.** Discretionary accrual is calculated by total accrual (result from Equation (a)) minus non-discretionary accrual (result from Equation (c)).

$$DACC_{i,t} = \frac{TACC_{i,t}}{TA_{i,t-1}} - NDACC_{i,t}$$

Where: Discretionary Accrual Company (DACC) I did an absolute value conversion in the year t. Because not all discretionary accruals have a positive value, they were converted to absolute value. The value of discretionary accrual may equal zero when the positive and negative values are added. Zero indicates that there is no discretionary accrual for managing earnings, but it is already known that the company always uses a positive or negative value. Consequently, the negative value needs to be changed to a positive.

Measures of control variables

The research adopted leverage as a control measure due to the hypothesis that highly leveraged firms are likely to engage in opportunistic activities and manipulation to avoid breach of the debt covenant violation. According to this study, there is a negative correlation between leverage and the accuracy of financial reporting. In earnings

management research, accounting for firm size is a common practice. Since a large firm typically has diversified or decentralized management decision-making, it is expected that it will have relatively higher discretionary accruals than a small firm. As a result, this study anticipates that there will be a converse in the relationship between firm size and financial reporting quality. The natural logarithm of the total assets at the end of the period is used to calculate the size ($\ln it = \log (Ai,t)$).

Empirical Regression Models

To test our hypothesis on whether corporate governance characteristics in year t affect discretionary accruals in year $t + 1$, we estimate the OLS regression as shown in the Equation.

$$DD_i = \alpha_{i,t} + \alpha_1 BSE_{i,t} + \alpha_2 BIND_{i,t} + \alpha_3 BCE_{i,t} + \alpha_4 BCM_{i,t} + Control\ variable_{i,t} + \varepsilon_{i,t} \dots \dots \dots Model 1$$

EMPIRICAL RESULTS

Descriptive Statistics

These descriptive statistics are based on ten-year observations of the listed non-financial firms in Kenya. The data span from 2012 to 2021, leading to 407 observations of all the measures under observation. The average absolute discretionary accruals were -0.083, with a maximum value of 0.0620, a minimum value of -6.4 and a maximum value of 1.3. These values indicate that, in their earning management practices, the companies tend more towards income-decreasing earnings management. This finding conflicts with that of Waweru and Riro's (2013) study, which indicated an average income-increasing earnings management of 3% in Kenya. This may be the case because it has been suggested that increased accounting choices with more latitude and an unclear IFRS may have increased the use of discretionary accruals (Soenarno, 2016).

The board size in this sample have, on average, 2.38; this represents the range of board size of 6 to a maximum of 8 members. Most of the companies in this study meet the recommended Kenyan corporate governance code of board size of more than three members. On average, the board in the sample meet 0.447 times per year, with the recommended number of meetings at least 4-6 times per year. On average, the independence of the board members represents 0.942 of the reaction between independent non-executives and independent executive members. Thus, it is evident that most board members are independent. The descriptive statistics in Table 4.1 also show that, on average, 0.927 of the firms have the CEO and Chairman as different individuals with clear roles.

Table 1: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
BSE	407	2.375	.687	1	3
Boardindependence	407	.942	.234	0	1

Variable	Obs	Mean	Std. Dev.	Min	Max
CEODuality	407	.927	.26	0	1
BoardMeetings	407	.477	.5	0	1
firmsize	407	15.715	2.167	8.791	20.997
Leverage	407	1.865	2.044	.03	5.94
DACC	407	-.083	1.328e+08	-6.3919260	1.262e+09

Correlation Analysis

Table 3.3 shows the correlation matrix for all model variables, with Pearson coefficients of correlations as appropriate. Correlation above 0.8 between independent variables indicates that multi-collinearity is present and might affect the results (Carcello, Neal, Palmrose, & Scholz, 2011). However, the correlation coefficients in Table 3.3 show that there is no multi-collinearity between the variables in the study. This is in line with Gujarati (2009), who suggested that the correlation matrix should not exceed 80% to ensure any self-association problems.

Table 2: Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) DACC	1.000						
(2) BoardSize	-0.126**	1.000					
(3) Boardindependence	0.031	0.450***	1.000				
(4) CEODuality	0.037	0.210***	0.303***	1.000			
(5) BoardMeetings	-0.165***	0.093*	0.215***	0.036	1.000		
(6) firmsize	0.546***	0.213***	0.150***	0.220***	0.066	1.000	
(7) Leverage	-0.068	0.005	-0.122**	-0.065	0.012	-0.023	1.000

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Multivariate Analysis

The Breusch-Pagan Lagrange Multiplier (LM) test, followed by the Hausman test, determines whether to use a random-effect regression or a simple OLS. The Hausman test is then used to distinguish between random and fixed effects. Finally, the association between the dependent variables (corporate governance characteristics) and the independent variables (discretionary accruals) is estimated using panel regression with a random effect model.

Table 3: Corporate Governance Characteristics and Discretionary Accruals Model

	(1)	(2)	(3)	(4)	(5)	(6)
	DACC	DACC	DACC	DACC	DACC	DACC
BSE	2.864	2.565	2.837	2.826	-3.465	-1.895
	(0.128)	(0.110)	(0.122)	(0.121)	(-0.141)	(-0.077)
Boardindependence		3.795	10.422	11.003	16.760	17.375*
		(0.051)	(0.130)	(0.135)	(0.198)	(0.206)

	(1)	(2)	(3)	(4)	(5)	(6)
CEODuality			14.048	14.074	4.795	7.629
			(0.212)	(0.212)	(0.069)	(0.110)
BoardMeetings				-1.633	-4.500	-2.996
				(-0.059)	(-0.156)	(-0.104)
firmsize					21.259**	21.618**
					(2.026)	(2.057)
Leverage						-3.818
						(-0.776)
_cons	-184.401	-187.226	-206.927	-206.701	-522.604**	-528.672**
	(-1.134)	(-1.084)	(-1.048)	(-1.054)	(-2.244)	(-2.266)
Observations	357	357	357	357	355	355
r2_w	0.000	0.000	0.000	0.000	0.005	0.006
<i>P-values are in parentheses</i>						
*** $p < .01$, ** $p < .05$, * $p < .1$						

The overall number of board members serves as a proxy for board size. As anticipated, the research's findings indicate a relatively insignificant link between the size of the board and discretionary accruals. The level of earnings management practices in listed companies in the study sample could be predicted to be significantly impacted by board size, whether it is large or small, at the 0.01 level of significance. This result is in line with studies by Ibrahim et al. (2018) that show comparable evidence between board size and discretionary accruals. Nevertheless, some contradictory results were shown in Kankanamge, Madhushani, Jayarathna, and Jayasinghe (2015) studies and Phuong and Hung (2020). Based on the results, H_{01} test specifications provide evidence that board size has a negative (1.895) insignificant coefficient with discretionary accruals at a 5% significance level. Thus, we fail to reject the null hypothesis H_{01} .

The board independence as a ratio measure between independent and non-independent board directors shows a positive significant relationship at 10% significance. According to the findings, the high percentage of independent directors on boards of non-financial companies listed on the Nairobi Stock Exchange (NSE Kenya) does not have an adverse effect on earnings management. Alves (2014) and Waweru (2018) reported a negative and significant relationship between board independence and discretionary accruals, which contrasts with these findings. We contend that despite the presence of "grey" directors Mangena and Chamisa (2008), boards in Kenya are only nominally independent. The null hypothesis (H_{02}) is thus rejected, and we draw the conclusion that there is a positive statistically significant relationship between board independence and discretionary accruals, with a coefficient of 17.37.

The main goals of CEO duality are to increase the independence of the board and decrease the concentration of power in the hands of one individual. According to agency theory, when there is CEO duality, the board's ability to observe management objectively is considerably reduced. Contrary to expectations, the study's findings show that CEO duality has a statistically significant positive effect on discretionary accruals. The findings concur with those of Aqlan, Alashaf, Barakat, and Zaid (2021), who discovered a favorable but negligible correlation between CEO-chair duality and discretionary accruals in Indian tourism industry firms. This outcome is consistent with the body of research. This finding is consistent with that of Asogwa, Ofoegbu, Nnam, and Chukwunwike (2019), who revealed that the firms' earnings quality is positively and significantly impacted by a board leadership model where CEOs and board chairpersons are separated. Additionally, CEO duality has a positive effect on earnings management practices, according to research by Bouaziz, Fakhfakh, and Jarboui (2020) in France.

On the contrary, Sarkar and Sarkar (2008) and Chatterjee (2020), using a sample of Indian firms, found that CEO duality negatively affects the quality of reported earnings. Based on the results, H_{03} test specifications provide evidence that CEO duality has an insignificant coefficient with discretionary accruals at a 5% significance level. Thus, we fail to reject the null hypothesis H_{03} .

The effects of board meetings on discretionary accruals show an insignificant negative relationship. Indeed, it is hypothesized that the greater the number of board meetings held during the fiscal year, the more opportunity for dealing with the firm's potential problems (Abbott, Parker, & Peters, 2004). Nevertheless, an active board of directors could provide more accurate and better supervision for the internal and external audit functions and the firm's performance. In contrast to these results, the present study does not find evidence of the significance of this relationship. However, we show that the number of board meetings could negatively affect the quality of financial reporting as measured by discretionary accruals. This is inconsistent with expectations since board meetings more frequently are expected to be more effective and diligent monitors of the financial reporting process. Based on the results, H_{04} test specifications provide evidence that board meetings have an insignificant coefficient with discretionary accruals at a 5% significance level. Thus, we fail to reject the null hypothesis H_{04} .

The discretionary accruals of the non-financial firms listed in the NSE exhibit a strong positive relationship with firm size. Thus, firms become more vulnerable to earnings management as their size grows. The results contrast with those of Al-Haddad and Whittington (2019), who discovered a significant negative impact of firm size on Jordanian firms, indicating that larger firms in Jordan are less likely to manage earnings through sales manipulations and discretionary accruals. This outcome is affirmed by (Al-Haddad & Whittington, 2019; Ge & Kim, 2014).

Leverage exhibits a relatively insignificant negative relationship with the discretionary accruals of the non-financial firms listed on the NSE, which is consistent with Young, Peng, Ahlstrom, Bruton, and Jiang's (2008) assertion that changes in leverage may have a variety of effects on those accruals. Contrary to popular belief, high-leverage companies engage in more income-increasing earnings management activities to maintain their debt agreements. Buniamin, Alrazi, Johari, and Abd Rahman (2008) reported a similar outcome, noting that firm leverage and earnings management have a significant positive relationship in the context of Malaysia.

Summary and Conclusions

Our findings have implications for several interested parties, including auditors, institutional investors, regulators, and policymakers who oversee assessing how well corporate boards of directors supervise a company's financial reporting and disclosure procedures. According to our findings, it can be argued that when cognizant of corporate boards of directors' failure to voluntarily improve their overall effectiveness and efficiency, especially when both have the incentive and capability to do so, these interested parties would raise their external assessment of financial reporting quality and disclosure. The findings of the current paper may also be valuable to decision-makers who have the power to appoint board members by selecting independent and knowledgeable individuals. Moreover, this paper recommends adopting better strategies for corporations and their corporate governance structures when communicating with audit committees and assessing their effectiveness in improving financial reporting quality and disclosure.

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Original Research

Presenting a Cause-Effect Model of the Factors Affecting the Fundamental Competencies of Human Resource Managers in Service Start-ups with the DEMATEL Approach

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Abstract

The current research has been done to provide a cause-effect model of the factors affecting the fundamental competencies of human resource managers in service start-ups using the Dematel approach. The research method is descriptive-survey with the statistical population of 12 experts, including university professors in the field of human resources and human resources managers and experts of service start-ups in three systems: Snapp, Tapsi and Maxim. At first, based on the research background, the factors affecting the fundamental competencies of human resource managers in service start-ups were determined, and then the DEMATEL technique was used as an approach to identify the cause-effect relationships. Then, with the method of Analytical Hierarchy Process (AHP), factors were prioritized in three taxi order systems. The results of this research showed that vision, leadership, and information technology have been identified as effective causal factors, and the Education and knowledge management, organizational culture, corporate communication, and rules of the organization have been identified as impressive factors. The results of the hierarchical analysis also showed that information technology has the uppermost priority in the Snapp and Tapsi taxi request system, but in the maxim system, vision and strategy receive the uppermost priority.

Keywords: Fundamental competence, Human resources, Service start-ups, Dematel.

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Introduction

Nowadays, in order to build a forward-looking and stable organization, which will form a competitive organization, it is necessary to develop the fundamental competencies within an organization. Fundamental competencies are basically the strategic actions which are taken to achieve the organizational strategic goal. For better performance, every organization needs some strategies directing to its goals. Fundamental competencies are assets that occasionally renew organizational strategies to advance it in the market. The fundamental competencies are the strength of the organization that equips it with the ability to resist to unpleasant changes in the external environment and the stability of the organization. In fact, by using fundamental competencies, organizations can continuously seek new ways to provide services and service innovation to update and engage people (Hooda & Singla, 2021). It is possible to develop competencies to achieve the organization's strategic goals, therefore organization managers should focus on these fundamental competencies as key elements (Sanchez, Jenny, & Miles, 2017). Today, mobile taxi booking (MTB) applications have been developed in cities as a bridge to connect passengers and taxis (Shen, Qiu, Li, & Feng, 2015). With MTB apps, travelers can search for available taxis around them and order or type in GPS. They set their locations by using GPS or by typing the target location so that drivers can easily have access to them. For the first time in the world, this service was provided by Uber in San Francisco, USA (Chan, Chang, Lau, Law, & Lei, 2016). In the last few years, start-up companies have been developed widely in industries of Iran, and accordingly, start-up companies have experienced many failures and accomplishments. In Iran, the urban transport business paradigm faced the digital transformation following the global trend (Nazari, Vedadhir, & Ezati, 2019). Currently, companies such as Snapp, Tapsi, etc. are also providing services in some big cities of Iran with the formation of online taxi request platforms. One of the challenges which startup business managers have faced with in today's world is the selection in human resources units. Therefore, this research seeks the cause-effect relationships of the factors affecting the fundamental competencies of human resources managers.

Theoretical foundations

Fundamental competencies

Fundamental competencies are the set of knowledge, skills and attitudes that managers must have in order to effectively manage different and complex situations (Lee, 2018). Fundamental competencies are also analyzed in the context of values. As Bacha (2012) also mentions. Fundamental competencies are defined as a specific and unique experience of the company allowing it to create value and, as a result, offer products that are unique and difficult to copy by competitors which is why it has been considered in fundamental competencies in a period of time (Nowak, 2018). Fundamental competencies are defined as knowledge and skills that can be identified to perform assigned tasks at the right time and place. It is believed that fundamental competencies have a basic process affecting the development of the organization and are considered as the key to success (Ng & Kee, 2018). Fundamental competencies frequently create challenges for imitative competitors or suppliers and partners. In other words, the lack of these types of competencies, which

are essential and needed, will lead to a significant strategic challenge or loss in the market. The distinction of the fundamental competencies of an organization is that they work overtime and frequently demonstrate the vital factors in order to succeed in a period of time. Another distinction of fundamental competencies is that it is difficult for competitors to copy or produce items (Rigby & Bilodeau, 2015). The fundamental competencies of the organization are defined as the ability to perform specific tasks even better than competitors. Fundamental competencies affect everything that leads to the company's development, what the organization focuses on, and the bottom line. Fundamental competencies may have the following natures (Nowak, 2018):

Market Access Competencies: This skill makes you stand next to customers and buyers.

Integration and Relational Competencies: This skill allows the company to do the job faster, with much more flexibility, or with much more confidence and credibility than the competitors.

Functional and Relational Competencies: This skill enables the company to invest in its own products or services.

Start-up businesses

In the last few years, developments in new technologies means that companies have adopted new business models, which includes globalization and the Internet usage as an asset to promote products and services (Zutshi, Grilo, & Jardim-Goncalves, 2015). With the technology evolution since the first decade of the 21st century, these business models have been adapting to new processes and social changes and also new consumer demands in this new digital era where the use of new technologies has become a habit in the personal and professional world (Saura, Palos-Sanchez, & Grilo, Detecting indicators for startup business success: Sentiment analysis using text data mining, 2019). The term "startup" was invented for business models using technology. A start-up is a technology-based company that offers a new product or service using the added value of embedded technology. This is defined as "innovation through technology" (Kopera, Wszendybyl-Skulska, Cebulak, & Grabowski, 2018). Start-ups can be defined as innovative investments that perform under a situation of uncertainty, time pressure and high risk. Some claim that technology start-ups are one of the most important players in building innovation ecosystems (Genome, 2017).

The goal of many start-ups is to create a revolution in the market in which they perform (Kopera, Wszendybyl-Skulska, Cebulak, & Grabowski, 2018). Start-ups use scalable business models (Saura, Reyes-Menendez, & Alvarez-Alonso, Do online comments affect environmental management? Identifying factors related to environmental management and sustainability of hotels, 2018). Many are creating successful products and services for consumers whose consumption habits are based on the digital age. Examples of services and products created as start-ups include Whatsapp, Facebook, Instagram, and the tech giant Alphabet (Google) (Saura, Palos-Sanchez, & Grilo, Detecting indicators for startup business success: Sentiment analysis using text data mining, 2019). Start-ups are small companies that start from an innovative idea using

technology, and with experience and the time passing through, they will become a technological and innovative company that is stable in time (Hagen & Bergh, 2018).

Although start-ups are pioneers of innovation, they face some specific innovation challenges. The work of innovation in start-ups is based on the entrepreneurial model that focuses on rapid growth and continuous pursuit of opportunities through continuous development in the situation of resource scarcity (Engel, 2015)

Human resource management in start-ups

Start-ups are new generation organizations and should be viewed from a completely different point of view. What works for other companies, may not work for start-ups in general. Trying to produce something innovative makes a start-up company face some challenges such as uncertainty in the future, dealing with competitors in the market, high friction rate and high wages offered by competitors. Also, start-ups are trying to be promoted. For their human resources, it is important to try to find, recruit and retain the best talent. Human resource management functions that should be applied by start-up entrepreneurs in organizations include job design, role description, recruitment and selection, training and development, performance evaluation, strategy incentives, work situations, employees' relations (Boudlaie, Kenarroodi, Amoozad Mahdiraji, & Afari-Sadeghi, 2020).

The results of the research by Sadeghi et al. (2019) showed that human resource management can play different roles from strategic to non-strategic in the start-up growth process. In addition, product quality, company financial performance, and stability are directly dependent on individual employees and their relationships with each other. Human resource managers focus on areas such as selection, recruitment, strategic allocation of human resources, employee development, and organizational environment to create synergy between employees' efforts and business goals (Keir, 2019). When looking at the reasons for the failure of start-ups from the vision of human resources, 60% of startup failures are due to human factors such as poor quality and efficiency, lack of innovation, lack of focus and strategy. The criticality of the human capital element in start-ups attaches importance for the development of human resource management systems to minimize the possibility of failure (Calden, García, & Betancourt, 2019). In addition, start-ups consist of a small number of employees, and this issue creates environmental conditions different from corporate environments (Gallup, 2019).

The importance of human resources in start-ups

Researchers are increasingly supporting the adoption of superior human resource management practices in start-ups. For example, they even support the importance of implementing high-performance work systems (intertwining practices such as structured selection, training, merit-based performance appraisal and promotion, share ownership rewards, and flexible approaches to work). Even in the early stages of start-ups formation this is emphasized, as it seems to increase their chances of achieving a higher level of growth. The longitudinal study of Barron and Hannan's (2002) is a large sample of high-tech start-ups in Silicon Valley that emphasized the enduring effects of early HRM decisions on startup development. In this regard, Rutherford et al. (2003) argued that

when firms achieve higher sales growth, specific features of human resource management such as employee development activities become important. Nevertheless, human resource management in small firms (especially start-ups) is not prioritized and considered very informal, because it includes the introduction of organizational rules and regulations, which often act as a tremendous threat to entrepreneurial spirit and flexibility of This type of business is considered (Jebali & Meschitti, 2021).

Although investment in human resource management can be considered as one of the most important decisions and increase productivity, but this increase in productivity is not enough to cover additional labor costs and new human resource management processes. However, the investment efficiency comes through advanced innovation or reduced conflict. It seems that the HRM efficiency depends on "parameters" such as business industry or strategic position. For example, it is more likely to find HRM systems in firms with a differentiation strategy than those aiming to achieve cost leadership (Harney & Alkhalaf, 2021).

In contrast, other researchers argue that firms with a differentiation orientation are less apt to adopt high-investment HRM systems, as their dynamism and flexibility may be suppressed by increased standardization. Firms can benefit more from the formal and informal coexistence with human resource management in order to improve innovation. Then, instead of being afraid of the increase in formalities in start-ups, both temporary and structured practices can be adopted in a complementary manner (Do & Shipton, 2019).

Background research

The background of the research is summarized in Table 1.

Table 1. Summary of the experimental background of the research

Components of fundamental competencies	Research purpose	Title	Author
In this research, the fundamental competence dimensions of human resource managers and the factors affecting them have been identified and categorized. Based on the findings in the first stage with the qualitative approach, eight dimensions of fundamental competencies including cognitive-insight competence, entrepreneurial competence, leadership competence, communication competence, individual competence, technical and specialized competence, moral competence and psychological	The current research has been done with the aim of designing the fundamental competence model of human resource managers and identifying its dimensions and components as well as the factors affecting the fundamental competence of	Designing fundamental Competencies pattern for human resource managers related to service start-ups in the urban transport sector	(Soleimani, Khademi, AbdulManafi , & Shahnazari, 2023)

competence and six effective factors were formulated.	human resource managers		
According to the results, the main phenomenon of this research is the process of extracting of international marketing managers competencies considering the causal factors (mathematical intelligence, cultural intelligence and personality traits), contextual factors (performance of Iranian consultants, performance of chambers of commerce and confounding factors (economic, political, and cultural conditions)	Present study aims to find international managers competencies by means of grounded theory.	Presenting International Marketing Managers Competency Model	(Basiji, Babaie Zakliki, Hoseinzadeh Shahri, & Khadivar, 2021)
The key dimensions of the identified competencies are: the dimension of fundamental competence, the dimension of technological competence. The research results show that the most important competencies layers of IT managers in the area of fundamental competencies include individual competencies layer and educational competencies layer and in technological competencies dimension include general competencies layer and professional competencies layer of Information technology managers	to design a model for the competencies of Mellat Bank's IT managers	Designing a model of basic and technological competencies of IT managers	(Saeidpanah, Alvani, & Hashemi, 2020)
Including data, information management, human factors, project management, research skills/knowledge, leadership and management, systems development and evaluation, and health/healthcare	Aimed to systematically review the academic literature relating to competencies, skills and existing course curricula in the clinical and health related informatics domains	Fundamental competencies for clinical informaticians: A systematic review	(Davies, Mueller, & Moulton, 2020)
The findings suggested that to ensure the implementation of future-oriented and sustainable e-governance, it is required to develop the fundamental-competencies. The significant fundamental-competencies explored are, namely,	The purpose of this paper is to empirically identify the themes of fundamental-competencies required for future-	Fundamental – competencies – a key to future – oriented and sustainable e-governance implementation: a	(Hooda & Singla, 2021)

process management, employee engagement, internal service quality, external service quality, citizen satisfaction, leadership, culture and technology	oriented and sustainable e-governance practices, especially across the developing nations.	mixed method research	
decision making, relationship management, communication skills, listening, Leadership, conflict, Management, ethical principles, collaboration and team management skills.	The objective of this research is to identify the fundamental competencies needed for nurse managers in the Spanish health system	Nurse Manager Fundamental Competencies: A Proposal in the Spanish Health System	(González García , Pinto-Carral , Villorejo, & Marqués-Sánchez, 2020)
Data show that communication, commitment and leadership appear as the three most relevant aspects. Multivariate analysis identified seven groups of competencies: leadership, self-management, interpersonal, communication, technical, .productivity and managerial	The purpose of this paper is to define the most important competencies to project success and investigate their correlations	The project manager fundamental competencies to project success	(Alvarenga, Branco, Guedes, Soares, & Silva, 2019)
Effective team learning on fundamental competencies (clinical competency, communication competency, critical thinking ability (and self-leadership	The aim of this study was to assess the comparative effectiveness of TBL and lecture-style classes in terms of teaching fundamental competencies in nursing education, which include clinical competence skills, problem-solving ability, communication competencies, critical thinking ability, and self-leadership.	Effects of team-based learning on the fundamental competencies of nursing students: A quasi-experimental study	(Lee, 2018)

Research method

The current research method is applied in the field of descriptive-survey methods, based on the results of previous studies, factors affecting fundamental competencies have been extracted.

Table 2. Factors affecting the basic competencies of human resource managers
(Soleimani, Khademi, AbdulManafi , & Shahnazari, 2023)

	Variables
1	Corporate communication
2	Vision and organizational strategy
3	Information technology
4	Education and management of organizational knowledge
5	Rules governing the organization
6	Organizational Culture

The statistical population in this study consisted of 12 experts, including university professors in human resources and managers and human resources experts of service start-ups in three systems: SNAPP, TAPSI, and MAXIM, which were selected by the purposeful snowball sampling method. The characteristics of experts are shown in Table 3.

Table 3. Characteristics of experts

Groups	Number	Expertise
Faculty member	6	PhD in Human Resource Management
Internet taxi human resources manager	5	Human resources management
Internet taxi human resources expert	1	Human resources management

At first, the factors affecting the fundamental competencies of human resource managers in service start-ups were identified, and then the Dematel technique was used as an approach to identify cause and effect relationships between factors.

Then, with the Analytical Hierarchy Process (AHP) method, factors were prioritized in three taxi request systems. To continue, Dematel and AHP methods are explained:

Dematel is a technique used to identify the algorithm of causal relationships between a set of variables. The algorithm of the Dematel technique performance is implemented in five steps (Habibia, Izadiyar, & Sarafrazi, 2022):

Step 1: Forming the direct relationship matrix (M)

To identify the pattern of relationships between n criteria, an $n \times n$ matrix is formed at first. The effect of the element in each row on the elements in the column is included in this matrix. A range of 0 to 4 points is used for scoring.

Table 4. Quantification of the affect

Number	0	1	2	3	4
Effect	Effectless	Low effect	Medium effect	High effect	Very high effect

Step 2: Normalize the direct correlation matrix.

For normalization, first, the sum of all rows and columns of the direct correlation matrix is calculated. The largest number of the sum of rows and columns will be displayed with k . For normalization, each row of the direct correlation matrix must be divided by k .

$$k = \max \left\{ \max \sum_{j=1}^n x_{ij}, \sum_{i=1}^n x_{ij} \right\} \quad (1)$$

$$N = \frac{1}{k} * X$$

Step 3: Calculate the complete correlation matrix

To calculate the complete correlation matrix, we first form an identical $n \times n$ matrix. Then we subtract this identical matrix from the normal matrix and invert the resulting matrix. The normal matrix is multiplied by the resulting matrix to obtain the complete correlation matrix. The matrix is identical matrix or identity matrix whose all domains except the main diameter are zero.

$$T = N \times (I - N)^{-1} \quad (2)$$

Step four: Calculate the internal correlation matrix

To calculate the internal relations matrix, the threshold value must be calculated. With this method, partial relationships can be ignored and the network of significant relationships can be drawn or the network of relationships map (NRM). Only relations whose values in matrix T are greater than the threshold value will be displayed in NRM. To calculate the threshold value of relationships, just calculate the average values of the matrix. After the intensity of the threshold is determined, all the values of the T matrix that are smaller than the threshold are zeroed, that is, the causal relationship is not considered.

Step five: Create a causal diagram

Four important features can be seen in the causal diagram:

- The degree of effect of variables: the sum of the elements of each row (R) for each factor indicates the degree of effect of that factor on other factors of the system.

- The degree of affect of variables: the sum of the elements of column (C) for each factor indicates the degree of affect of that factor on other factors of the system.

- Therefore, the horizontal vector ($R + C$) is the degree of affect of the desired factor in the system. In other words, the higher the value of $R + C$ of a factor, the more interaction that factor has with other factors of the system.

- The vertical vector (R - C) shows the affect of each factor. In general, if R-C is positive, the variable is considered a causal variable, and if it is negative, it is considered an effect.

Finally, a Cartesian coordinate system is drawn. In this device, the longitudinal axis is based on R + C values and the transverse axis is based on R - C values. The position of each agent is determined by a point with coordinates (R + C, R - C) in the device. In this way, a graphic diagram will also be obtained.

The basis of the work of AHP method is based on three basic principles 1. Creation of the breakdown structure of the investigated problem; 2. Pairwise comparisons of different criteria; 3. Consolidation and obtaining the priority of criteria.

The first step of creating the work breakdown structure consists of dividing the sub-criteria into simple groups, which are displayed at different levels in a hierarchical structure. The second step of pairwise comparisons of criteria: involves assigning a degree of importance to each group to measure the importance at each level of the hierarchy. Then, numerical judgments are created at each level of the matrix hierarchy. In fact, in this matrix, n is the number of criteria at a certain level of the hierarchy and m is the number of options. Therefore n matrix is formed in that level with m rows and m columns. All pairwise comparisons matrices have two basic properties:

1- The main diameter of the matrix is always assigned the value 1 (because each criterion i is compared with itself).

2- Matrices are inverse matrices. (Values from 1 to 9 are considered in the comparison of criteria i compared to j and opposite values in the comparison of j compared to i). There is an agreement that the main w of matrix A is calculated, which is obtained in the form of equation 1-3 (Li, Phoon, Du, & Zhang, 2013).

$$\begin{aligned}
 Aw &= \lambda_{\max} w \\
 \bar{w}_i &= \left(\prod_{j=1}^n a_{ij} \right)^{1/n} \\
 w_i &= \frac{\bar{w}_i}{\sum_{i=1}^n \bar{w}_i} \\
 \sum_{i=1}^n w_i &= 1 \\
 \lambda_{\max} &= \sum_{i=1}^n \frac{(Aw)_i}{nw_i}
 \end{aligned} \tag{3}$$

In these relationships: A: pairwise comparison matrix with positive numbers; n: number of rows and columns of the matrix; λ_{\max} : largest eigenvalue; w: eigenvector associated with the largest eigenvalue. The adjustment of judgment matrices using a measurement criterion called compatibility rate, which is calculated as the following equation:

$$CI = \frac{CI}{RI} \tag{4}$$

Which: CI: consistency index RI: random index CI is also calculated as the following equation:

$$CI = \frac{\lambda_{\max} - n}{n - 1} \quad (5)$$

If the CR matrix includes a high value, it means that the judgment values, consistency rate, are not compatible, and generally values like 0.1 and below are acceptable. If this value is higher, the judgments are not reliable and should be renewed (Bottero & Peila, 2005).

Findings

The results of the Dematel method

In order to identify the pattern of causal relationships between the factors affecting the basic competencies of human resource managers, the Dematel method was used to reflect the internal relationships between the effective factors from the experts' point of view, and the initial matrix of direct relationships or X was formed.

Table 5. Primary matrix of direct relationships

code	Variables	1	2	3	4	5	6
C1	Corporate communications	0	1	2	3	3	3
C2	Vision and organizational strategy	4	0	3	2	3	3
C3	Information Technology	1	3	0	2	4	3
C4	Education and management of organizational knowledge	1	1	2	0	4	3
C5	Rules governing the organization	3	1	1	3	0	3
C6	Organizational Culture	3	1	1	3	3	0

First, the sum of all rows and columns is calculated. The inverse of the largest number of the row and column sum is represented by k. According to the table above, the largest number is 17, and all the matrices of the matrix are multiplied by the inverse of this number to make the matrix normal.

$$k = \frac{1}{\max \sum_{j=1}^n x_{ij}} = \frac{1}{17} = 0.0588$$

Therefore, by normalizing the initial matrix of direct relations, the matrix of normalized direct relations was obtained, which is shown in the Table 6.

Table 6. Normalized direct relationships matrix

Variables	1	2	3	4	5	6
C1	0	0.059	0.118	0.176	0.176	0.176
C2	0.235	0	0.176	0.118	0.176	0.176
C3	0.059	0.176	0	0.118	0.235	0.176
C4	0.059	0.059	0.118	0	0.235	0.176
C5	0.176	0.059	0.059	0.176	0	0.176
C6	0.176	0.059	0.059	0.176	0.176	0

To calculate the complete matrix, first the same matrix $I_{(6 \times 6)}$ is formed and in the next step the same matrix is minus the normal matrix, the matrix obtained by subtracting the same matrix from the normal matrix must be reversed. Finally, the normal matrix must be multiplied by the inverse matrix.

$$T = N \times (I - N)^{-1}$$

The complete correlation matrix (T) the main criteria will be as follows in Table 7.

Table 7. Total relationship matrix

Variables	1	2	3	4	5	6
C1	0.277	0.217	0.304	0.468	0.532	0.494
C2	0.549	0.204	0.407	0.499	0.625	0.579
C3	0.378	0.332	0.223	0.451	0.612	0.529
C4	0.32	0.205	0.286	0.293	0.547	0.468
C5	0.409	0.2	0.243	0.445	0.352	0.467
C6	0.409	0.2	0.243	0.445	0.502	0.317

To determine the Network Relationship Map (NRM), a threshold value must be calculated. With this method, it is possible to ignore minor relationships and draw a network of significant relationships Only relations those values in matrix T are greater than the threshold value will be displayed in NRM Threshold values of the relations, that is, the average values of the T matrix, are obtained as 0.389. All the values of the T matrix that are smaller than 0.389 are set to zero, that is, the causal relationship is not considered.

Table 8. Matrix of general relations-applying the threshold limit

Variables	1	2	3	4	5	6
C1	0	0	0	0.468	0.532	0.494
C2	0.549	0	0.407	0.499	0.625	0.579
C3	0	0	0	0.451	0.612	0.529
C4	0	0	0	0.293	0.547	0.468
C5	0.409	0	0	0.445	0	0.467
C6	0.409	0	0	0.445	0.502	0

The pattern of cluster relations and Cartesian coordinates of the studied variables is as follows in Figure 1.

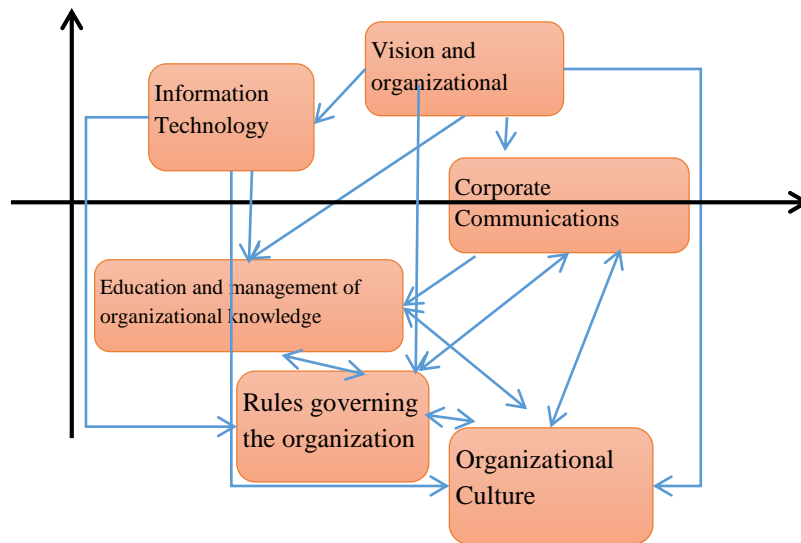


Figure 1. Cluster relations model and Cartesian coordinates

Finally, the order of effect and under effect of the factors is specified in Table 9.

Table 9. The order of affecting and being effected by variables

Variables	1	2	3	4	5	6
(Effect) R quantity	2.292	2.863	2.525	2.119	2.116	2.116
(Efficacy) C quantity	2.342	1.358	1.705	2.601	3.17	2.855
R + C	4.634	4.221	4.23	4.72	5.286	4.97
R - C	-0.05	1.505	0.82	-0.48	-1.05	-0.74

At this stage, the meaningful causal diagram of the relationships between the variables is shown in this way, the variables that are above the horizontal axis are the affecting variables and the variables that are below the horizontal axis are the impressionable variables.

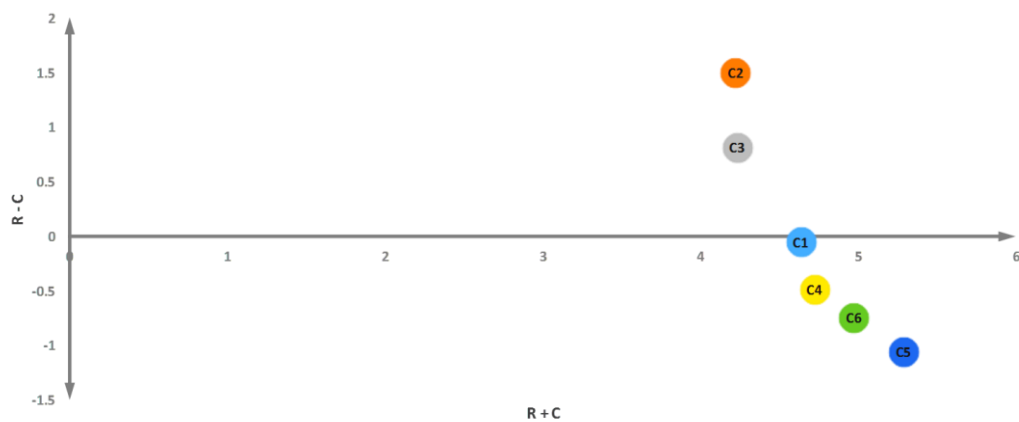


Figure 2. Spatial diagram of relations (public relations diagram)

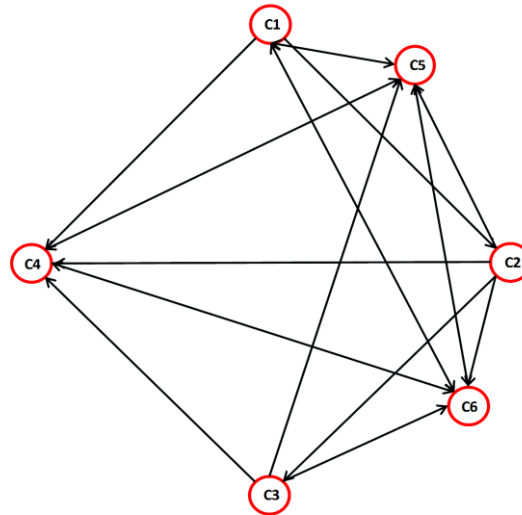


Figure 3. Network relations map

The results of the AHP method

Determining the weights of affecting factors of the fundamental competencies of human resource managers with the AHP method. In the current research, weighting was used in the Expert Choice software environment to determine the factors' weights. The basis of weighting the weights of the factors in the AHP method is shown in the following table:

Table 10. The basis of weighting the factors by AHP method

Verbal expressions	Numbers
Same preference	1
a little more	2
More preferred	3
much more	4
Totally preferable	5

Based on the results of weighting the factors, respectively, information technology with weight (0.220), vision and organizational strategy with weight (0.188), corporate communication with weight (0.186), rules governing the organization with weight (0.141), education and knowledge management with weight (0.140), organizational culture with weight (0.125). Also, based on the output of the software, the value of inconsistency rate equal to 0.003 was obtained, which is less than the reported value of 0.1 and is confirmed.

Table 11. Weights index

Main indicators	weights	Grade
Information Technology	0.22	1
Vision and organizational strategy	0.188	2
Corporate Communications	0.186	3
Rules governing the organization	0.141	4
Education and knowledge management	0.14	5
Organizational Culture	0.125	6

Next, in order to achieve the weighting of the factors in each of the start-up intra-city transportation businesses, i.e., Snapp, Tapsi and Maxim, it has been used in the Expert Choice software environment.

Prioritization and weighting of factors in SNAPP from the point of view of experts

The inconsistency rate of this test is calculated as 0.02. This value is less than the criterion of 0.1, so the reliability of the research tool is confirmed in this part. As it is clear in the above diagram, the information technology factor with 0.22 weight has been assigned the highest priority.

Table 12. Prioritization and weighting of factors in Snapp from the experts' point of view

Main indicators	weights	Grade
Information Technology	0.22	1
Corporate Communications	0.16	2
Education and knowledge management	0.157	3
Vision and organizational strategy	0.156	4
Organizational Culture	0.147	5
Rules governing the organization	0.143	6

Prioritization and weighting of factors in TAPSI from the experts' point of view

The inconsistency rate of this test is calculated as 0.004. This value is less than the criterion of 0.1, so the reliability of the research tool is confirmed in this part. As it is clear in the above diagram, the information technology factor with a weight of 0.183 has been assigned the highest priority.

Table 13. Prioritization and weighting of factors in TAPSI from the experts' point of view

Main indicators	Weights	Grade
Information Technology	0.183	1
Corporate Communications	0.181	2
Vision and organizational strategy	0.163	3
Education and knowledge management	0.163	4
Organizational Culture	0.16	5
Rules governing the organization	0.152	6

Prioritizing and weighting factors in Maxim from the experts' point of view

The inconsistency rate of this test is calculated as 0.003. This value is less than the criterion of 0.1, so the reliability of the research tool is confirmed in this part. As it is clear in the above diagram, the vision and organizational strategy factor with a weight of 0.187 has been assigned the highest priority.

Table 14. Prioritization and weighting of factors in Maxim from the point of view of experts

Main indicators	Weights	Grade
Vision and organizational strategy	0.187	1
Information Technology	0.183	2
Corporate Communications	0.179	3
Organizational Culture	0.155	4
Education and knowledge management	0.149	5
Rules governing the organization	0.147	6

Conclusion and suggestions

As it was mentioned, the current research was done to provide a causal model of the factors affecting the fundamental competencies of human resource managers in service start-ups with the Dematel approach. In the second step, factors were prioritized in three taxi request systems using the Analytical Hierarchy Process (AHP) method. The results showed that the effect of the variables, the sum of the elements of each line for each factor, indicates the effect of that factor on other factors of the system, and the highest impact is related to the variables of vision and organizational strategy and information technology with values of 2.863 and 2.525, respectively. Effect of the variables, the sum of the column elements for each factor indicates the degree of effect of that factor on other factors of the system. The highest effect was related to the variable of rules governing the organization with a value of 3.17 and organizational culture with a value of 2.855. Therefore, the horizontal vector ($R + C$) is the effect and impression of the desired factor in the system. In other words, the higher the value of $R + C$ of a factor, the more interaction that factor has with other factors of the system. The laws governing the organization have the most interactions with other variables with a value of 5.286. The vertical vector ($R - C$) shows the effect of each factor. In general, if $R - C$ is positive, the

variable is a causal variable and if it is negative, it is an effect. Causal variables that this value has become positive include the variable of vision and organizational strategy and information technology with values of 1.505 and 0.82, respectively. The results of the hierarchical analysis also showed that the vision and organizational strategy factor with a weight of 0.187 has the highest priority in the Maxim taxi request system, and the information technology factor with a weight of 0.183 has the highest priority in the Tapsi system. Finally, the information technology coefficient with a weight of 0.22 has the highest priority in the Snapp taxi request system. In the literature of startup human resources, technology, culture, and education are mentioned in the research of Kaiver (2018). Also, in a research, work culture and Kartimi are mentioned as effective factors in the human resources of start-ups (Lepanen, 2015). Kaushik (2018) raised the issue of education and culture as effective factors in the human resources of start-ups. Javadin et al. (2020) have mentioned the discussion of effective work culture and skill increase in the human resources model of start-up businesses as the ruling platform.

Therefore, based on the results, it is suggested that the managers of the taxi request systems pay more attention to the discussion of information technology in the organization, considering the dynamic and flexible environment of this type of business, as well as the information technology and the vision and strategies of other effective factors that are considered in the market up. Start-ups should be placed in relation to information technology, its effects on organizations have always been noted, the changes that information technology brings in areas such as structure, authority, power, job content, employee job hierarchy Supervision and job of managers can be mentioned In order to strengthen the technology in the organization, the necessary infrastructure and capital should be considered in every business in the field of information technology related to that business. In the field of organizational visions, the emphasis on employees' participation in improving the determination and implementation of visions and strategies for achieving goals in the organization should be taken into account in order to increase the competencies of human resource managers, and following the improvement of technology and vision, organizational culture and communication can be improved. The improvement will also be the basis for education and knowledge management in the organization and the improvement of the rules governing the organization, and this will provide the fundamental competence of human resource managers. Human resource management and all the factors affecting it formally and informally in order to strengthen innovation in this type of organizations should be taken into consideration so that the prevailing laws and its standardizations do not suppress the running and flexibility of this type of business.

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Original Research

An Investigation of the Relationship Between Life Expectancy at Birth and Economic Growth in Developing Countries

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Abstract

This study aimed to investigate the relationship between life expectancy at birth and economic growth in developing countries. The Document and Library review was used to collect data. Then, the relevant information was extracted from the World Bank website. The necessary information was collected through the World Bank website (2000-2020) to analyze the information and hypothesis test. After collecting the required information for the considered countries, the research hypotheses were examined using correlation and regression analysis and the panel data statistical method, and the data was prepared for analysis. Then, Eviews 12 is used to perform the final analysis. The results showed that there is a positive and direct relationship between Healthcare expenditures as one of the indicators of life expectancy at birth and economic growth in developing countries. It is also concluded that there is a negative and inverse relationship between Food Poverty as one of the sub-indicators of life expectancy at birth and economic growth in developing countries, while there was a negative and inverse relationship between the Death Rate as one of the sub-indicators of life expectancy at birth and economic growth in developing countries. In addition, there is a positive and direct relationship between Access to Educational Facilities as one of the sub-indicators of life expectancy at birth and economic growth in developing countries. Finally, there is a positive and direct relationship between Median Household Income as one of the indicators of life expectancy at birth and economic growth in developing countries.

Keywords: Life expectancy at birth, Economic growth, Developing countries, Panel data.

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Introduction

Today, reliable information on Neonatal death in any society is necessary to evaluate health system programs and determine priorities for implementing essential interventions to control various diseases and injuries (Abdulsalam Abubakar et al). This information can be effective for judging health changes and upgrading the health system to another level and finally lead to economic growth in the long term (Dumitrescu, E. and Hurlin, C). Of course, the raw and specific death rate alone cannot be a good benchmark concerning death at birth in a society. Therefore, this indicator, along with life expectancy at birth (the average number of years a baby will live after birth), is used as a variable of life expectancy, if the mortality probability for the next years will be the same as now (Kiran, B et al). The economic growth of developing countries leads to an increased income and the abundance of available goods, thereby increasing the welfare of the society (Metin and Özlem). Access to educational facilities as one of the indicators of life expectancy at birth can have a significant impact on the economic growth of developing countries (Abdul Salam et al., 2021). Considering the importance of studying factors affecting life expectancy at birth, it can be said that health is a valuable thing and a goal for humanity, in which economists seek to find an optimal mechanism and method to improve the health level of society and developing countries (Kieran et al., 2019). Understanding the nature of health and the factors affecting it at the birth of babies is very important to achieve higher levels of health (Abdul Salam et al., 2021).

Economic misery from the negative economic growth rate of a country is one of the factors affecting life expectancy at birth. It is one of the economic indicators that was seriously emphasized by economists (Damitriso and Horlin, 2020). An increase in inflation in developing countries can lead to an increase in medical products and services costs. These problems lead to a decrease in life expectancy at birth in society (Kao, C., & Chiang, M. H, 2012). The high unemployment rate has forced the government to develop policies related to unemployment reduction. It makes household health expenses less important, thus leading to a reduction in general health expenses (Pedroni, P). Reductions in public health expenditures in turn decrease health outputs including life expectancy at birth (Breitung, J, 2011). An increase in unemployment, a general decrease in personal income, and mental stress worsen health conditions and decrease life expectancy in society (Westerlund, J, 2018). Education is one of the most important factors for determining the health output and life expectancy at birth and reducing the inflation rate and death rate among families, as well as increasing the economic growth rate in developing countries in the long term (Metin and Ozlem, 2019). The results of studies have shown that families with higher education have better health status (Brittany, 2011). These families pay more attention to health and choose the right nutrition and lifestyle, and can better use health information and the healthcare system (Damitriso and Horlin, 2020). Accordingly, the main research problem is to investigate the relationship between life expectancy at birth and economic growth in developing countries.

Literature review and theoretical foundations

Economic growth in developing countries is a process in which Gross Domestic Product (GDP) growth is the main axis. The growth in the absolute amount of goods and

services has usually been accompanied by an increase in the average material well-being or the product per capita, as well as population growth (Damitriso and Horlin, 2020). The modern definition of economic growth in developing countries also includes an increase in economic welfare (Metin and Ozlem, 2019). Life expectancy at birth is one of the important indicators of mortality condition. It expresses the cultural, social, economic, and health status of society (Kiran et al., 2019) and can be useful in evaluating the services provided (Programme, 2018). Infant mortality can be due to unfavorable economic conditions and a lack of economic freedom (Abdul Salam et al., 2021). Many factors such as medical and health status, welfare levels and social security, social services provision and insurance, occupational and economic security, food safety and nutritional quality, literacy level, etc. have an effect on life expectancy at birth in different societies. The improvement of each of these criteria has a direct role in increasing the quality of life expectancy (Damitriso and Horlin, 2020).

Health expenditure is one of the criteria that can affect the life expectancy in a society in the long term (Kendall, J, 2017). Increasing health expenditure and reducing food poverty by governments to reduce poverty lead to a decrease in mortality rates; In this way, we can expect an increase in the life expectancy indicator (Im, K et al., 2015). Governments usually develop the indicators of life expectancy to increase economic growth and achieve the desired economic growth in the long term according to strengthening human resources algorithms (Westerland, 2018). A developing country's economic growth rate increases if life expectancy at birth is at a standard level, while the death rate decreases in the long term, and governments can provide more suitable facilities to society over time according to predetermined algorithms (Abdul Salam et al., 2021).

Financial development improves life expectancy and mortality rates through several channels (Westerland, 2018). There are also factors related to the domestic economic condition that help improve the mortality rate and life expectancy at birth (Metin and Ozlem, 2019). In keeping with the studies, there are four influencing channels of financial development, health output, and economic growth, including income growth, infrastructure development, education, and risk management (Damitriso and Horlin, 2020). Economic growth leads to the infrastructure development that is needed to increase critical health output at birth and life expectancy (Kieran et al., 2019). These infrastructures include hospitals, roads, electricity, and food supply (Levin, A et al, 2013). Access to electricity is also necessary for hospitals and provides better medical services (Kendall, 2017). Positive fluctuations in family income (increase) are one of the indicators that can greatly increase life expectancy at birth (Damitriso and Horlin, 2020). The fact that the average income of households is higher than the average income of all households in society helps to stabilize the standards related to health and food in people's lives, and we can expect an increase in the economic growth of countries in the long term after improving the general well-being of households. (Metin and Ozlem, 2019). The following hypotheses have been raised to achieve the research goals after examining the research problem and preliminary studies about possible answers:

H1: There is a significant relationship between life expectancy at birth and economic growth in developing countries.

H11: There is a significant relationship between health expenditures as one of the indicators of life expectancy at birth and economic growth in developing countries.

H12: There is a significant relationship between food poverty as one of the indicators of life expectancy at birth and economic growth in developing countries.

H13: There is a significant relationship between mortality rate as one of the indicators of life expectancy at birth and economic growth in developing countries.

H14: There is a significant relationship between access to educational facilities as one of the indicators of life expectancy at birth and economic growth in developing countries.

H15: There is a significant relationship between median family income as one of the indicators of life expectancy at birth and economic growth in developing countries.

In the following, some related past studies are reviewed. Nowrozi et al. (2021), in the research "Effective Factors on Productivity Growth in Iran and Hope for the Future", concluded that out of the 20 variables used, 5 variables of foreign investment, investment in the railway safety, innovation index, and exchange rate were removed from the model. In keeping with the results, the neural network model with Tansig activation function with 3 neurons has a predictive power of 0.993 and a minimum model error of 0.0019. Pourali et al. (2021), investigated the effects of macroeconomic variables and the public and institutional welfare state on the economic growth in selected countries. Yekta et al. (2021) discussed the relationship between life expectancy and fear of COVID-19 among working people. The findings showed that life expectancy has a significant and inverse relationship with panic and fear of the COVID-19 pandemic, that is, with the increase in fear of COVID -19, life expectancy decreases. Babaei (2021) researched "the effect of health indicators and macroeconomic variables on the quality of life expectancy". The results of comparing the panels of developed and developing countries indicate that the impact of economic and health variables on the life expectancy indicator is more in developing countries than that in developed countries in almost both classes of investigated indicators.

Shafiei et al. (2019) investigated the effect of financial development indicators on the life expectancy of men and women in selected developing countries using The generalized method of moments (GMM) method. Finally, based on the estimated results, it was proved that the facilities assigned to the private sector as one of the financial development indicators have a significant and positive effect on the life expectancy of men and women in developing countries. Metin and Ozlem (2019) studied the relationship between life expectancy at birth and economic growth in 56 developing countries. The results showed that life expectancy at birth has a positive effect on economic growth in most cases, but in some cases, financing will have an indirect and adverse effect on economic growth due to the increase in government debt. Abdussalam (2021) investigated life expectancy at birth and the accumulation of human capital and economic growth. The results showed that life expectancy at birth has a positive and direct effect on the country's economic growth. It was also proven that financial development

in some cases may have a negative and inverse effect on economic growth in any country, but in most cases this effect is positive.

Dumitrescu and Horline (2020) investigated the factors influencing economic growth and life expectancy at birth. The results of this research showed that the accumulation of human capital in most cases, affects the economic growth of countries and life expectancy at birth, but in some cases, it has also led to social problems and economic stagnation in different countries.

Karin et al. (2019) investigated financial development and economic growth and life expectancy at birth using the panel data statistical method. The results showed that financial development has a positive effect on economic growth and life expectancy at birth, but in some cases, financial development and life expectancy at birth cause economic recession in a country with the intervention of some other variables such as inflation rate and reduction of capital accumulation. Kendall et al. (2017) investigated the impact of life expectancy at birth and human capital on economic growth. The results showed that in most cases, life expectancy at birth has a positive effect on economic growth, but in some cases, direct financing will harm economic growth because of an increase in public debt of the government.

Methodology

The geographical scope of the research is developing countries. This study is correlational research in terms of nature and content. The Causal-Comparative method has been used to analyze the correlation between variables. The applied research approach was selected according to the research objective. Real information and different statistical methods are used to reject or accept hypotheses. The present research is in the field of Proof theory and is performed in the framework of deductive-inductive arguments, which means that the theoretical foundations and literature are used to accept or reject hypotheses through library studies, articles, and sites in a deductive format and gathering information in an inductive format. The current research uses the library and archival studies. First, the important contents of the past research are summarized using library studies and the Note-taking technique. Then the relevant information was extracted from the World Bank website. The conceptual model of the research is developed in Figure 1.

Model numbers 1 to 5 will be used to test hypotheses 1 to 5, respectively, as described below. In this model, research hypotheses 1 to 5 will be confirmed if the coefficients (coefficients related to independent variables) are significant at the 95% confidence level. The mathematical model of the research (adapted from Metin and Ozlem, 2019) is estimated as follows:

$$\ln(Y_{i,t})IPC = \alpha_0 + \beta_1 LEB1_{i,t} + \beta_2 LEB2_{i,t} + \beta_3 LEB3 + \beta_4 LEB4 + \beta_5 LEB5 + \varepsilon_{i,t} \quad (1)$$

Dependent variable:

($\ln(Y_{i,t})IPC$): Economic growth in developing countries

Economic growth will be measured by GDP (Metin and Ozlem, 2019).

Independent variables:

($LEB1_{i,t}$): Health expenditure as one of the life expectancy indicators

($LEB2_{i,t}$): Food poverty as one of the life expectancy at birth indicators

($LEB3$): Food poverty as one of the life expectancy at birth indicators

($LEB4$): quality of educational facilities as one of the life expectancy at birth indicators

($LEB5$): Median family income as one of the life expectancy at birth indicators

In these models, we assume:

i represents the company (Cross-sectional units) and t represents the year.

$\varepsilon_{i,t}$ = Random error of company i in year t

The required information was collected through the World Bank website for a period of 21 years (2000-2020) to analyze the information and test the hypotheses. The research hypotheses were examined using correlation coefficient and regression analysis and the statistical method of panel data after collecting the required information from the selected countries. Preliminary calculations were done using Microsoft Excel and the data was prepared for analysis. Then Eviews is used to perform the final analysis.

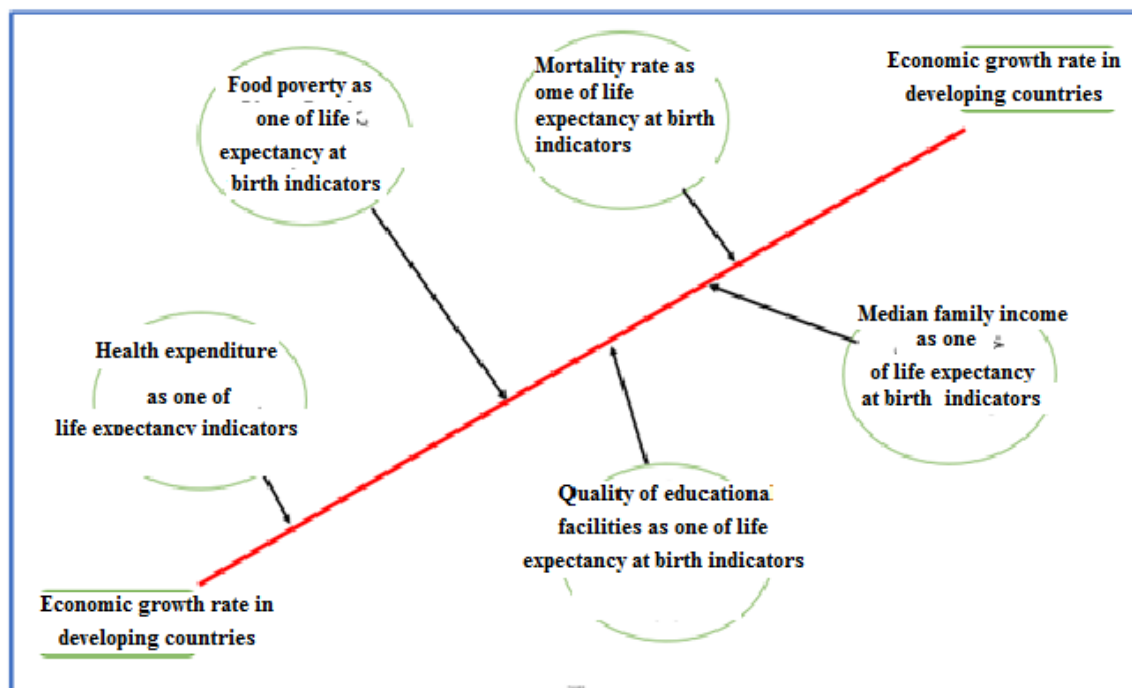


Figure 1: Conceptual model of the research (Metin and Özlem)

Findings

The summary of descriptive statistics related to the variables of the model with the help of SPSS Statistics 22.0 is presented in Table 1 after screening and deleting unnecessary data. The average, lowest and highest economic growth rates in the sample developing countries are 0.0561, 0.0322, and 0.0830, respectively (Table 1). Skewness and kurtosis, which should be 0 and 3 respectively for the variable to have a normal distribution, show that the economic growth rate does not have a normal distribution.

Table 1. Descriptive statistics for research variables

Variable	Number of observation	Average	standard deviation	Min	Max	Skewness	Kurtosis
Economic growth rate in developing countries	2142	0.0561	0.1974	0.0322	0.0830	0.818	0.049
Health expenditure as one of the life expectancy indicators	2142	0.5515	0.1637	0.2267	0.6274	0.390	0.097
Food poverty as one of the life expectancy at birth indicators	2142	0.1474	0.1559	0.0052	0.2188	0.359	0.392
Quality of educational facilities as one of the life expectancy at birth indicators	2142	0.1216	0.2685	0.0023	0.2864	1.106	4.911
Median family income as one of the life expectancy at birth indicators	2142	0.3350	0.1814	0.0215	0.6615	0.115	3.327

In the present study, the normality of the dependent variable was investigated through the Kolmogorov-Smirnov (K-S) statistic. Table 2 shows the results of the K-S test for the variable of economic growth in developing countries. Since the economic growth variable in developing countries has a significance level of K-S statistic less than 0.05, the economic growth variable in developing countries haven't had a normal distribution.

Table 2. The results of the normality test of the dependent variable

Variable	Number (N)	Statistics (K-S)	Significance
Economic growth variable in developing countries	2142	3.412	0.001

The normality of the dependent variable for economic growth in developing countries is a necessary condition for regression models, therefore, it is necessary to normalize this

variable before *hypothesis testing*. Johnson Transformation was used to normalize the data and analyzed using Minitab. The results of the K-S test after the data normalization process are described in Table 3. Since the Kolmogorov-Smirnov statistic for the dependent variable of economic growth in developing countries is higher than 0.05 (0.944), after normalization of the data, the significance level of the variable of economic growth in developing countries has a normal distribution after the normalization process.

Table 3. The results of the normality test of the dependent variable of economic growth in developing countries after the normalization

Variable	Number (N)	Statistics (K-S)	Significance
Economic growth variable in developing countries	2142	0.528	0.944

Table 4. Matrix of Pearson correlation coefficients between research variables

	Economic growth rate in developing countries	Health expenditure as one of the life expectancy indicators	Food poverty as one of the life expectancy at birth indicators	Mortality rate as one of the life expectancy at birth indicators	Quality of educational facilities as one of the life expectancy at birth indicators	Median family income as one of the life expectancy at birth indicators
Economic growth rate in developing countries (<i>P-Value</i>)	1					
Health expenditure as one of the life expectancy indicators (<i>P-Value</i>)	0.084 (0.037)	1				
Food poverty as one of the life expectancy at birth indicators (<i>P-Value</i>)	0.062 (0.124)	-0.015 (0.710)	1			
Mortality rate as one of the life expectancy at birth indicators (<i>P-Value</i>)	0.020 (0.614)	-0.015 (0.719)	-0.061 (0.134)	1		
Quality of educational facilities as one of the life expectancy at birth indicators (<i>P-Value</i>)	-0.013 (0.749)	-0.015 (0.719)	-0.138 (0.001)	-0.030 (0.466)	1	
Median family income as one of the life expectancy at birth indicators (<i>P-Value</i>)	0.049 (0.225)	0.031 (0.451)	0.068 (0.093)	-0.030 (0.462)	-0.009 (0.83)	1

In this study, the collinearity relationship between independent variables was investigated using the Pearson correlation coefficient. In this section, the relationship between the research variables and the correlation between them was discussed using Pearson's correlation coefficient and was analyzed by Spss software. The correlation coefficient matrix between research variables is presented in Table 4. There is a direct relationship between the independent variables of the research, which is a normal correlation (table 4). Therefore, it is possible to enter these variables in one model at the same time due to the absence of a collinearity problem between these variables and it is not necessary to check and test them as separated models.

The results of the research hypothesis test

In this section, first, the necessary model for estimating the model is determined for each hypothesis, and then the research model is estimated and the results are interpreted and all the above tests have been analyzed by Eviews.

The first research hypothesis

The purpose of testing the first hypothesis of the research is to analyze the relationship between health expenditures as one of the indicators of life expectancy at birth and economic growth in developing countries. This hypothesis is estimated using model (1) in the form of panel data. It will be approved if the β_1 coefficient is significant at the 95% confidence level.

$$\ln(Y_{i,t})IPC = \alpha_0 + \beta_1 LEB1_{i,t} + \beta_2 LEB2_{i,t} + \beta_3 LEB3 + \beta_4 LEB4 + \beta_5 LEB5 + \varepsilon_{i,t} \quad (3)$$

Chow or bounded F test was used to determine whether the use of the panel data method would be efficient in estimating the desired model. The Hausman test is used to determine which method (fixed effects or random effects) is more suitable for estimation (fixed or random detection of cross-sectional unit differences). The results of these tests are presented in Table 5. The results of the Chow test and its P-Value (0.0240) indicate that the panel data method can be used. It is necessary to estimate the model using the fixed effects method according to the results of the Hausman test and its P-value (0.0246) which is less than 0.05.

Table 5. Chow and Hausman test results for model (1)

Test	Number	Statistics	Statistics number	Degrees of freedom	P-Value
Chow	2142	F	4.2669	(505, 101)	0.0240
Hausman	2142	χ^2	6.6055	5	0.0246

The Jarque–Bera test is used to test the normality of error sentences. The results of the Jarque -Bera test indicate that the residuals obtained from the estimation of the research model at the 95% confidence level have a normal distribution so that the probability of this test (0.9285) is greater than 0.05. The Breush-Pagan test was used to check the homogeneity of variances. It can be said that the model has a variance heterogeneity

problem due to the significance level of this test, which is less than 0.05 (0.0182). The generalized Least Squares (GLS) estimation technique was used to solve this problem. The value of Durbin Watson's statistic is equal to 2.32 according to the initial results of the model estimation and since it is between 1.5 and 2.5, it can conclude that the remainders are independent of each other. Finally, the model does not have a clear error since the significance level of Ramzi's test (0.1931) is greater than 0.05. The summary of the results of the above tests is presented in Table 6.

Table 6. The results of the tests related to the statistical hypothesis of the model (1)

Ramsey statistics		Durbin-Watson statistics	Breusch-Pagan statistics		Jarque-Bera statistics	
<i>P-Value</i>	<i>F</i>	D	<i>P-Value</i>	<i>F</i>	<i>P-Value</i>	χ^2
0.1931	1.6490	2.32	0.0182	7.9341	0.9285	1.9335

Model (1) of the research is estimated using the panel data method and as fixed effects, taking into account the results of the Chow and Hausman tests as well as the results of the classical regression statistical hypothesis test. The model estimation results are presented in Table 7. The estimation of the model using Eviews is as follows. In the test of the significance of the model, since the probability value of the F statistic is less than 0.05 (0.0000), the significance of the model is confirmed with 95% confidence. The coefficient of determination of the model also shows that 67.23% of the economic growth in developing countries is expressed by the variables of the model.

Table 7. The results of the research hypothesis test using the fixed effects method

Dependent variable: economic growth in developing countries				
Number of observations: 2142 years - country				
Variable	Coefficient	t statistics	P-Value	Correlation
Fixed component	0.1511	6.8177	0.0002	Positive
Health expenditure as one of the life expectancy indicators	0.0479	2.0688	0.0157	Positive
Food poverty as one of the life expectancy at birth indicators	-0.1090	2.4200	0.0259	Negative
Mortality rate as one of the life expectancy at birth indicators	-0.0257	4.4999	0.0006	Negative
Quality of educational facilities as one of the life expectancy at birth indicators	0.0068	3.2248	0.0072	Positive
Median family income as one of the life expectancy at birth indicators	0.0221	2.5439	0.0232	Positive
The coefficient of determination of the model				0.6723
<i>F</i> statistics (<i>P-Value</i>)				12.3462 (0.0000)

Since the probability of the t statistic for the variable coefficient of health expenditure for one of the indicators of life expectancy at birth is less than 0.05 (0.0157), a significant relationship between health expenditure as one of the indicators of life expectancy at birth

and economic growth in developing countries was confirmed at a 95% confidence level. The positive coefficient of this variable (0.0479) indicates a direct relationship between health expenditures as one of the indicators of life expectancy at birth and economic growth in developing countries so economic growth increases in developing countries in 0.0479 units with an increase of 1 unit of health expenses as one of the indicators of life expectancy at birth.

The second research hypothesis

The test of the second hypothesis is to investigate whether there is a significant relationship between food poverty as one of the indicators of life expectancy at birth and economic growth in developing countries. Since the probability of the t statistic for the variable coefficient of food poverty as one of the indicators of life expectancy at birth is less than 0.05 (0.0259), a significant relationship between food poverty as one of the indicators of life expectancy at birth and economic growth in developing countries is confirmed at the 95% confidence level (Table 7). The negative coefficient of this variable (-0.1090) proves the inverse relationship between food poverty as one of the indicators of life expectancy at birth and economic growth in developing countries so that economic growth in developing countries decreases by 0.1090 units with an increase of 1 unit in food poverty as one of the indicators of life expectancy at birth.

The third research hypothesis

In this hypothesis, the relationship between mortality rate as one of the indicators of life expectancy at birth and economic growth in developing countries was investigated. Since the probability of the t statistic for the variable coefficient of mortality rate as one of the indicators of life expectancy at birth is less than 0.05 (0.0006), a significant relationship between mortality rate as one of the indicators of life expectancy at birth and economic growth in developing countries is confirmed at the 95% confidence level (Table 7). The negative coefficient of this variable (-0.0257) proves the inverse relationship between mortality rate as one of the indicators of life expectancy at birth and economic growth in developing countries so that economic growth in developing countries decreases by 0.0257 units with an increase of 1 unit in mortality rate as one of the indicators of life expectancy at birth.

The fourth research hypothesis

The test of this hypothesis is to investigate whether there is a significant relationship between the quality of educational facilities as one of the indicators of life expectancy at birth and economic growth in developing countries. Since the probability of the t statistic for the variable coefficient of quality of educational facilities as one of the indicators of life expectancy at birth is less than 0.05 (0.0072), a significant relationship between quality of educational facilities as one of the indicators of life expectancy at birth and economic growth in developing countries is confirmed at the 95% confidence level (Table 7). The positive coefficient of this variable (0.0068) proves the direct relationship between the quality of educational facilities as one of the indicators of life expectancy at birth and economic growth in developing countries so that economic growth in

developing countries increases by 0.0068 units with an increase of 1 unit in quality of educational facilities as one of the indicators of life expectancy at birth.

The fifth research hypothesis

This hypothesis investigates whether there is a significant relationship between median family income as one of the indicators of life expectancy at birth and economic growth in developing countries. Since the probability of the t statistic for the variable coefficient of median family income as one of the indicators of life expectancy at birth is less than 0.05 (0.0232), a significant relationship between median family income as one of the indicators of life expectancy at birth and economic growth in developing countries is confirmed at the 95% confidence level (Table 7). The positive coefficient of this variable (0.0221) proves the direct relationship between median family income as one of the indicators of life expectancy at birth and economic growth in developing countries so that economic growth in developing countries increases by 0.0221 units with an increase of 1 unit in median family income as one of the indicators of life expectancy at birth.

Discussion and results

The results show that there is a significant relationship between health expenditures as one of the indicators of life expectancy at birth and economic growth in developing countries. The positive coefficient of this variable (0.0479) proves the direct relationship between health expenditures as one of the indicators of life expectancy at birth and economic growth in developing countries so that economic growth in developing countries increases by 0.0479 units with an increase of 1 unit in health expenditures as one of the indicators of life expectancy at birth. Therefore, according to the analyzes related to the acceptance of the hypothesis, it can be concluded that there is a positive and direct relationship between health expenditures as one of the indicators of life expectancy at birth and economic growth in developing countries. The result of the first hypothesis test is consistent with the significant relationship between the independent and dependent variables in Peng et al. (2017), Anginer et al. (2016), and Cummins and Weiss (2013), but it is inconsistent with the results of Karatelli (2012) and Selinta (2010) regarding the type of correlation (direct or reverse).

It can be said that there is a significant relationship between food poverty as one of the indicators of life expectancy at birth and economic growth in developing countries, based on the presented results. The negative coefficient of this variable (-0.0190) indicates the inverse relationship between mortality food poverty as one of the indicators of life expectancy at birth and economic growth in developing countries so that economic growth in developing countries decreases by 0.01090 units with an increase of 1 unit in mortality rate as one of the indicators of life expectancy at birth. Therefore, according to the analyzes carried out to prove the second hypothesis of the research, it can be concluded that there is a negative and inverse relationship between food poverty as one of the indicators of life expectancy at birth and economic growth in developing countries. The results of the second research hypothesis are consistent with the research findings of Kambara et al. (2017), Fuji et al. (2013), and Karatelli (2012), but they are inconsistent with the research findings of Selinta (2010).

It can be said that there is a significant relationship between mortality rate as one of the indicators of life expectancy at birth and economic growth in developing countries, based on the presented results. The negative coefficient of this variable (-0.0257) indicates the inverse relationship between mortality rate as one of the indicators of life expectancy at birth and economic growth in developing countries so that economic growth in developing countries decreases by 0.0257 units with an increase of 1 unit in mortality rate as one of the indicators of life expectancy at birth. Therefore, according to the analyzes carried out to prove the third hypothesis of the research, it can be concluded that there is a negative and inverse relationship between mortality rate as one of the indicators of life expectancy at birth and economic growth in developing countries. The result of the third hypothesis is consistent with the significant relationship between the independent and dependent variable in Peng et al. (2017), and Cummins and Weiss (2013), but it is inconsistent with the results of Karatelli (2012) in terms of the type of relationship (direct or reverse).

It can be concluded that there is a significant relationship between the quality of educational facilities as one of the indicators of life expectancy at birth and economic growth in developing countries, based on the presented results. The positive coefficient of this variable (0.0221) indicates the inverse relationship between the quality of educational facilities as one of the indicators of life expectancy at birth and economic growth in developing countries so that economic growth in developing countries increases by 0.0221 units with an increase of 1 unit in 0.0221 in increase as one of the indicators of life expectancy at birth. Therefore, according to the analyzes performed to prove the present hypothesis, it can be concluded that there is a positive and direct relationship between the quality of educational facilities as one of the indicators of life expectancy at birth and economic growth in developing countries. The results of this hypothesis are consistent with Fuji et al. (2013) and Karatelli (2012) and are inconsistent with Selinta's (2010).

It can be said that there is a significant relationship between median family income as one of the indicators of life expectancy at birth and economic growth in developing countries, based on the presented results. The positive coefficient of this variable (0.0068) indicates the inverse relationship between median family income as one of the indicators of life expectancy at birth and economic growth in developing countries so that economic growth in developing countries increases by 0.0068 units with an increase of 1 unit in median family income in increase as one of the indicators of life expectancy at birth. Therefore, according to the analyzes carried out to prove the fifth hypothesis, it can be concluded that there is a positive and direct relationship between median family income as one of the indicators of life expectancy at birth and economic growth in developing countries. The result of the current hypothesis is consistent with the significant relationship between the independent and dependent variable in Peng et al. (2017), and Cummins and Weiss (2013), but it is inconsistent with Caratelli (2012) in terms of the type of relationship (direct or reverse).

Finally, it is recommended that organizations participating in the human resource d publish more comprehensive information about economic growth in developing countries for people according to the results of this research and similar research. Human resource development standards development authorities are recommended to voluntarily disclose

comprehensive information about the level of economic growth in developing countries and measures related to demographics. Since the promotion of human resources can have important effects on the decisions of individuals and families in a society, the provision of complete and transparent information by government bodies on the factors affecting economic growth in developing countries will be very helpful. Economic analysts and human resources development consultants should perform special analyzes based on the state of economic growth in developing countries and the factors affecting it according to human resources development standards along with the normal analyzes and techniques. According to the results of the first hypothesis, it is recommended to perform research on the relationship between health expenditures as one of the indicators of life expectancy at birth and economic growth in developing countries and its impact on countries' emigration.

In keeping with the results of the second hypothesis of the research, it is suggested to perform research on the relationship between food poverty as one of the indicators of life expectancy at birth and economic growth in developing countries and its impact on the growth rate of crimes in societies. Based on the results of the third hypothesis in this research, it is recommended to research the relationship between the death rate as one of the indicators of life expectancy at birth and economic growth in developing countries and its impact on the inflation rate in these countries. According to the results of the fourth hypothesis of the research, it is suggested to research the relationship between the quality of educational facilities as one of the indicators of life expectancy at birth and economic growth in developing countries and its impact on tourism development. to the fifth hypothesis of the research, it is recommended to perform research on the relationship between median family income as one of the indicators of life expectancy at birth and economic growth in developing countries and its impact on political relations between countries.

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Original Research

Impact of Board Size and Financial Leverage on Firm Value: Evidence from a Fastest Growing Economy

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Abstract

This paper plans to examine the effects of board size and financial leverage on the firm value measured as ROE and Tobin's Q of DSE-listed manufacturing companies in Bangladesh ranging a period from 2010 to 2022. This research developed ordinary least square (OLS) and fixed effects model (FEM) to identify the hypothesized relationships. The paper finds that board size does not matter for firm value but the affinity between financial leverage and firm value is positive and statistically significant. Firm size and firm age are found with a perplexing role in enhancing the value of firms because they show negative affinity when the firm value is measured as ROE but the same associations become positive when the firm value is measured as Tobin's Q. This paper adds to the emerging body of literature on board size-performance and leverage-performance relationship in the Bangladeshi context using a reasonably wider and newer data set.

Keywords: Corporate governance, firm value, manufacturing company, Bangladesh.

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Introduction

The mounting speed of globalization and the fast-changing business environment has created an urge to know corporate governance (hereafter called CG) qualities and practices around the globe (Bufarwa et al., 2020). CG is a well-researched and highly debated area now (Jahid et al., 2020). It includes a broad range of statutes and systems followed by executives to accomplish corporate financial goals. Scholars observed from various viewpoints applying various analytical lenses. For example, Sir Adrian Cadbury viewed it from a directional perspective, and he described it as a system by which corporations are governed and regulated (Cadbury, 1992, p.15), while Shleifer and Vishny (1997, p.737) highlighted the link viewpoint and considered it a means of dealing with how corporate fund providers convince them of receiving a fair profit on both own and loan capital. Agency theory is the principal basis of CG (Jackson et al., 2013; Ermongkonchai, 2010), which suggests stocks should be scattered widely and the duties of managers to be separated from that of owners, and managerial works might differ from those needed to optimize the earnings of stockholders (Kapopoulos and Lazaretou, 2007). This is what is known as the principal-agency conflict (Fama and Jensen 1983; Zhang et al. 2016). Jensen and Meckling (1976) found a 'master-servant' frame and insisted on acknowledging the power link, where the master specifies tasks for the servant (Mallin, 2006, p.12). But it is highly doubtful that representatives will ever work for the highest benefits of the master (Jensen and Meckling, 1976). Dalton et al. (1998) opined that the agents work for their interests instead of stockholders' interests as they get control over the company. Agency costs occur due to the abuse of managers' power and to check the abuse (Mallin, 2006, p.13).

Many questionable corporate failures have taken place in Europe and the USA, which have sparked previous debates on ways to hold back the conflicts between stockholders and management and plan good governance practices for sustainable industrial development. An increasing call for a sound CG mechanism has gained momentum due to the above occurrences. Recent studies on CG in emerging markets reveal (Pucheta-Martínez and Gallego-Álvarez, 2020; Ciftci et al., 2019; Uribe-Bohorque et al., 2018; Ararat et al., 2017; Roy, 2017; Ducassy and Guyot, 2017; and Lozano et al., 2016) that firms with more effective CG mechanisms may avail greater access to low-cost finance, control agency conflicts, ensure high operational and financial performance and, in turn, can protect shareholders interest. It is also evident that the CG mechanism is less effective when a country experiences a weak governance system (Rashidet al., 2018). Sound CG mechanisms lead to higher productivity, profitability, and value, and these, in turn, make a firm more attractive to investors. Moreover, relevant information should pass to the stakeholders to ensure good governance and transparency (Hasan et al., 2012).

Bangladesh is an emerging economy located in the South Asia region. CG in Bangladesh is at an early stage, and some forces like legal, political, and socio-economic factors and different actors influence the code (Piesse et al., 2012; Chahine&Safieddine, 2011). The CG practices in Bangladesh are less developed than the developed countries, such as the Anglo-American affiliated countries, Germany, and Japan. Wang and Chen (2016) noted that emerging economies are significantly unique in their institutional, regulatory, and legal environment. However, Bangladesh has experienced many

corporate collapses over two decades, such as Hallmark, Bismillah Group, Oriental Bank, Modern Food Ltd, Adamjee Jute Mills Ltd (the biggest jute mills in the globe), and two major stock market crashes, one in 1996 and another in 2010-11 (Meah and Chaudhory, 2019). The stock market collapse caused colossal losses for small investors that testimony absence of firm-level good governance and the failure of the regulatory bodies (Ferdous, 2018). CG knowledge becomes crucial in emerging economies since it helps develop governance mechanisms that allow firms wide passage to cheap finance, alleviate agency conflicts and dependable achievement, and promote a positive outlook of the corporate stakeholders (Claessens&Yurtoglu, 2013). A few studies (Ferdous, 2018) have shown the status of CG in Bangladesh based on some compulsory administrative requirements (for example, Sobhan, 2016; Sobhani et al., 2009). Hasan et al. (2013) found most of the companies in Bangladesh have concentrated ownership and dominant stockholders, and as such, dominant families or a group of companies manage those firms. In these circumstances, management is nothing but an extension of dominant owners, which results in CEOs, administrative managers, and board chairs must be from the dominant stockholder groups in most Bangladeshi firms. Even in most cases, founding family ownership takes the lead in all areas of governance and management. It is evident (Farooque et al., 2007) that, on average, the top five shareholders own higher than 50 percent of the equity capital of a firm. Many scholars (Khan et al., 2013) mentioned that the ownership designs of 219 publicly traded companies of the Dhaka stock exchange (hereafter called DSE) revealed that the leading three shareholders held about one-third of the total stocks. The ratio becomes large in land and buildings, oil & energy, engineering, textile, and pharmaceuticals & chemical. Another study disclosed that firms in Bangladesh are not interested in enlisting in the stock market for their required funds as they fear losing control over the firm (Haque et al., 2011). The dominant presence of large shareholders, external CG devices, such as institutional investors, financial leverage (hereafter called FL), and regulatory requirements could influence firm performance. Bangladeshi firms fail to ensure standard CG practices analogous to the developed world. It is worth mentioning that CG devices work well in Anglo-American countries since their jurisdiction is highly conditional upon the clarity of the enforcement of laws (Asian Development Bank, 2000). But the CG code is less effective in emerging economies like Bangladesh as the vital organizational powers have limited ability to exert control over firms to ensure compliance (Hasan et al., 2012). As such, this paper plans to investigate the influence of board size (hereafter called BS) and FL on firm value (hereafter called FV) in the context of Bangladesh. This inquiry is revealing because no study is available in the literature in the context of developing countries like Bangladesh and beyond. Besides, this paper adds to the emerging body of literature on CG-performance relationships in the Bangladeshi context using a reasonably wider and newer data set. The remainder of this paper is organized as under: Section 2 presents the literature review hypothesis development. Section 3 talks about the data and the research approach, followed by results in section 4. Section 5 presents the discussion of findings and ending comments and leads to further research in Section 5. The paper ends with a discussion and ending comments and leads to further research in Section 6.

Prior Studies and Hypothesis Development

The purpose of CG devices is to lessen the agency cost emerging due to the divorce of ownership from management (Khan et al., 2020) since agents are sometimes viewed with

opportunistic behavior to exploit personal benefits at the expense of the owners (Hasan et al., 2013). Usually, the influence of CG devices on corporate financial attainment presented diverse and indecisive results around the globe. Asian Financial Crisis in 1997-1998 forced numerous trouble-prone nations to focus on designing more sound CG practices (Detthamrong et al., 2017). Those countries have been trying to lessen their financial vulnerability and enhance CG practices. In such a situation, companies promote a culture of awareness, clarity, and responsibility that leads to long-term value creation and sound financial health. Against the above backdrop, the present study attempts to identify the effects of BS and FLOn firm performance. Prior literature on the affinity between performance and CG traits, precisely, the size of the board, board independence, gender diversity, surveillance structure, and directors' shareholdings exhibits mixed results.

BS has a part in leading and guiding managers (Detthamrong et al., 2017). A comprehensive board is more viable for adequate access to diverse resources than an undersized board. BOD having diverse learning can develop better decision-making ability, which, in turn, produces better firm performance. But, the observed results on the connection between BS and performance are diverse. Yermack (1996) noted a negative relationship between BS and firm performance in a sample of 452 big industrial companies in the USA from 1984 to 1991. Hasan et al. (2013) noted that firm financial performance increases with BS for complex firms. Besides, Mishra and Kapil (2018) conducted a study on 391 Indian companies out of CNX 500 companies listed on the National Stock Exchange covering the period from 2010 to 2014, five years, and noted that there is a positive association between BS and FV. Puni and Anlesinya (2020) tested the relationship between CG mechanisms and firm performance taking a sample from Ghanaian listed companies from 2006 to 2018, where they advanced that BS has positive and significant impacts on corporate financial performance. Bhatt and Bhattacharya (2015) examined the effects of board attributes on corporate financial performance by taking a sample of listed firms in the Indian information technology (IT) sector and noted that BS has a positive and significant effect on corporate financial performance. In addition, Mishra and Mohanty's (2014) noted that the board attributes have a significant impact on the financial success of the 141 Indian listed companies. Huang and Hillary (2018) advanced that board characteristics have a positive influence on the ROA of 1,500 enterprises over a period from the years 1998 to 2010. In their study of 29 Indian banks for the years 2009 to 2016, Shukla et al. (2018) found that the board features had a beneficial impact on the market performance of the sample banks. Varghese and Sasidharan (2020) found a positive tie between BS and FV. Jackling and Johl(2009) uncovered that BS impacted performance in Indian firms. Rashid et al. (2010) tested the relationship between boardroom composition and financial performance with a sample of 90 companies listed on the DSE from 2005 to 2009, five years. They advanced that board autonomy does not influence the financial performance in most of the Bangladeshi listed companies. They also documented that the size of the board is negatively associated with financial performance. Jensen (1993) indicates that firm performance declines when BS increases. This is based on the argument that working effectively with a large group of people to communicate, coordinate tasks, and make decisions is more difficult and expensive than working with smaller groups. The expenditures outweigh the benefits of having more personnel available. Therefore, Jensen (1993) noted that keeping boards small can help them function better. Eisenberg et al. (1998) reported a negative

connection between BS and firm performance in a sample of firms in Finland. Mak and Kusnadi (2005) found a hostile relationship between BS and company performance, estimated by the Q ratio on a sample of Malaysian and Singaporean corporations. Fatma and Chouaibi (2021) noted that BS is inversely linked to the FV. In addition, Sehrawat et.al. (2020) advanced that BS does not matter for FV.

From the perspective of the agency hypothesis, a large board is suitable for monitoring managers as many individuals will examine the administration's activities that help decline agency costs emerging from the breakup between management and shareholders and thus improve firm performance (Rashid, 2018). It is a notion that BS is connected positively with corporate performance. Based on the above backdrop, the current study proposes that:

H₁: There is a positive association between BS and firm performance.

Modigliani and Miller (1958) demonstrated that corporate capital structure is irrelevant when finding a company's value. However, Roberts and Sufi (2009) suggested that debt capital can enhance a firm financial performance by inducing more careful supervision by creditors. Literature on corporate finance reported assorted outcomes about the influence of FL on corporate performance, i.e., it has no positive or insignificant effect on corporate financial performance (Hsu et al., 2021; Prashar and Gupta, 2020; and Chang and Shim, 2019). Antoniou et al. (2008) observed that the affinity between FL and firm performance is negative. Cai et al. (2011) pointed out that a shift in FL affects stock prices negatively. Vithessonthi and Tongurai (2015) affirmed that the FL of Thai companies is negatively associated with corporate financial performance. The proof is compatible because the expenses of economic misery are more than the usefulness of financing. Contrarily, Margaritis, and Psillaki (2010) found a positive influence of FL on corporate financial performance. Also, Berger and Patti (2006) showed that a high FI or a lower debt-equity ratio is related to more satisfactory corporate financial performance. But Connelly et al. (2012) found no association between FL and company financial performance. If the use of debt in the capital structure can influence creditors to monitor the activities of firms, then higher FL would be more likely to use in projects with sound fundamentals by rigorous investment screening, and they do better than the companies with lower FL (Detthamrong et al., 2017). Hence this study proposes the following hypothesis.

H₂: There is a positive association between FL and firm performance.

Research Method

This paper collects data from respective annual reports from the sample companies for thirteen years from 2010 to 2022. Initially, this paper found 202 manufacturing companies (hereafter called MC) listed on DSE, but the annual reports are available for 82 companies after meeting the three important criteria, such as firstly, the company must be listed before December 31, 2010, and remain listed till December 31, 2022, the secondly, annual reports must be available at the company website and thirdly, this study skips some firm-year observations with the negative book value of equity (Elkamhi et al., 2012). The efficacy of CG mechanisms may be weak where the regulatory interventions are more

stringent, particularly in the financial sector and public utilities. And as such, this research has planned to study enterprises in the manufacturing sectors as the regulatory interventions in these sectors are lenient (Booth et.al., 2000), which facilitates quick appraisal of the effects of CG mechanisms on corporate financial performance. The study has three variables of interest. The independent variables include BS and FL. The dependent variable is firm financial performance measured as return on equity (hereafter called ROE) and Tobin's Q (hereafter called QR). The company's age and size are the control variables. Table 1 presents a summary of the operationalization of variables.

Table 1. Summary of Research Variables

Variables	Indicators	Measure
Independent variables	BS	The total number of directors on the corporate board includes executive directors, non-executive directors, and the chairperson.
	Leverage (LEV)	Total liabilities to total assets
Control Variables	Firm age (hereafter called FA)	The total number of years since the listing on DSE
	Firm size (hereafter called FS)	Natural logarithm of total asset
Dependent Variable Several studies measured firm financial performance using accounting-based proxy variables, such as return on equity (ROE) and return on assets (ROA), and market-based measures (QR) to capture the effectiveness of CG mechanisms (Rashid et al., 2010). Accounting-based performance measures are constrained by some problems as accounting profit can be manipulated if managers prefer a particular accounting method to improve performance (Rashid, 2013). The behavior of managers is opportunistic for taking advantage of information asymmetry to manipulate accounting numbers (Healy, 1985). Thus, this study plans to use ROE and QR to measure corporate financial performance (Hsu, 2021).		
ROE	The ratio of operating income (EBIT) to total Shareholders' equity	This ratio shows how profitable a company is relative to its total shareholders' equity $ROE = \frac{Operating\ income}{Total\ equity}$
QR	Tobin's Q	The ratio of market value (MV) to book Value (BV) of assets. The MV of the assets is determined as the MV of the equity plus the BV of the assets minus the BV of the equity. Several researchers in the field of CG and corporate finance used this technique to determine the firm's financial performance. (Maniruzzaman and Hossain, 2019 _a).

The current research has developed subsequent panel regression models to analyze the effects of BS on corporate performance and FL:

$$\text{Model-1: } ROE_{it} = \alpha + \beta_1 \times BS_{it} + \beta_j \text{Control}_{it} + \varepsilon_{it}$$

$$\text{Model-2: } QR_{it} = \alpha + \beta_1 \times BS_{it} + \beta_j \text{Control}_{it} + \varepsilon_{it}$$

Where:

α	Intercept.
ROE	Return on equity.
QR	QR is used as a proxy for a market measure of performance
LEV	FL measures the ratio of total liabilities and total assets.
BS	Board size.
Others	Control variables: FA and FS.
ε	Error term.

Findings

The correlation matrix (see Table 3) for the dependent and independent variables reveals no multicollinearity problem as the correlations are low between the variables. Gujarati (1995) mentions that if the correlation between the variables remains under .80, it indicates that there is no multicollinearity problem. Besides, the current study presents descriptive statistics (see Table 2) on the variables used. Descriptive Statistics demonstrates mean, median, SD, maximum, and minimum to know the nature of data before running the OLS regression.

Table 2. shows a summary of statistics of key variables

Variables	Minimum	Maximum	Mean	Median	Std. Deviation
ROE	-1.430	.970	.108	.080	.179
QR	.510	1.520	1.069	1.060	.117
BS	4.000	14.000	7.252	7.000	1.676
ID	.000	4.000	1.210	1.000	.744
LEV	.004	4.476	.602	.543	.407
FS	2.901	10.797	6.966	6.961	1.490
FA	5.000	46.000	24.710	25.000	8.034
N=1066					

The Breusch-Pagan Godfrey test was used to test the heteroscedasticity in the distribution. The Breusch-Pagan Godfrey test indicates that the null hypothesis (p-value=0.1295) is accepted, which further signals that there is a heteroscedasticity in the distribution. When a predictor variable in a multiple regression model can be linearly

predicted from the others with a high degree of accuracy, multicollinearity issues must be examined using variance inflation factors (VIF). There is a maximum VIF threshold value of 10 for the multicollinearity assumption (Gatwirth et al., 2009).

Table 3. presents the correlation matrix of the key variables

Variables	ROE	QR	BS	ID	LEV	FS	FA
ROE	1						
QR	.226	1					
BS	0.027	0.016	1				
ID	0.052	0.171	0.226	1			
LEV	0.004	0.075	-0.023	-0.112	1		
FS	0.106	-0.270	0.289	0.279	-0.216	1	
FA	0.236	0.234	0.184	0.388	-0.023	0.152	1
N=1066							

This paper initially planned to develop an ordinary least square (hereafter called OLS) to catch the effects of BS and FL on FV measured as ROE. But the Breusch-Pagan Godfrey test reveals that the data set contains some endogeneity problems. In this case, the OLS regression model is not suitable for regression analysis. To remove the endogeneity effects from the data set, this research planned to use either fixed effects model (hereafter called FEM) or random effects model (REM) based on the predictions from Hausman Test statistics. The chi-sq. statistics (12.456268) and p-values (0.0143) of Hausman test indicate that FEM is more suitable for the study. So, this paper adopted FEM (see table 4) for regression analysis. FEM has power to eliminate the endogeneity effects pertaining to the data set because it removes both cross-section effects and period effects from the panel data. However, OLS regression model is presented for reader understanding (see table 4).

Table 4. Regression results for ROE

Variables	FEM		OLS		Collinearity Statistics	
	Coefficient	Prob.	Coefficient	Prob.	Tolerance	VIF
BS	0.006206	0.2063	-.004325	0.1984	.771	1.296
LEV	0.066961	0.0000	0.012355	0.3581	.864	1.157
FS	-0.003531	0.7724	0.010716	0.0055	.710	1.409
FA	-0.013668	0.6494	0.005158	0.0000	.640	1.563
Hausman Test:	Chi-sq. Statistic=12.456268 Prob.=0.0143					
F. Statistic	8.168877		17.87558			
Prob.	0.0000		0.0000			
R ²	0.450119		0.123137			
Adj. R ²	0.395017		0.119605			
Durbin-Watson Stat.	1.552		0.961			

From table 4, it is observed that BS is positively linked to ROE but the relationship is not statistically significant. The connection between FL and FV (see table 4) is positively associated and the relationship is significant at a 1% level of significance. The positive tie between FL and FV reveals that the use of debt capital in the capital structure of most of the MCs in Bangladesh tends to enhance value. The control variables, such as FS and FA are negatively associated with ROE, though the relationships are not statistically significant.

Furthermore, this research also plans to test the effects of BS and FL on FV based on the market measure (QR). As the data set contains endogeneity effects, this research again plans to use either REM or FEM for regression analysis. To select a suitable model for regression analysis, this paper conducted Hausman Test. The chi-sq. Statistics of the Hausman test (56.423406) and p-value (0.0000) reveal that FEM is more suitable for the study. Therefore, this paper analyzed the hypothesized relationship based on FEM (see table 5). However, the result of OLS is presented for readers understanding.

Table 5. Regression models for QR

Variables	FEM		OLS		Collinearity Statistics	
	Coefficient	Prob.	Coefficient	Prob.	Tolerance	VIF
BS	-0.003747	0.1824	0.004229	0.0430	.771	1.296
LEV	0.005486	0.6937	0.003369	0.6866	.864	1.157
FS	0.064411	0.0000	-0.025720	0.0000	.710	1.409
FA	0.042124	0.0145	0.003987	0.0000	.640	1.563
Hausman Test:	Chi-sq. Statistic=56.423406 Prob.=0.0000					
F. Statistic	13.70666		48.37407			
Prob.	0.0000		0.0000			
R ²	0.578681		0.154242			
Adj. R ²	0.536462		0.151054			
Durbin-Watson Stat.	1.651		0.875			

From table 5, it is observed that BS is inversely linked to QR though the relationship is not statistically significant. It signals that the BS of Bangladeshi MC in most cases does not matter for performance. The connection between FL and FV (see table 5) is positively associated and the relationship is not significant. The positive tie between FL and FV reveals that the use of debt capital in the capital structure of most of the MC in Bangladesh tends to enhance FV. The firm-level control variables, such as FS and FA are positively associated with QR and relationships are statistically significant (see table.5). These directions of relationship reveal that larger and more experienced firms are more efficient to add corporate value in the context of Bangladesh.

Discussions

This study examines the hypothesized associations between the variables using FEM. The analysis uses data extracted from the annual reports of DSE-listed firms in Bangladesh from 2010 to 2022, thirteen years. This study is based on the premise of the agency theory and uses two established performance measures of the corporate finance literature that are QR (market-based performance measure) and ROE (accounting-based performance measure) to measure FV. Besides, this paper attempts to investigate the effects of firm-level control variables, such as FS and FA on the corporate financial performance. Two FEMs, one for QR and the other for ROE (see Tables 4 and 5), have been developed to catch the effects of BS and FL on FV. Hypotheses designed for the study are not in line with the actual results. Some are accepted, while others are rejected at different levels of significance. This study tries to answer the questions referring to the logical grounds of why and why not hypotheses are accepted. The study has developed, in total, two hypotheses and tested them by producing multiple regression models.

The first hypothesis assumes a positive relationship between the BS and FV based on Market Measures and Accounting measures. The results of both the regression models (see table 4 and 5) advanced that BS is positively associated with ROE, while negatively associated with QR. However, none are statistically significant. These findings signal that BS does not matter for FV in the context of MC in Bangladesh. More specifically, larger boards are not capable enough to add value. These findings contradict the prediction of agency theory. In Bangladesh, there is no CG except for family governance. Controlling families can do whatever they want. The appointment of directors heavily relies on the will of founding family members. In most cases, family members get priority to be appointed in the key position of the company, such as CEO, directors, and other key personnel of the company ignoring their level of skills and expertise. Besides, corporate owners maintain a close link to the power party of the government of Bangladesh. Therefore, family owners tend to exploit the right of let alone shareholders and other levels of stakeholders in connection with the management. This paper realizes that the above-noted issues create the BS inefficient to excel the value of the company. Therefore, the positive association between BS and FV measured as ROE is supported by some past studies in the corporate finance and CG literature (Jackling and Johl, 2009; Rashid, 2015; Detthamrong et al., 2017; Mishra and Kapil, 2018; Varghese and Sasidharan, 2020). They advanced that BS has a vital role in improving the ability of directors to supervise and control the activities of managers. A large board is more likely to provide better access to various resources than a small board. Agency theory predicts that a corporate board with diverse experience and knowledge would probably have more effective learning and sensible decision-making ability, resulting in better FV. Thus, the more the number of directors, the more will be the surveillance ability of the boards. Rashid (2015) argued that a large board could watch the actions of managers more, which could reduce agency costs arising due to the separation of management from ownership that, in turn, improve firm performance. This outcome is not supported by some studies (Fatma and Chouaibi, 2021; Guest, 2009; Cheng et al., 2008; and Hanifa&Hudaib, 2006). The inverse link between BS and FV measured as QR is in line with some past literature (Sehrawatetal et.al., 2020; Guest, 2009; Cheng et al., 2008; and Hanifa&Hudaib, 2006), while this result is contrasted by some past evidence (Jackling and Johl, 2009; Rashid, 2015; Detthamrong et al., 2017).

Moreover, while measuring the impact of FL on FV measured as ROE and QR (see Tables 4 and 5), the paper revealed a positive association but the tie with ROE is statistically significant, which signals that FL affects FV positively in Bangladesh. More specifically, it can be argued that the extent of borrowed capital is liked with the value addition of most of the MC in Bangladesh. Firms in Bangladesh are aware enough of the cost of debt, tax benefits, and its associated risk. Thus, the efficient use of debt by the Bangladeshi MC helps in maximizing the FV. This research also supports agency theory as the relative cost of debt and equity is considered in planning the capital structure (Myers and Majulf, 1984). Some companies in Bangladesh do not want to collect funds through issuing shares as they fear losing control over the affairs of the company. This may be one of the causes of use of more debt in the capital structure of a company in the context of Bangladesh. Fosu (2013) advanced that there is a positive association between FL and FV. The 1 percent increase in debt to total capital can result in up to a 10% overall increase in the profitability for US firms except for the extreme scenarios, where high leverage may result in firms' bankruptcy (Berger & Di Patti, 2006). The study of Margaritis&Psillaki (2010) also supported the relevance of the agency theory. Some earlier studies noticed that the relationship FL value is negative (Chechet&Olayiwola, 2014).

Furthermore, while testing the effect of FS and FA on FV measured as ROE (see Table 4), the FEM shows negative affinity but the ties are not statistically significant. These outcomes indicate that bigger and more experienced firms cannot contribute to the value addition of MC in Bangladesh. This finding supports some past studies (for example- Maniruzzaman & Hossain, 2019b Haniffa&Hudaib, 2006) as they found a negative association between FS and corporate financial performance. Besides, this finding does not support some past studies, such as Carter et al. (2003) and Yermack (1996). On the other hand, when this paper attempts to assess the effects of FS and FA on FV measured as QR, it is observed that the relationship is positive and statistically significant at 1% and 5% levels of confidence (see Table 5). This affinity advanced that the larger and older firms are more capable to enhance value in the context of MC of Bangladesh. It is a general premise that older firms have better financial performance because of their experiences and the benefit of learning by doing (Tshipa et al., 2018). Also, younger companies are prone to "liabilities of newness" that refer to several poorly understood factors leading to higher failure rates (Sobhan, 2016). Aging can also harm financial performance because of the inertia effects that could lead a firm to become inflexible and unresponsive to the rapidly changing business environment in which they operate (Solakoglu and Demir, 2016). This is more revealing because the extent and direction of the relationship change as the changes of measurement criteria (such as ROE and QR) of the regressed variable (see Table 4 and 5).

Conclusions

The 1997-1998 Asian Financial Crisis and many questionable corporate failures in Europe and the USA caused most crisis-hit countries to focus on creating and developing better CG practices (Detthamrong et al., 2017). They tried to reduce their vulnerability to economic shocks and improve their CG practices. Thus, companies must create a culture of consciousness, transparency, and accountability, which will create long-term value and sound financial health for them. And as such, the term CG has witnessed a concern for

corporate stakeholders in the contemporary global market setting. CG forms a broad spectrum of statutes and systems that corporations follow to achieve success and accomplish corporate financial goals. Against the above backdrop, the study has developed some hypotheses on the effects of BS and FL (as proxy variables of CG) on corporate financial performance based on accounting and market measures. A review of the literature on the relationship between corporate performance and some CG variables like BS and FL has shown mixed results. The outcomes of the study reveal that BS does not matter for corporate value in the context of MC in Bangladesh. But the presence of debt capital in the capital structure of Bangladeshi MC seems value-additive, particularly when the FV is based on market measures. FS and FA are found with a perplexing role in enhancing the value of the firm because they show negative affinity when the FV is measured as ROE but the same relationship becomes positive when it is measured as QR.

This paper acknowledges some limitations which may be the research fed of further research. This study considers only MC but the future study may consider total non-financial companies listed on DSE. This study adopts OLS and FEM for data analysis but the use of the 2 LS regression model or 3 LS regression model may provide more accurate results. Besides, the future study may include some variables like the ownership level of the founding family, directors having political connections, and ethnic diversity in the board.

Abbreviations

BS	Board size
CG	Corporate governance
DSE	Dhaka Stock Exchange
FA	Firm age
FEM	Fixed effects model
FL	Financial Leverage
FS	Firm size
FV	Firm value
MC	Manufacturing Companies
OLS	Ordinary least square
REM	Random effects model
ROE	Return on equity
QR	Tobin's Q

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