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Original Research

The Effect of Corporate Governance on Competitive Advantage Through Organizational Learning

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Abstract

In this rapidly changing environment, organizations need to preserve their competitive position by committing to corporate governance practices and facilitating learning capabilities. This study aims to investigate the influence of corporate governance on competitive advantage through organizational learning at different Jordanian industrial companies listed on the Amman Stock Exchange. In order to evaluate the relationships, a questionnaire with 52 Likert scale items is designed based on previous studies. The questionnaire is distributed randomly to the top and middle managers working at Jordanian industrial companies registered on the Amman Stock Exchange. The collected data are analyzed using multiple linear regression tests along with Baron and Kenney's approach to finding that all factors of corporate governance significantly impact competitive advantage and that organizational learning partially mediates the relationship between corporate governance and competitive advantage. The study can fill the literature gap by exploring the mediating impact of organizational learning on the relationship between corporate governance and competitive advantage.

Keywords: Corporate Governance, Organizational Learning, Competitive Advantage, Jordanian Industrial Companies, Amman Stock Exchange.

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Introduction

In the last few years, competitive advantage has started to occupy the minds of practitioners and academicians to deal with all new global phenomena, such as globalization, integration into the world economy, and openness and liberalization policies. Besides, the fast pace of technological developments urges organizations to find new ways of improving their products. Hence, sell them at competitive prices. Corporate governance looks into ways to enhance the competitive value of organizations. For instance, Eisenhardt (1989) argues that corporate governance practices can lower agency costs, which enhances the financial returns of the firms. He et al., (2009) claimed that corporate governance mechanisms can be used by BOD to encourage competitive actions. Bobillo et al., (2017) found that corporate governance mechanisms foster the firms' innovation practices. Corporate governance is a broad concept that explains how an excellent relationship between the board of directors and shareholders can be established. It includes rules, processes, and policies that can direct the organization to achieve its goals.

The influence of corporate governance on competitive advantage has been studied for decades, but there have been no consensus results. That may be due to the lack of discussion about the variables that affect the relationship between them. Therefore, this study takes into account the mediation effect of organizational learning, including several dimensions explaining this relationship. Organizational learning is the process of creating, retaining, and transferring knowledge within an organization. This study proposes that engaging in corporate governance and organizational learning will influence the organizational competitive advantage, helping it to survive and compete adequately.

This study could provide some contributions to academic research and practical management. Although many articles have investigated the impact of corporate governance on competitive advantage, this study asks whether and how corporate governance impacts competitive advantage. The topic has not yet been fully addressed.

Problem Statement

Rapid changes throughout the world, such as technological development, globalization, and intensive competition, urge organizations to adopt administrative methods that might minimize the negative impact of threats and capture new opportunities. Corporate governance practices can be embraced by organizations to make a difference. Organizations need to start searching for new competitive edges that enable them to stay in the market by using information and communications technology and modern knowledge. The researcher believes that corporate governance along with the practices of organizational learning can be good sources of sustainable competitive advantage. Based on what is mentioned above, this study looks forward to evaluating the influence of corporate governance on competitive advantage through organizational learning by answering the following problem statement.

Does corporate governance impact competitive advantage through organizational learning?

Purpose

This study intends to examine the effect of corporate governance on competitive advantage through organizational learning.

Research Hypotheses

H1: There is a statistically significant effect of corporate governance on competitive advantage.

H2: organizational learning mediates the relationship between corporate governance and competitive advantage.

Literature Review

Corporate Governance and Competitive Advantage

Most theories of corporate governance have only emerged to solve many agency problems, such as competition among managers, profit sharing, and the capital market (Miozzo & Dewick, 2002). Weisbach (1988) found that having outside directors helps in management monitoring. Using Tobin's Q, (Ghabri, 2022) found a direct influential relationship between corporate governance and firm performance by investigating the ability of legal systems to interact with good corporate governance practices. Dkhili Hichem (2023) revealed that environmental, social, and governance (ESG) affect Tobin's Q arguing that ESG is beneficial in terms of firm reputation and image. Raithatha and Haldar (2021) explained that corporate governance might be a source of enhancing corporate financial performance. Natto and M-mokoteli (2022) used GMM Dynamic Panel Data to find a relationship between corporate governance and economic growth of India.

He et al., (2009) conducted a study to explore the relationship between corporate governance and competitive behavior at the firm level. He et al., (2009) assume that corporate governance mechanisms can be applied to monitor the flow of the firm's capabilities and resources and can be used by BOD to encourage competitive actions. Similarly, (Zorn, 2014), in his thesis, proposed that corporate governance mechanisms used by managers and BOD directly affect the competitive actions of the firms. Zoran found that two corporate governance strategies, CEO incentive pay, and CEO equity ownership, are correlated to competitive actions.

Moreover, using a longitudinal research methodology in 6 countries, Bobillo et al., (2017) found that corporate governance mechanisms foster the firms' innovation practices, which assumed a key differentiation strategy of firms. Dzulkifli et al., (2020) analyzed the effect of corporate governance principles on the patients' satisfaction in Happy General Hospital of Makassar City. The results show that independence and fairness principles have a direct relationship with the satisfaction of patients.

Nginyo et al.,(2018) conducted a study using an open-ended items questionnaire to reveal that there is a direct influence of corporate governance on competitive strategies. In their research, corporate governance includes four dimensions: transparency, accountability, fairness, and responsibility.

AL-Qatawneh (2015), in his study, targeted Jordanian Pharmaceutical Companies to find that there is a direct relationship between corporate governance and competitive advantage using a questionnaire. It's found that all dimensions of corporate governance (Accountability, Justice, Social Responsibility, and Autonomy) impact competitive advantage (AL-Qatawneh, 2015).

Based on the above argument, the researcher proposed the first main hypothesis

H₁: Corporate Governance has a significant effect on Competitive Advantage.

Corporate Governance, Organizational Learning, and Competitive Advantage

Lauer and Wilkesmann (2017) argued that positive corporate governance practices can't be productive without the existence of organizational learning. Kruger (2015) found that there is a relationship between corporate governance and organizational learning stressing the importance of applying consistent learning practices in order to use corporate governance practices effectively. Moreover, Nawaiseh et al., (2021) found that corporate governance practices have an impact on organizational learning. In their study, corporate governance including participation, equality, efficiency, strategic vision, transparency and accountability has an influence on organizational learning except for strategic vision and transparency.

In addition, it is important to mention how organizational learning plays an essential role in enhancing the competitive position of organizations. Many previous studies shed light into the effect of organizational learning on competitive advantage. Jashapara (2003) found that the organizational learning system has a positive impact on organizational performance and that the organizational learning focusing on efficiency and proficiency is a reason for competitive advantage in UK construction companies. López et al., (2005) found that organizational learning leads to innovation and competitiveness of firms. Prieto and Revilla (2006) tested 111 firms to show how organizational learning has a relationship between the financial and non-financial performance of the firms.

Moreover, Abadi and Nematizadeh (2012) found that the relationship between corporate governance and strategic planning effectiveness is fostered by organizational learning. They stated: "In conclusion, corporate governance and organizational learning are not only compatible and able to be used in conjunction with one another, but are also complementary. In other words, the effect of a wide learning of organization is possibly to reinforce the effect of corporate governance on strategic planning effectiveness and vice versa".

Regarding the effect of organizational learning on competitive advantage, Gachanja et al., (2020) revealed that organizational learning impacts the innovation output of

industrial firms in Kenya. Chahal and Bakshi, (2015) showed how organizational learning affects intellectual capital which in turn can enhance the competitive advantage of banks.

Based on the research review, there is almost no study explains the mediating role of organizational learning in the relationship between corporate governance and competitive advantage. Despite the dependent and independent variables, several studies found that organizational learning mediates the relationships between variables (e.g., Khaki et al., 2017; (Bahrami et al., 2016; Bai et al., 2021; Zhang et al., 2020; Aragón et al., 2014).

Based on the above studies, this study includes the third main hypothesis

H₂: Organizational Learning mediates the relationship between Corporate Governance and Competitive Advantage.

Based on the above discussion, the study model is developed (figure 1)
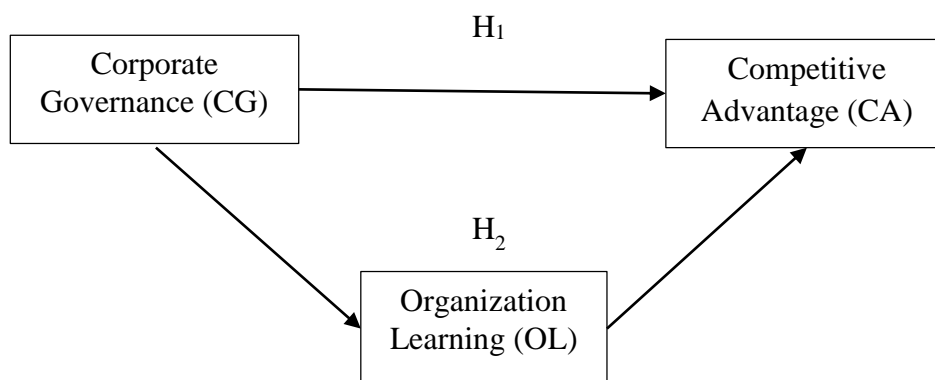
Figure 1. The study Model

Research Methodology and Findings

Research Instrument

In order to investigate the causal relationships of this study, a quantitative methodology using a questionnaire is adopted. Azim et al., (2015) 28 items are used to evaluate corporate governance. The competitive advantage scale is adopted from Chen and Lai's (2006) with 8 items. Organizational learning is developed by Gomez et al., (2005) with 16 items.

Sampling and Data Collection

The target population of this study includes 1500 middle and top managers working at 47 Jordanian industrial companies listed in Amman Stock Exchange ASE. The sample size is calculated based on the random sampling method with a 95% confidence level. 312 individualized questionnaires were collected, which is enough to represent the study population. Based on the demographic analysis, the males exceed females, which

constitute (59.1%) of the study sample, while Females constitute (40.9%) of the total sample. The age group (36 to 45) ranked first and accounted for 38.8% of the total sample. The next sample is the group aged (27 to 35 years), which forms 36% of the study sample. The age group (46 or Older) comes in third place to constituting 22.8%. finally, the group aged (Under 26 years) represents 2.5% of the total sample. Respondents answered as Supervisors constitute 41.8% of the total sample, followed by the head of the department (37.8%), and managers with 20.3% came in last place. 37.8% of the respondents have (11-15) years of work experience. The next group represents those with 6-10 years of practical experience and constitutes 36.3% of the sample. Respondents with 16 years and above experience represent 23.1%. Finally, those with 5 years and less experience represent 2.8%. The holders of a bachelor's degree constitute 78.8% of this study's total sample, followed by the holders of graduate degrees by 19.7%, and finally, diploma degree holders represent 1.5% of the total sample.

Analysis

Factor Analysis

The principal component analysis with varimax rotation is used to test the exploratory factor analysis for each variable.

Corporate Governance

The Kaiser-Meyer-Olkin (KMO) test and Bartlett test of sphericity are conducted to verify the sample's sufficiency. The results extracted from the analysis are (KMO=0.939, Bartlett test= 22411.431, df= 378, p=0.000). Factor analysis of corporate governance extracts three components named Commitment to corporate governance, Structure and Functioning of the Board, and Transparency and Disclosure. The three dimensions' cumulative variance is 93.028 % (Table 1).

Table 1. Factor Analysis Results of Corporate Governance

Factor / Item	Factor Loading	Variance (%)	Alpha
Structure and Functioning of the Board		33.137	.989
SFB_15	.863		
SFB_8	.850		
SFB_12	.848		
SFB_7	.844		
SFB_14	.843		
SFB_10	.834		
SFB_9	.829		
SFB_13	.828		
SFB_11	.826		
SFB_16	.819		
Commitment to corporate governance		21.28	.992

Factor / Item	Factor Loading	Variance (%)	Alpha
CG_4	.834		
CG_5	.825		
CG_6	.823		
CG_3	.818		
CG_2	.815		
CG_1	.797		
Transparency and Disclosure		17.208	.993
TD_28	.871		
TD_19	.869		
TD_27	.865		
TD_26	.863		
TD_18	.858		
TD_25	.855		
TD_21	.854		
TD_20	.853		
TD_17	.845		
TD_24	.844		
TD_23	.839		
TD_22	.831		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy			.939
Bartlett's Test of Sphericity	Approx. Chi-Square		22411.431
	df		378
	p-value		.000

Competitive Advantage

The Kaiser-Meyer-Olkin (KMO) test and Bartlett test of sphericity are conducted to verify the sample's sufficiency. The results extracted from the analysis are (KMO=.928, Bartlett test=6004.684, df=28, p=0.000). Factor analysis test of competitive advantage found only one component named Competitive Advantage with 94.080% as a cumulative variance (Table 2).

Table 2. Factor Analysis Results of Competitive Advantage

Factor / Item	Factor Loading	Variance (%)	Alpha
Competitive Advantage		.967	.991
CA_45	.977		
CA_50	.975		
CA_51	.973		
CA_49	.973		
CA_47	.967		
CA_44	.967		
CA_48	.965		
CA_46	.963		

Factor / Item	Factor Loading	Variance (%)	Alpha
Kaiser-Meyer-Olkin Measure of Sampling Adequacy			.928
Bartlett's Test of Sphericity	Approx. Chi-Square		6004.684
	df		28
	p-value		.000

Organizational Learning

The Kaiser-Meyer-Olkin (KMO) test and Bartlett test of sphericity are conducted to verify the sample's sufficiency. The results extracted from the analysis are (KMO=.896, Bartlett test= 15761.964, df= 120, p=0.000). Factor analysis of organizational learning extracts two components named Managers commitment and openness and System and knowledge perspectives with a cumulative variance of 89.813 % 89.813 % (Table 3).

Table 3. Factor Analysis Results of Organizational Learning

Factor / Item	Factor Loading	Variance (%)	Alpha
Managers Commitment and Openness		49.557	.989
MCO_62	.882		
MCO_61	.874		
MCO_60	.870		
MCO_63	.867		
MCO_53	.834		
MCO_58	.826		
MCO_52	.825		
MCO_55	.816		
MCO_56	.805		
System and knowledge perspectives		40.255	.975
SKP_65	.877		
SKP_64	.864		
SKP_66	.863		
SKP_67	.860		
SKP_57	.736		
SKP_58	.730		
SKP_59	.726		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy			.896
Bartlett's Test of Sphericity	Approx. Chi-Square		15761.964
	df		**1**20
	p-value		.000

Multiple Regression Analysis

The Effect of Corporate Governance on Competitive Advantage

All regression assumptions were approved to conduct multiple linear regression tests to accept or reject the first hypothesis (Table 4).

Table 4. Multiple Linear Regression of Model 1

Dependent Variable	Independent Variables	β	Std. Error	t-value	p-value	VIF
Competitive Advantage	Commitment to corporate governance	.289	.050	6.256	.000	2.754
	Structure and Functioning of the Board	.326	.054	7.227	.000	2.635
	Transparency and Disclosure	.341	.049	7.660	.000	2.552
R=.867 R^2 = .751 Adjusted R^2 = .749 F:323.462 p: .000						

The results indicate that all dimensions of corporate governance (Commitment to Corporate Governance, Structure and Functioning of the Board, and Transparency and Disclosure) have an impact on the competitive advantage (R=.867, R^2= .751, Adjusted R^2 = .749, F (323.462), p: .000).

Moreover, table 4 shows that the independent variables (Commitment to corporate governance, Structure and Functioning of the Board, and Transparency and Disclosure) explain 75.1% of the variation in the dependent variable (Competitive Advantage). Therefore, the researcher can't reject the first hypothesis of this study

H$_1$: There is a statistically significant effect of corporate governance (Commitment to Corporate Governance, Structure and Functioning of the Board, and Transparency and Disclosure) on competitive advantage.

The Mediation Effect of Organizational Learning

Managers commitment and openness

In order to test the second hypothesis, Baron & Kenny's (1986) approach is adopted including four steps in which regression analyses are tested. Step 1 is already tested and confirmed (see section 3.3.2.1). Steps 2, 3, and 4 are tested (Tables 5, 6, and 7).

Table 5. Multiple Linear Regression of Model 2

Mediating Variable	Independent Variables	β	Std. Error	t-value	p-value	VIF
Managers commitment and openness	Commitment to corporate governance	.331	.055	6.607	.000	2.754
	Structure and Functioning of the Board	.296	.059	6.056	.000	2.635
	Transparency and Disclosure	.301	.053	6.244	.000	2.552
R=.842 R^2 = .708 Adjusted R^2 = .705 F: 259.708 p: .000						

Table 5 shows that all factors of corporate governance (Commitment to Corporate Governance, Structure and Functioning of the Board, and Transparency and Disclosure) impact the mediating variable (Managers Commitment and Openness) (R=.842, R^2= .708, Adjusted R^2 = .705, F: 259.708, p: 0 .000).

Table 6. Multiple Linear Regression of Model 3

Dependent Variable	Independent Variables	β	Std. Error	t-value	p-value
Competitive Advantage	Managers commitment and openness	.870	.026	33.459	.000
R=.881	*R^2= .776*	*Adjusted R^2 = .775*		*F: 1119.532*	*p: .000*

Table 6 shows that managers commitment and openness affects competitive advantage (R=.881, R^2= .776, Adjusted R^2 = .775, F: 1119.532, p: 0 .000).

Table 7. Multiple Linear Regression of Model 4

Dependent Variable	Independent Variables	β	Std. Error	t-value	p-value	VIF
Competitive Advantage	Commitment to Corporate Governance	.117	.044	2.868	.004	3.128
	Structure and Functioning of the Board	.172	.047	4.365	.000	2.936
	Transparency and Disclosure	.184	.043	4.724	.000	2.862
	Managers Commitment and Openness	.521	.042	12.226	.000	3.427
R=.911	R^2= .831	Adjusted R^2 = .828		F: 392.165	p: .000	

Table 7 shows that all factors of corporate governance (Commitment to Corporate Governance, Structure and Functioning of the Board, and Transparency and Disclosure) along with manager commitment and openness affect competitive advantage (R=.911, R^2= .831, Adjusted R^2 = .828, F: 392.165, p: 0.000)

To confirm the mediating variable's effect using Baron & Kenney's approach, The Betas' values in the first step are compared with those in the last steps. Table 8 compares Beta values before and after controlling the mediating variable (Managers Commitment and Openness).

Table 8. Betas before and after controlling Managers Commitment and Openness

Independent Variable	Beta Coef before controlling the mediating variable	Significance relationship from the first step	Beta Coef after controlling the mediating variable	Significance relationship from the fourth step	Results
Commitment to corporate governance	.289	Significant	.117	Significant	Partial Mediation
Structure and Functioning of the Board	.326	Significant	.172	Significant	Partial Mediation
Transparency and Disclosure	.341	Significant	.184	Significant	Partial Mediation

Table 8 shows that beta values of all corporate governance dimensions are reduced after controlling the first dimension of the mediating variable (Managers commitment and openness).

System and knowledge perspectives

In order to test the second hypothesis, Baron & Kenny's (1986) approach is adopted including four steps in which regression analyses are tested. Step 1 is already tested and confirmed (see section *3.3.2.*1.). Steps 2, 3, and 4 are tested (Tables 9, 10, 11).

Table 9. Multiple Linear Regression of Model 5

Mediating Variable	Independent Variables	β	Std. Error	t-value	p-value	VIF
System and knowledge perspectives	Commitment to corporate governance	.172	.055	3.392	.000	2.754
	Structure and Functioning of the Board	.410	.059	8.293	.000	2.635
	Transparency and Disclosure	.337	.053	6.926	.000	2.552
$R= .838$ $R^2 = .702$ *Adjusted R^2 = .699* *F: 251.536* *p: .000*						

Table 9 shows that all factors of corporate governance (Commitment to Corporate Governance, Structure and Functioning of the Board, and Transparency and Disclosure) impact the mediating variable (System and knowledge perspectives) (R= .838, R^2= .702, Adjusted R^2 = .699, F: 251.536, p: 0.000)

Table 10. Multiple Linear Regression of Model 6

Dependent Variable	Independent Variables	β	Std. Error	t-value	p-value
Competitive Advantage	System and knowledge perspectives	.899	.025	36.135	.000
$R=.895$ $R^2= .802$ $Adjusted\ R^2 = .801$ F: 1305.753 p: .000					

Table 10 shows that System and knowledge perspectives affects competitive advantage (R=.895 $R^2= .802$, Adjusted $R^2 = .801$, F: 1305.753, p: 0.000).

Table 11. Multiple Linear Regression of Model 7

Dependent Variable	Independent Variables	β	Std. Error	t-value	p-value	VIF
Competitive Advantage	Commitment to Corporate Governance	.190	.040	5.205	.000	2.852
	Structure and Functioning of the Board	.090	.046	2.325	.021	3.199
	Transparency and Disclosure	.146	.040	3.946	.000	2.934
	System and knowledge Perspectives	.576	.040	14.573	.000	3.351
$R=.922$ $R^2= .851$ $Adjusted\ R^2 = .849$ F: 455.428 p: .000						

Table 11 shows that all factors of corporate governance (Commitment to Corporate Governance, Structure and Functioning of the Board, and Transparency and Disclosure) along with System and knowledge Perspectives affect competitive advantage (R=.922, $R^2= .851$, Adjusted $R^2 = .849$, F: 455.428, p: 0.000)

To test the mediating variable's effect using Baron & Kenney's approach, The Betas' values in the first step are compared with those in the last steps. Table 12 compares Beta values before and after controlling the mediating variable (System and knowledge Perspectives).

Table 12. Betas before and after controlling the System and knowledge perspectives variable

Independent Variable	Beta before controlling the mediating variable	Relationship from the first step	Beta after controlling the mediating variable	Relationship from the fourth step	Results
Commitment to corporate governance	.289	Significant	.190	Significant	Partial Mediation
Structure and Functioning of the Board	.326	Significant	.090	Significant	Partial Mediation
Transparency and Disclosure	.341	Significant	.146	Significant	Partial Mediation

Table 13 shows that beta values of all corporate governance dimensions are reduced after controlling the second dimension of the mediating variable (System and knowledge perspectives).

Conclusion and Implications

Several studies that investigated corporate governance focused on the elements of corporate governance separately and denied the mediation elements that can explain the relationship between corporate governance and competitive advantage. Therefore, this study estimates the impact of corporate governance through the mediation effect of organizational learning that could be involved in any organizational practice.

Regarding the impact of corporate governance on competitive advantage, the results confirm the theoretical and implication studies (He et al., 2009; ZORN, 2014; Dzulkifli et al., 2020; AL-Qatawneh, 2015; Ghabri, 2022; Raithatha and Haldar 2021; Natto and M-mokoteli 2022). Specifically, the study found that all corporate governance elements (commitment to corporate governance, structure and functioning of the board, and transparency and disclosure) significantly impact competitive advantage. The most effective element was transparency and disclosure. That asserts the importance of transparency and disclosure in getting high profits, lowering cost, and enhancing customer satisfaction. Transparent organizations can increase customer satisfaction, enhance their profitability, build good growth, and produce products with competitive cost and high quality.

The second hypothesis claims that organizational learning mediates the impact of corporate governance on competitive advantage. Based on the results of Baron and Kenney (1986), it is found that the first and the second elements of organizational learning (Managers commitment and openness, and System and knowledge perspectives) partially mediate all the relationships between corporate governance dimensions (commitment to corporate governance, structure and functioning of the board, and transparency and disclosure) and competitive advantage. One of the related studies that found close results is "Analyzing the Impact of Corporate Governance and Organizational Learning on Strategic Planning Effectiveness (An Empirical practice among some industrial companies in Iran)." The results of this study found that corporate governance and organizational learning separately have a relationship with strategic planning.

Anyway, this study contributes to the corporate governance study by explicating the mediating role of organizational learning. It can be a good reference for Jordanian manufacturing organizations as it is one of the first to examine the mediating effect of organizational learning on the relationship between corporate governance and competitive advantage.

Regarding the managerial implications, the study approves that corporate governance includes vital capabilities that influence competitive advantage, which is considered an important measure of organizational performance. By committing to corporate governance, organizations can build morale and a good reputation that helps build strong relationships. Corporate governance requires organizations to comply with local, national, and international policies and regulations, and thus reducing the likelihood of

costly crises and scandals. Moreover, by being committed to corporate governance practices, having the best structure of the board, and disclosing transparent information, organizations can enhance their competitive positions in the markets.

Moreover, the study emphasizes the importance of organizational learning in explaining and supporting the effect of corporate governance on competitive advantage. Management in organizations needs to encourage organizational learning practices along with the practices of corporate governance for greater competitive advantage. When corporate governance and organizational learning are applied jointly in a proper way, organizations can be more competitive. Organizational learning that dedicates time and resources to building a learning culture makes organizations more competitive.

Future Research and Limitation

The study provides researchers with several points of view to study. Researchers can include various control variables to explain the relationships between corporate governance and competitive advantage. For example, intellectual capital, information technology, strategic position, customer satisfaction, and reputation are important control variables that might facilitate the relationship.

Moreover, the population sample is limited to Jordanian manufacturing companies. Researchers can repeat investigating the same relationships in several sectors and various countries. In addition, a larger sample can be studied.

Further research could be conducted by applying the topic in a case study. A case study could deeply explain the interaction between variables. By monitoring firm parameters, researchers can evaluate the variables and their determinants using a qualitative method. The case study can specifically explain how corporate governance can be applied in manufacturing companies.

In spite of the study's results, it contains limitations. The study is cross-sectional, focusing on a specific point of time. The study could be conducted using panel data where the study's variables are compared in different time periods. Moreover, the corporate governance questionnaire including some items is not compared with external governance models. The instrument of data collection is restricted to some factors where researchers can adopt different instruments to evaluate the relationships of this study.

Author Contributions

Raghad Darweesh verified and contributed to the data analysis and, took over most of data interpretation and writing of the manuscript, liaised with co-authors regarding any editorial queries, agreed to take responsibility and be accountable for the contents of the article.

Mohammad Abuareish made a significant contribution to the work reported. Specifically, in the conception, study design, execution, acquisition of data, analysis and interpretation. He also critically reviewed the article.

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Original Research

Investigating the Effect of the Increase in Living Costs on the Age of Marriage in Iran (2021-2022)

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Abstract

This article examines the effect of the increase in the cost of living on the age of marriage in Iran. Age of marriage, reproductive age and number of children are used as dependent variables and income, unemployment and living expenses are used as independent variables in this article. The required data was collected from the distribution of 384 questionnaires among single and married men and women. For data analysis, one-sample t-test and Kolmogorov-Smirnov test were used. According to the results obtained from the data analysis, with the increase in the cost of living, the age of marriage and reproductive age also increases, and also with the increase in the cost of living, the desire to have more children decreases, and there is a significant relationship between income and the number of children. This is despite the fact that there is no significant relationship between unemployment and marriage age, if unemployment and income and living expenses are dependent on each other, but in the statistical population of this article, unemployment does not explain its effect on marriage age correctly. Also, there is an inverse relationship between the amount of income and the age of marriage.

Keywords: Marriage age, Fertility Age, Living Expenses, Income.

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Introduction

Since all decisions and plans related to the start and continuation of a joint life are affected by the economy and financial issues, studying the family economy is very important. In this chapter, the explanation of the family economy, statement of the problem, the necessity of conducting the research and also the definition of the terms used in this research have been discussed.

Family economics examines the life cycle of a family from the time of marriage to the time of death or divorce. This branch of science, using economic analysis methods, deals with the choices of men and women in the formation and continuation or dissolution of the family. The arrival of economists and their efforts to understand the way of choosing a spouse and the decision making of people from the time of marriage to childbirth and divorce to compare the benefits of marriage and childbearing and divorce and the resulting costs, caused at the end of the 20th century and the beginning of the 20th century and first, in the issue of family economy, economic analysis should be done. Family economy can be defined as how to organize and manage home resources. A complete list of time, money, living space, etc. can be prepared. The items on this list may look different, but they all have one thing in common. The characteristic of all these items in today's life is that they are rare. Earning halal income and managing expenses are two basic propositions of family economy. Family economy plays an important role in the economy of different nations (Shirkund, 2021: 42).

Family economy is not only limited to prosperous and rich families. This science will have more applications for low-income groups whose income and expenses do not match. One of the notable points in family economics is that increasing income does not mean improving the family's livelihood because increasing income will lead to increasing expenses, and it is the management of expenses that reveals the art of managing the family economy (ibid.: 47).

It is like this that in some families consumption increases with the increase in income. Income and expenses have increased to the same extent and income and expenses are equalized. In this situation, the management of family members in relation to prioritizing their expenses can also help to improve the family economy. Estimated and not planning for the family economy.

In 1973, Gary Becker was the first person to propose the theory of the marriage market, and after that economists and sociologists began to investigate and analyze this issue. In the methodology of economics, similar to a science like physics, an economist like Gary Becker proposes a model to explain human behavior in the category of marriage based on empirical observations and says that people consider the cost of the benefit of marriage and make the optimal decision. Then, the fit of the model with the experimental data is examined and possibly the predictions of the model are analyzed. Just like in physics where a theory is tested after it is presented, Becker's theory is also tested. Measuring experimental data has become more important in the last one to two decades. Of course, there are very serious differences between physics and social sciences and especially economics in terms of the methodology and philosophy of these sciences.

Becker's view of marriage is similar to forming a company; That is, people form a company called "family" whose goal is to achieve maximum productivity. This productivity is achieved both through the satisfaction of emotional needs and through cost savings through living in the same house or government incentives such as tax reductions and the birth of children, which is similar to crop production. It means that usually a rich person is not willing to establish a company with a poor person or the probability of establishing a company between two people of the same race is higher. The second path is provided by the game theory, and by means of it, the marriage market can be examined like many other markets, such as the job market or online shopping. In this framework, there is also "competition" and for example 10 thousand men and women compete with each other in choosing a spouse or 10 thousand companies in hiring labor. Game theory predicts a behavior pattern in such a situation (Akbarpour, 2014: 2). One of the important categories in the field of family issues that economists have analyzed at the beginning of the household life cycle is the age of marriage. Marriage of young people at the right age increases the health of the social environment; Therefore, identifying factors affecting the age of marriage can be a step for better planning in order to lead young people to marry on time and prevent its unwanted postponement (Mehrbani, 2022: 70). This research seeks to answer the question, what is the relationship between the amount of income and the age of marriage?

In addition, examine the relationship between marriage age and living expenses, reproductive age and living expenses, number of children and living expenses, number of children and household income.

In the studied sample, 49% are men and 51% are women. 51.96% are single, 44.39% are married and 3.66% are divorced. The largest number of respondents belong to singles. The minimum and maximum age of separation is 18 and 28 years, respectively, and the average age of separation is 23.8 years. The age of most respondents is between 20 and 30 years (58.1%).

The education level of most of the respondents is bachelor degree (43.6 percent).

Theoretical Foundations

The family is the smallest socio-economic institution, which is very important like all other institutions, because this institution can train and educate people who somehow influence their socio-economic structures and the family and society in some way. Paying attention to issues such as marriage and childbearing can be examined from two socio-economic points of view. In the next section, we review the literature on the subject.

Marriage

Marriage is one of the forms of commitment between men and women. Generally, couples legitimize the union through the marriage ceremony, the durability of the union is expected and having children in such unions is acceptable (Lukas and Mir, 1381: 124). Age at marriage affects the number of years a woman is likely to have a child. Women who marry early will have more children than those who marry later. Age at marriage affects the length of subsequent generations. Early marriages can significantly increase

the number of births by shortening the length of the generation, which is calculated based on the average number of years between a cohort of women and their daughters (ibid., 127).

Many non-industrialized countries that have achieved fertility reduction in recent years have also experienced a significant increase in the marriage age of women, and this issue can lead to the assumption that the increased marriage age may be a necessary precondition for the adoption of new control methods. Fertility is in the period of marriage. The effect of higher marriage age on fertility can be both direct and indirect. As the age of marriage increases, the suitable physical age for having children also increases, and the indirect effect may be a decrease in fertility due to changed attitudes towards marriage and family. Changed attitudes may delay women's marriage and limit the number of children (ibid., 132).

Marriage, as the first step to form a family institution, means mixing two perspectives, two histories, and different values and worldviews. In fact, marriage is the first and most important stage in the family life cycle where the choice of spouse is made and success in other stages of life depends on success in this stage. In recent decades, changes in marriage patterns, reluctance to marry, marriage at an advanced age or not marrying in general have increased significantly (Khojste Mehr et al., 2020: 19). Economic factors are also very influential in increasing the age of marriage, increasing the cost of food, clothing, housing, health and education also play an important role in reluctance to marry.

Economy of Marriage

How do men and women decide to choose the best option? Is the chosen one the best and should he stop looking and get married? What are the costs and benefits of marriage?

Benefits of marriage: The per capita cost of food is reduced, there is no need for two household items such as a broom, refrigerator, etc.

Costs of Marriage: Sharing space and resources will cause costs, for example, one of the costs is the results of joint decision-making. In this case, compared to the case where a person decides alone, One or two people do not get what they want.

Also, marriage is a long-term commitment that is not cheap to end.

For example, economists know that the marriage rate has decreased in the 21st century, and over the past 50 years, people have been getting married later and later. One way to examine these two phenomena is to see whether the net benefits of marriage (especially for younger people) have declined in recent decades.

Historically, women benefited more from marriage when economic opportunities were less. At that time, the only way for women to survive economically was to contribute to their husbands' income. Even for men, the benefits of marriage have decreased in recent times.

The reason can be found in home production. The family has a set of productions and the family members are the human capitals of the production process. The output of

household production includes many things such as: children and their upbringing, food, house cleaning and household financial management. Like any other production process, home production also requires the division of labor, where this division is done between men and women. Over time, the cost and benefits of marriage have changed. Especially, since women took a greater share in the labor market and also due to the growth of technology, less labor is required for home production. As a result, the benefits associated with the allocation of labor in the domestic sector have decreased significantly. Women no longer need to have access to men's income, and men no longer need someone to manage the household. Because devices such as microwave ovens, washing machines, the reduction in the cost of preparing food from outside the home, and the widespread use of child care providers have caused households to produce fewer goods and services themselves. Therefore, less labor is needed.

These changes in the cost and benefits of marriage have caused women and men to have various choices. These changes can well explain the decrease in the marriage rate and its delay (Akbarpour, 2019: 3).

The behavioral pattern of each couple in the marriage market is based on the goods and services provided by the household as a result of the marriage. Most of these goods and services are neither salable nor transferable, although they may be transferable between members of the same family. These goods and services include the number of children and the method of raising children, earning credit, entertainment, companionship, love and the health status of family members. As a result, they cannot be considered a normal consumer product because they cover a wide range of human activities and purposes. The benefit and cost of marriage should be balanced. The profit from marriage depends on the opportunities of the marriage market. As long as both couples participate in the labor market, increasing income increases the motivation to marry. With the increase in income, marriage expenses are not noticeable to a large extent, and therefore the motivation for marriage will increase.

Marriage expenses increase during the period when a person is looking to choose a spouse. An increase in property income and an increase in the wage rate lowers the age of marriage. When we assume the years of education and other variables to be constant, people with a higher wage rate marry earlier. Increasing the salary of women compared to men reduces the motivation to marry. The profit from marriage also depends on traits such as beauty, intelligence and education, which are considered as indirect market opportunities (Gary Becker, 1973: 813-846).

Microeconomic Theory About Fertility

Forming a family has costs and benefits, so the dimensions of the formed families depend on these costs and benefits. If the costs of family formation are high (or low) compared to its benefits, the birth rate in the family will decrease (or increase) (Todaro, 1366: 885). The contractual theory of consumer behavior assumes that a person with a certain set of tastes or preferences for a series of goods tries to find the satisfaction he gets from consuming such goods, in relation to his limited income and the relative prices of the goods to the maximum.

In the analysis of fertility, a child is considered as a special type of consumer goods (also a type of capital goods in developing countries) and therefore fertility becomes a rational economic response to consumer (family) demand for children compared to other goods. It is assumed that the general effects of income and substitution effects work, that is, assuming that other factors remain constant, it is predicted that the desired number of children is directly related to household income, inversely related to the price (cost) of children, and vice versa. It changes with the desire for goods compared to the child. In summary:

1. The higher the household income, the higher the demand for children.

2. The higher the net price (cost) of the child, the lower the quantity demanded.

3. The higher the price of other goods compared to the baby, the higher the demand for the baby.

4. The stronger the desire to have goods than to have children, the lower the demand for children (Todaro, 2017: 211-212).

Higher standards of living in low-income families, combined with a relative increase in the price of children, induce families to have fewer children and in return improve their welfare (ibid., 215). In fertility analysis, children are treated as durable consumer goods, such as cars or televisions, which bring satisfaction over a long period of time.

Household Cost Groups

Personal (household) consumption expenditure, which alone constitutes 50-60% of the national gross expenditure, the examination of the share of its components and its changes, plays an important role in the family economy and the national economy. Iran Statistics Center annually prepares and makes available to the public the average cost of an urban and rural household. Based on the global classification and in accordance with the United Nations system of national accounts, these statistics are divided into two groups, edible and non-edible. Household consumption expenses can be classified according to durable and non-durable goods. As the income increases, non-food consumption increases more compared to food consumption, because food consumption cannot exceed a certain limit according to the physical or physiological conditions of the human body, but there is no such limit for non-food or durable consumption. High-income people buy suitable housing, cars and other capital goods, or the higher the household income, the more people travel and have fun. But low-income groups spend most of their expenses on food and housing. It can be concluded that almost every Iranian family spends its expenses in three main parts: food, housing and other items (Farzaneh, 2010: 166).

According to the information collected from Iran Statistics Center, the average cost of urban food has increased by approximately 90% from 2017 to 2019, which is approximately 75% for the average cost of rural food from 2017 to 2019. Also, the average urban non-food cost has increased by approximately 100% from 2017 to 2019, and the same rural non-food cost has increased by approximately 74% from 2017 to 2019. According to these statistics, the average cost of an urban household has increased by

approximately 97% from 2017 to 2019, and the average cost of a rural household has increased by approximately 75% from 2017 to 2019. According to the analysis of these statistics, it is clear that with the growth of food and non-food costs and the increase in prices, as well as the decrease in the purchasing power of the consumer, the economic conditions of the household make it difficult to meet the needs. Since most people in the society do not know how to optimally allocate income and do not seek to learn it. The family economy will face challenges. On the other hand, when the government intervenes in any aspect of economic and social issues, this itself creates costs that people have to pay a part of these costs.

Table 1. Average Cost of Food in Urban and Rural Qreas (Thousand Rials)

Year	2017	2018	2019	2020	2021
Urban	3275	44570	54953	58126	62431
Rural	32940	45796	56063	57033	57778

Source: Iran Statistics Center, The results of Household Income and Expenditure Statistics

Table 2. Average Cost of Non-Edible in Urban and Rural Qreas (Thousand Rials)

Year	2017	2018	2019	2020	2021
Urban	99965	119711	151029	176739	199967
Rural	51033	62391	73497	81495	89205

Source: Iran Statistics Center, The results of Household Income and Expenditure Statistics

Table 3. Average total cost of an urban and rural household (Thousand Rials)

Year	2017	2018	2019	2020	2021
Urban	132716	164281	205982	234865	262397
Rural	83973	108188	129560	138528	14683

Source: Iran Statistics Center, The results of Household Income and Expenditure Statistics

According to the information collected from Iran's Statistics Center, the average annual cost of an urban household increased by approximately 114% between 2017 and 2021, and these figures for rural households from 2017 to 2021 It has increased by approximately 101 percent.

Table 4. Average total annual income of an urban and rural household (Thousand Rials)

Year	2017	2018	2019	2020	2021
Urban	130301	101281	204549	241318	278872
Rural	79727	167241	121091	139051	161038

Source: Iran Statistics Center, The results of Household Income and Expenditure Statistics

According to Table 4, the average total urban annual income has increased by approximately 114% during the years 2017 to 2021, and this figure for the total rural annual income from 2017 to 2021 is approximately 101%. Considering the average increase in the total income of urban and rural households and comparing it with the

increase in the total expenditure of urban and rural households, we come to the conclusion that the income and expenditure of rural and urban households have increased by the same amount. According to the statistics of the North Khorasan Provincial General Registry Office, last year, 6 marriages under the age of 10 and 1,102 marriages between the ages of 10 and 14 were registered, and 3 girls under the age of 10 were married in 2021, One of the reasons for early marriage of girls is the lack of income of the head of the family and the family's preference is for the consumer to decrease from the family's consumption basket, which is one of the negative consequences of inflation and the increase in living costs, which will also bring negative results.

The Economy of Children and the Demand for Children in Developing Countries

In fertility analysis based on microeconomic theory, children are considered as durable consumer goods, such as cars or televisions, which bring satisfaction over a long period of time. According to the theory of consumer behavior, people have limited resources and try to maximize satisfaction by choosing among different goods (Lucas and Mir, 2004: 106). In poor societies, children are also considered as capital goods. Therefore, in the theory of fertility economics, it is assumed that the selection mechanism that is used in less developed countries is basically related to additional or final children that are considered as capital goods. That is, parents in less developed societies adopt a child with the view that that child is a good labor force for the family and can play the role of a supporter for the parents in their old age. It is assumed that parents weigh economic benefits against economic costs when deciding to have an additional child, and as we know, the economic benefits of children, the expected income from children's work, and their financial support for parents in old age. Is. Against the benefits of these two major elements, there is a cost.

1. The opportunity cost of the mother's lost time means the income that the mother could have earned if she did not stay at home to take care of the child.

2. The cost of educating a child (both the cost of the lost opportunity and the real cost) means choosing between having fewer but more educated and higher quality children and a higher cost with the potential ability to earn more money or more children but Illiterate and low quality.

The theory of reproductive economics in less developed countries concludes that when the price or cost of a child increases, for example, as a result of increasing educational facilities and employment of women, increasing school fees, establishing a minimum working age law for children, or the social insurance system for the elderly. which is provided through the government, parents will demand fewer additional children and substitute quality for quantity or income from mother's employment for childcare activities (Todaro, 2017: 216). 80% of Iranian society wants to have only one child. Individuals' education expenses and funds have become important for families. Factors affecting the emergence of the challenge of having children in Iran include the prevalence of individualism, increasing the age of marriage, decreasing the marriage rate, increasing the divorce rate, and increasing the level of education and employment of women. Today, due to the strengthening of the nuclear family and economic difficulties in industrialized

societies, the average age of marriage has increased. Contemporary behavioral patterns seek welfare, consider it an essential part of life, and in this way create more material expectation, which is considered a time-consuming matter to achieve (Eramaki, 2015: 96).

Economic theories can also provide information on how to decide to have children and how many. The logic of marginal cost and benefit is still the main logic of this analysis. The interests of children are both economic and emotional, they are considered as economic assets, especially as parents' supporters in old age, and they are also considered as labor force in the labor market or the market of household products. On the other hand, they bring a lot of joy to their parents. All these benefits must be weighed against their costs. Obviously, the costs of food, food and children's education are among the costs that must be paid by parents for children. Children also take up more of the parents' time, and as a result, they have less time to allocate in other markets. In addition, children will reduce the freedom of parents, because for every decision they have to pay attention to what effect this decision has on their children.

In short, it can be said that there are economies of scale in the birth of children, that is, the average cost of increasing the number of children in each subsequent child decreases, because the marginal cost of subsequent children decreases. It is clearly known that the force needed to raise two children is not twice as much as the force required to raise one child, and also things like clothes and toys can be used by the next children as well (Akbarpour, 2014: 3).

White Marriage

Today, the gap between sexual maturity and economic maturity in Iran has reached more than ten years. The distance is increasing day by day. At the same time, marriage is the only legitimate way to have sex in Iran, and now this way has many obstacles. The youth unemployment problem has been one of the most fundamental issues in recent years in Iran (Eramaki et al., 2011: 43). The first factor in the formation of this type of marriage is economic changes and the introduction of capitalism and the emergence of job insecurity. The increase in job insecurity is related to the process of economic globalization. The increase in privatization caused by the expansion of capitalism and economic liberalism in Iran has been one of the main factors that have created the basis for the emergence of new behavioral patterns in the society. With the process of privatization in the country, not only unemployment but also the problem of job insecurity has become noticeable in recent years. Job insecurity is much more than the issue of unemployment and refers to employees who feel their job future is unstable. The requirement for marriage is to have economic independence and job stability. One of the problems of unstable jobs is the expansion of temporary work contracts. Today, short-term contracts bind employers to fire their employees whenever they want, with little or no cost. In the meantime, the emergence of insecure economic patterns raises the age of marriage by creating an uncertain future, and after that, it puts other patterns in front of him to satisfy his needs. The increase in unemployment among educated people, the mismatch between the supply and demand of labor force, the expansion of economic colonialism, capitalist economy, in the service of the class that owns the means of production, and the process of privatization are some of the economic factors that are

effective in creating behavioral patterns for changing the style of marriage. Cultural changes include moral liberalism and rethinking the capitalist tradition.

When the idea of economic liberalism entered Iran in the 1981s, it also brought its own culture. A culture that was not easily seen at that time, but the emergence of moral liberalism in different groups of society was one of its later results. One of the results of moral liberalism has been the emergence of multiple patterns of premarital sexual relations in the urban space of Iran.

Ethical liberalism has created a philosophical foundation to justify new behavioral patterns. A new logic that not only does not consider these new behaviors to be abnormal, but also basically challenges any dominant norm and affirms the free will of the individual in choosing his behavioral values. These norms include the spread of cultural indifference, moral and behavioral relativism, doubts about previous norms, modernity and increasing instability in relationships, the emergence of enlightened tendencies in premarital relationships and efforts to justify relationships, individualism, devaluation of marriage, limitations marriages (ibid.,55-59). The results of these phenomena are the basis of white and domestic marriage.

An Overview of the Research Done

In a research, Mehrabani investigates the effect of factors such as education, gender and income on the age of marriage. The statistical population of his research is married men and women at least 35 years old and living in Tehran city, and the sample size was used by Cochran's method and 415 observations for married men and 409 observations for married women (Mehrbani, 2013: 101).

Mehrabani stated two hypotheses in his research:

1. The marriage age of men is higher than that of women. The influential variable in determining the age of marriage is education, usually people wait to enter the marriage market after graduation, increasing the duration of education and obtaining higher academic degrees increases the age of marriage (ibid., 99). Lifetime income is provided through education and other sources. Since the income from education is realized only after marriage, other sources of income are considered in determining the age of marriage.

The importance of these sources of income shows the economic class of the decision-maker when entering the marriage market and it shows the difference in the decisions of economic classes in this regard. A single person earns money only from the transfers of her family or the property left for her, which is very dependent on her economic origin.

2. An increase in income leads to a decrease in the age of marriage. According to this hypothesis, high-income people or members of families with a high economic class get married earlier, and poor people or members of the lower classes of society enter the marriage market at an older age. The results of this research show that education has a positive and significant effect on the marriage age of men and women, people with higher income have a higher marriage age (ibid., 110).

In a research, Khojaste Mehr and colleagues interviewed 18 married students of Shahid Chamran University of Ahvaz, who had been married for almost a year. In their study, the dramatic decrease in marriage statistics is not affected by changes in economic factors and opportunities. Their study shows that the idealism of some young people and making their marriage conditional on having a high income and having all the facilities, brings about a change in the cultural attitude towards marriage. According to this study, two general categories of main factors for changing the attitude and value of marriage among students were obtained, cultural-social factors and experiences and observation of incomplete or ineffective patterns.

The great changes in the cultural and social field that have taken place in Iran have had a great impact on changing people's views and ways of thinking, as well as increasing the number of divorces, family fights, social harms, poverty and reducing the quality of life and living standards of people. There are examples of observing incomplete patterns in today's Iranian society (Khojeste Mehr, 2015: 23).

In a study, Mehrabani investigated the economic benefits of marriage in the form of an increase in the couple's income using Cochran's method and by examining 1294 households from the end of 2009 to April 2010, he explained the hypothesis based on the effect of cross productivity.

Based on this hypothesis, human capital, especially the education of one of the spouses, has a positive effect on her spouse's income level. The results of this research show that one-year increase in women's education increases the income of their husbands by 2.85% on average. While one-year increase in men's education increases their wives' income by 3% on average (Mehrbani, 2013: 917-921).

Afshari, in a research using panel data and through the Hausman test in the period from 1385 to 1391, used the two key variables of per capita income growth rate and unemployment rate in estimating business cycles (Afshari, 2019: 1). Based on the analysis of the model, the growth rate of per capita income has a positive effect on fertility, and fertility has shown a negative reaction to unemployment. Unemployment among young men causes marriage to be postponed, and in times of recession, working men earn less, making marriage less attractive. Women's unemployment and increasing marriage age make them continue their education, which both have a negative effect on fertility, and stagnation and unemployment have a negative effect on fertility. Women's higher education has an effect on fertility through delaying the age of marriage on the one hand and changing the decision-making structure in the family. According to the fertility opportunity cost model, increasing the participation rate of women has a positive effect on fertility because based on the income effect, the family receives more income with the participation of women, and on the other hand, the substitution effect makes them give up the income from the labor market in order to have children. and pay such a price for having children, and for this reason, increasing participation can have a negative effect on fertility (Afshari, 2019: 11).

Rastegar Khaled et al. conducted a research titled "Attitudinal assessment of the late marriage phenomenon in Ilam" by surveying and distributing a questionnaire among 384 citizens of Ilam city over the age of 20 to investigate the effect of economic, social and

cultural factors on late marriage. According to them, the economic factor and high dowry, heavy dowry, the cost of marriage ceremony, unemployment, problem of housing and provision of life necessities, inflation and low income are the effective factors in late marriage (Rastegar Khalid et al., 2014: 696).

Farzangan and Qalipour in a research using empirical evidence from the provinces of Iran addressed the marriage crisis and housing costs, the results of this research indicate that there is a negative relationship between housing costs and the marriage rate. Granting special marriage loans by the government to couples and reducing the unemployment rate increases the marriage rate (Farzangan and Qalipour, 2015: 107-123).

In a study using data from a survey conducted by the Economic Research Association and the Jordanian Ministry of Statistics, Gabel and Heaney concluded that the increase in women's education causes their marriage age to be delayed, which is more common in women than in men. Men who are engaged in government jobs decide to get married earlier than other men, and unemployment is a factor in delaying the marriage of Jordanian men (Gebel and Heaney, 2016: 221-237).

In a study of Korean men's marriage delay, Park and Kiangli concluded that men with high school education or less tend to delay marriage more than men with higher education, and this factor causes Korean men to postpone marriage. because the prospects of men with low education have decreased greatly due to the rapid expansion of education and economic crises and show a significant decrease in marriage (Park and Kiang Lee, 2017: 187-200).

In an article based on the dynamic dynamics model, Linyon and Courteau investigated the relationship between the higher education of men and women and their marriage age. The results show that the motivations from the marriage market for men are negligible. On the other hand, the effect of the marriage market for women is greater than that of higher education, and the marriage market plays the role of insurance in relation to the return to education. Men go to higher education because of having a suitable job, so that they can have a suitable job for themselves, for this reason, the age of marriage of men increases (Linen and Courteau, 2016: 221-237).

The income of married American men is at a higher level than that of single men. Also, the income of married men grows more than that of married women (web 2).

Research Method

This research is applied in terms of purpose and descriptive-survey in terms of data collection. Survey research method does not mean a special technique for collecting information. Although the questionnaire is widely used in this method, other techniques can also be used to collect information. A survey is a set of systematic and standardized methods to collect information about the views, beliefs, opinions, behaviors or characteristics of a group of members of a society.

The hypotheses of this research are:

1. There is a direct relationship between the age of marriage and the cost of living.

2. There is a direct relationship between reproductive age and living expenses.

3. There is a negative relationship between the number of children and the cost of living.

4. There is a direct relationship between the number of children and family income.

5. There is a direct relationship between marriage age and unemployment.

6. There is an inverse relationship between income and age of marriage.

The statistical population of this research is all single and married men and women living in Iran.

Due to the unlimited statistical population, the following formula known as Cochran's relation is used.

$$n = \frac{S_x^2 . Z_{\frac{a}{2}}^2}{d^2} \qquad (1)$$

where in:

n: sample size

Z: 1/96 (the number corresponding to the first type of error from the normal table).

S_x^2: The variance of the population, the size of the population is unknown, and to calculate the variance of the population, a number of questionnaires have been distributed, based on which the variance of the original sample is calculated.

d=0.05: limit of estimation error (estimated accuracy or maximum limit error: the distance between the estimated value and the actual value).

Therefore, the minimum sample size investigated in this research is equal to 384 people according to the following relationship.

$$n = \frac{S_x^2 . Z_{\frac{a}{2}}^2}{d^2} = \frac{0.5 \times 0.5 \times (1.96)^2}{(0.05)^2} \cong 384 \qquad (2)$$

There are many tools and methods to collect data, in this research, a questionnaire was used to collect information. This questionnaire includes two parts; The first part includes questions related to the personal information of the respondents (gender, marital status, etc.) and the second part includes questions related to examining the effect of the increase in living expenses on the age of marriage, reproductive age and number of children, the effect of increasing household income on the number of children. , the effect of the duration of unemployment on the age of marriage and the relationship between income and age of marriage, which includes 20 questions. Scoring in this questionnaire based on a 5-point Likert scale is very low, 1; low, 2; medium, 3; High, 4; very much; 5, is

Determining the Reliability of the Questionnaire

In this research, in order to determine the reliability of the questionnaires, 30 questionnaires were distributed among the statistical community and Cronbach's alpha value was calculated for the questionnaire using SPSS software. The results are shown in the table below. As can be seen in the table, the amount of Cronbach's alpha coefficients obtained for the variables of the questionnaire as well as in general is higher than 0.7, so the reliability of the questionnaire can be confirmed.

Determining the Validity of the Questionnaire

The content validity of a test is usually determined by experts in the subject under study. At this stage, by conducting various interviews and obtaining people's opinions, the necessary corrections have been made, and thus it is ensured that the questionnaire measures the same characteristic that the researchers are looking for.

In this research, after compiling the initial framework, in order to evaluate the research questionnaire, several professors, experts and relevant experts were consulted, and their critical comments and correction suggestions were applied in the questionnaire.

Methods of Information Analysis

In this research, two methods of descriptive statistics were used to analyze demographic information and inferential statistics to test hypotheses. Descriptive statistics include frequency tables, percentages, averages, and standard deviations, and at the inferential level, Kolmogorov Smirnov and one-sample t-tests were used to test the hypotheses. It should be noted that SPSS 18 software was used to analyze and apply the above tests.

Research Findings

Among the respondents, 49% are men and 51% are women, 51.96% are single, 44.39% are married, and 3.66% are divorced. The age of most of the respondents is between 20 and 30 years (58.1%) and the occupation of most of the respondents is freelance (49.2%) and the average number of working people in the family is 2.03 people. The education level of most of the respondents is bachelor degree (43.6 percent) and the average monthly family income of most respondents is between 1 and 2 million Tomans (47.7 percent) and the average amount of monthly family expenses of most respondents is between 1 and 2 million Tomans (46.9 percent). The housing status of most of the respondents is property (61.3 percent). The amount of rent varies among the respondents and according to the average amount which is approximately 759,000 Tomans and the income of the household or individual is between 1 and 2 million Tomans, according to the income and the amount of rent, a lot of money is paid for housing rent and accounts for a larger share of income.

Table 4. Kolmogorov-Smirnov Test Results (N=384)

Introduction of variables	Z Statistic	Significance Level	Result
The variable of the first hypothesis	1.25	0.09	Normal
The variable of the second hypothesis	1.16	0.32	Normal
The third hypothesis variable	1.15	0.18	Normal
The fourth hypothesis variable	1.17	0.11	Normal
The fifth hypothesis variable	1.33	0.41	Normal
The sixth hypothesis variable	1.10	0.21	Normal

In this research, a questionnaire with a 5-point Likert scale was used. So that the answers to the questions using a 5-point Likert scale are very low, 1; low, 2; medium, 3; High, 4; Too much; 5, it is specified and the valuation of the options is as follows.

Considering the normality of the research variables, the one-sample parametric test is used to check the hypotheses, in which a hypothetical average is needed, and according to the valuation of the options, it is calculated as follows.

$$\text{Hypothetical mean} = \frac{1+2+3+4+5}{5} = 3 \qquad (3)$$

In fact, the number 3 obtained is the same as the average limit or the optimal limit, and in the test of hypotheses, the corresponding values are compared with the number 3. If it is more than 3, it can be said that the status of the variables is above the desired level and actually effective.

The interpretation of the result of the first hypothesis test is as follows: with the increase in the price and cost of food, clothing, housing, and the necessities of life, as well as high dowry and heavy dowry, the cost of marriage ceremonies and housing problems, inflation and low income, the age of marriage also increases. These economic factors play an effective role in postponing the age of marriage.

The interpretation of the result of the second hypothesis test is as follows: as the marriage age increases, the reproductive age also increases. The higher the price of children and the cost of having children, the less willing couples are to have children. Working women do not want to have children due to spending time to generate income outside the home and experience lower fertility than housewives. Unemployment of men and women causes marriage to be postponed and fertility to be postponed.

Table 5. One-sample t-test results for six hypotheses compared to number 3

Hypothesis	Variable	Number	Average	t statistic	Deviation from the assumed mean	Sig.
1	Effect of living expenses on the age of marriage	384	3.12	4.269	0.12	*0.000
2	Effect of increasing living costs on reproductive age	384	3.39	7.705	0.39	*0.000
3	Effect of the increase in the cost of living on the number of children	384	3.18	3.904	0.18	*0.000
4	Effect of increasing household income on the number of children	384	3.33	8.549	0.33	*0.000
5	Effect of the duration of unemployment on the age of marriage	384	2.72	-7.166	-0.28	*0.000
6	The relationship between income and marriage age	384	3.35	6.699	0.35	*0.000

*Significance at the 0.05 level

The interpretation of the result of the third hypothesis test is as follows: with the birth of a child and subsequent children, the need for food, clothing and housing increases compared to before. Meeting these essential needs is a difficult task for most people. If the family does not respond to these needs, it refuses to give birth to a child, and we often see single-child families.

Women are forced to work outside the home alongside men to help with financial issues and meet the needs of the family, this causes couples to choose between income and having children, and in today's economic conditions, women prefer having income. They prefer to have children and avoid having children without financial support.

With the increase in income, the tendency to fertility increases because children in the family not only have spiritual value, but in developing countries, children are known as capital goods that can help the family's economy in adulthood, and on the other hand, in As parents age, children play a supportive role and provide emotional security, but evidence shows that families want fewer and better-quality children and Most of the girls are studying in universities and the unemployment variable is not effective for them, and according to the society's custom, the management of the family's economy and livelihood is the responsibility of the man. Boys who get married with the financial support of their families are not affected by the length of unemployment, and also in the poor class of society, we often see that they encourage their daughters to marry unemployed or low-income boys in order to cover the cost of living for the girl's family be reduced.

But there is an ambiguity as to why the explanatory variable of income is effective in the dependent variable of the model, but the explanatory variable of unemployment is not effective in the dependent variable of the model! It seems that the respondents to the

questionnaire did not correctly answer the questions related to this variable, therefore, one of the most effective factors on the age of marriage is not significant in this research.

The decision to marry is higher in high-income boys than in low-income boys. Young people who have enough income to manage their finances are able to pay the expenses of marriage and living, the increase in income affects the reduction of the age of marriage.

Suggestions

According to the research results, the following practical suggestions are provided:

1. The increase in living expenses has a direct effect on the age of marriage, this increase includes all food and non-food expenses. Because individuals and households perform their activities based on economic changes and understanding of economic conditions. By understanding how the increase in expenses hinders young people from entering the marriage market, it is better to fully explain the issue of living expenses for young people. Knowing how to manage expenses is a way to facilitate entering the marriage market and also to increase the desire to have children. Increasing awareness about the two influencing variables of income and expenses is the first step to improve the economic behavior of all households. It is possible to promote this level of awareness through educational texts and holding educational workshops.

2. Changing the attitude of households and young people towards business and earning and their expectations from work and income from their economic activity will solve a major part of their problems. According to the results of the research, there is an inverse relationship between income and age of marriage.

3. Since there is a direct relationship between the amount of income and the age of marriage and between the number of children and the cost of living, these factors are completely related to each other. With an increase in income, a person has a greater desire to marry because he hopes to continue his married life in terms of financial coverage, and he can afford the expenses of life, provided he has economic awareness, and he has more motivation to have children. Now this issue has become a challenge in the society because the increase in unemployment and not having enough income prevents young people from getting married, and on the other hand, no institution is thinking of eliminating this phenomenon. If we ignore this issue, in the near future we will bear a lot of economic and social costs. With the increase of the educated class, their way of thinking about work and work culture in the society has changed and they sit waiting for a desk job to be provided for them and they do not have an entrepreneurial spirit. Defects in education hinder the development of the individual and the society in every dimension. By training an expert and entrepreneur, a new step can be taken in the direction of improving the work culture in the society and creating jobs by the individual himself.

Suggestions for Future Research

The findings of this type of research can have an effective role in understanding the economic factors and obstacles on the way of young people getting married, therefore government institutions and universities and research centers in a wider range can

examine the economic obstacles facing young people and aim to Provide practical solutions to remove these obstacles. We offer the following suggestions to researchers for future research:

1. Examining how to remove economic obstacles with a cultural approach, including reducing the costs of marriage ceremonies and dowry.

2. Investigating the interest of boys and girls in marriage and having children.

3. Investigating how to define family economy and marriage in Iranian families.

4.Theorizing in the field of family economy and children's economy according to the cultural, social and economic conditions of each society.

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Original Research

Effect of Green Supply Chain Management Practices on Environmental Performance of Sugar Firms in Western Kenya

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Abstract

Organizations are facing increasing pressure to consider the environmental impact of their industrial operations, particularly in high-polluting industries. Supply chain management is now being utilized more frequently to address the environmental pollution challenges that arise due to industrial development. Despite the implementation of environmental management policies, sugar companies in Western Kenya are still encountering disputes with local communities due to pollution caused by their production processes. Experts suggest that the incorporation of Green Supply Chain Management (GSCM) strategies may be effective in reducing the environmental impact of manufacturing processes. However, the effectiveness of these strategies had not been examined through empirical research. As a result, this study aimed to investigate the impact of GSCM practices on the environmental performance of Western Kenya's sugar manufacturing firms. A survey was conducted using an explanatory design, with 127 respondents drawn from various departments within the organizations. The reliability of the survey instruments was evaluated using Cronbach's alpha coefficient. The findings revealed that R^2 for GSCM practices was 0.684 (p=0.00) and statistically significant, indicating that GSCM practices account for 68.4% of the variance in environmental performance. The study concluded that manufacturing companies should adopt GSCM as a critical strategy for sustainable initiatives, which can contribute to a company's competitive advantage and overall profitability.

Keywords: Pollution prevention, Resource conservation, Sustainability.

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Introduction

The rapid advancement of the industry has resulted in significant environmental issues, such as the discharge of greenhouse gases, hazardous pollutants, and accidental chemical spills (Peng and Lin, 2008). In response to increasing worldwide environmental apprehensions, the concept of Green Supply Chain Management (GSCM) has arisen. GSCM refers to the incorporation of environmentally friendly practices into all aspects of supply chain management. This encompasses product design, material selection, manufacturing processes, delivery to customers, and proper disposal. According to Bowersox and Closs (1996), the supply chain encompasses all processes involved in the alteration and transportation of commodities or provisions from their raw material stage to their final destination with the customers, both within and outside the organization. Srivastava (2007) further highlights that GSCM involves considering environmental factors throughout the entire supply chain process, from product design to customer delivery.

Managing environmental pressures and meeting stakeholder expectations have become increasingly challenging for businesses, as pointed out by Kassinis and Vafeas (2006). The implementation of environmental management techniques has become a major issue for enterprises, according to Hofer, Cantor, and Dai (2012), who emphasize the importance of addressing stakeholder pressures. Tseng, Wang, Chiu, Geng, and Lin (2013) highlight the need for industrial enterprises to actively engage in environmental management in order to achieve sustainable development goals. De Giovanni (2012) notes that environmental degradation has been a significant concern for businesses, especially since society has become more aware of the harmful effects of unsustainable practices.

The manufacturing industry has significant impacts on society, the environment, and the economy, creating opportunities for individuals to contribute to sustainability efforts. With a highly competitive market, businesses are seeking ways to decrease supply chain expenses and have turned to green supply chain management as a means to achieve this objective. GSCM has been identified as a vital management strategy to help companies attain sustainability in their manufacturing processes by reducing environmental impact and increasing efficiency, (De Giovanni, 2012).

Green supply chain management (GSCM) covers all aspects of supply chain management that are required to comply with environmental regulations (Zhu & Sarkis, 2007). They assert that GSCM can be divided into intra-organizational and inter-organizational environmental practices. It is important for a company to be aware of the practices of other members in the supply chain and meet the expectations of stakeholders (Ashby, Leat, & Hudson-Smith, 2007), as a company is a part of the supply chain. The concepts and practices of environmental and social responsibility are increasingly important and are considered a significant aspect of business requirements today (Ashby *et al.*, 2012).

Green Supply Chain Management (GSCM) is the practice of integrating environmental sustainability into all aspects of supply chain management. This includes

product design, material selection, manufacturing processes, delivery to consumers, and proper disposal at the end of the product's useful life. According to Bowersox and Closs (1996), the supply chain encompasses all activities related to the transformation and movement of goods or services from raw materials to end users, both internal and external. Srivastava (2007) further emphasized that GSCM involves taking environmental considerations into account throughout the entire supply chain process, from product design to customer delivery.

Different organizations may adopt varying GSCM practices depending on their operations, characteristics, and industrial sector. According to Liu *et al.* (2013), there is no one-size-fits-all approach to GSCM. Dheeraj and Vishal (2012) identified green purchasing, manufacturing, materials management, distribution, marketing, and reverse logistics as the five major GSCM practices. Similarly, Ninlawan *et al.* (2010) highlighted green procurement, manufacturing, distribution, and reverse logistics as the primary GSCM practices. Likewise, Amemba *et al.* (2013) and Srivastava (2007) listed green procurement, manufacturing, operations, reverse logistics, and waste management as significant parts of GSCM. This research focuses on investigating GSCM practices under the categories of green purchasing, manufacturing, distribution, and reverse logistics.

Green manufacturing (GM) pertains to a production process that is exceedingly efficient and generates minimal waste or pollution, utilizing inputs that are environmentally sound. Ninlawan *et al.* (2010) have observed that GM can potentially reduce costs related to raw materials, enhance overall production efficiency, decrease expenses attributed to environmental and occupational safety concerns, in addition to promoting a more favorable corporate image. In contrast, green procurement is centered on responsible purchasing which aims to minimize material usage, promote item reuse, and facilitate the recycling of materials during procurement activities (Ninlawan *et al.,* 2010). This encompasses all operations designed to ensure that the products, machinery, and services produced by a company have minimal impact on the natural environment. The present investigation concentrates on green procurement as it is proactive and addresses strategic matters, in contrast to green purchasing (Dobler & Burt, 1996).

The idea of green distribution refers to implementing eco-friendly and efficient methods and techniques for the shipment of goods in the logistics industry (Rodrigue, Comtois & Slack, 2006). The transportation of products to consumers is a major environmental concern due to the emission of hazardous substances such as lead and zinc, and gases like carbon monoxide, carbon dioxide, and methane when utilizing petroleum-based fuels (Wu & Dunn, 1995). Furthermore, these means of transportation produce excessive noise and the development of transportation infrastructure damages the environment significantly. In order to safeguard the environment, it is critical to opt for modes of transportation that minimize or eliminate these concerns.

Reverse logistics refers to the process of returning materials and products from their point of consumption to their original source with the aim of recovering or creating value or disposing of them safely, all while minimizing the negative environmental impact of a company's products. The term "reverse logistics" was coined by experts such as Carter & Ellram (1998) and Srivastava & Srivastava (2006). Alnoor, Eneizan, Makhamreh & Rahoma (2018) stated that businesses utilize reverse logistics for various reasons,

including reducing expenses, meeting evolving consumer demands, protecting their aftermarkets, and demonstrating their commitment to environmental responsibility.

Sugar Industry Environmental Concerns in Kenya

Environmental concerns are gaining importance in the sugar industry due to various factors such as pressure from environmentalists and local communities, increased regulation, and market demands (Solomon, 2005). The sugar industry, along with other intensive agricultural sectors, faces several environmental challenges. Murty, Kumar, and Paul (2006) highlighted the need for sustainable production in the sugar industry, emphasizing the importance of enhancing production systems to optimize water and nutrient usage, conserve soils, and control weeds, pests, and diseases with minimal pesticide impact.

The sugar industry faces numerous sustainability challenges due to its negative environmental impacts like land use change, soil degradation, high water consumption, atmospheric pollution from burning bagasse and trash, and loss of biodiversity from monocultures (Duarte, Gaudreau, Gibson & Malheiros, 2013). According to Eustice *et al.* (2011), cane burning reduces organic carbon in the soil, while green cane harvesting improves it. They propose that to overcome these challenges, an environmental management plan is necessary to control fertilizer use optimization, tillage techniques, soil acidity and compaction, and avoid soil erosion. This plan should also promote the ethical use of chemicals and conserve water and energy. Moreover, sugarcane production has been associated with several significant socioeconomic risks, including rising inequalities in rural areas, poor wages, and worker exploitation (Leal *et al.,* 2013).

The production and processing of sugarcane has been linked to harmful effects on the environment and society, including the destruction of natural habitats, excessive water usage, heavy reliance on pesticides, and pollution of air and water (Sugar task force, 2020). Additionally, this industry affects the livelihoods of a significant portion of Kenya's population, with about 25% depending on it and contributing to 15% of the agricultural GDP. Despite these concerns, there have been no efforts made by Kenyan sugar companies to demonstrate their sustainability practices and environmental impact. Therefore, the purpose of this study is to evaluate the impact of GSCM techniques on the environmental performance of sugar enterprises located in western Kenya.

The NEMA report of 2015 revealed that, despite the implementation of solutions such as wastewater treatment, environmental contamination caused by sugar mills in Western Kenya remains on the rise. Non-governmental organizations like the World Bank have been promoting cleaner production methods to tackle this issue. An example of such intervention is the LVEMP II project, which began in 2009 and is being undertaken by the Kenya National Cleaner Manufacturing Center. This project permits firms to adopt cleaner production practices voluntarily, thereby reducing pollution and enhancing their competitiveness. However, the environmental performance of sugar companies in Western Kenya continues to deteriorate, according to KSBs report of 2011.

Empirically, Miima, Neyole, Nyongesa, and Akali (2011) conducted a study to investigate the impact of Mumias Sugar's effluent discharge on River Nzoia. They found

that the factory treated the effluents from sugar milling activities in six ponds before releasing them into the river. However, the river was still heavily polluted, and the pollution levels were higher than the permitted levels set by NEMA and WHO. The study suggested that despite using recycling as a reverse logistics activity, the sugar factory could not manage water pollution. Therefore, to enhance environmental performance, sugar companies should adopt cleaner production methods, and all supply chain participants must be involved both upstream and downstream. Similarly, Marabu conducted a study in 2011 that revealed the presence of waste generation in sugar production at Mumias Sugar Company. The study pointed out the high levels of chemical emissions in the river Nzoia, excessive water consumption, and limited use of molasses. The study suggested implementing green procurement, which involves disclosing the environmental impact of all manufacturing inputs.

The preceding information highlights two key points: firstly, sugar companies are an integral part of Kenya's economy; and secondly, these companies still contribute to environmental pollution despite implementing cleaner production methods, which requires a specific approach to address stakeholder concerns. While there is no empirical evidence yet, it is believed that strict adherence to green supply chain management (GSCM) principles can provide a long-term solution to these issues. GSCM involves managing raw materials, components, and processes efficiently to reduce environmental impact from suppliers to customers. Therefore, by adhering to green standards and involving all supply chain participants, sugar companies can improve their environmental performance. The impact of GSCM strategies on the environment performance of sugar companies needs further exploration.

Environmental Performance

ISO 14001 defines environmental performance as the quantifiable outcomes of an organization's environmental management systems, which are aligned with the organization's environmental policies and goals. Green *et al.* (2012) assert that the primary goal of environmental performance is to reduce environmental pollution. They suggest that an organization can enhance its environmental performance by minimizing air emissions, decreasing wastewater, reducing solid waste, limiting hazardous substance consumption, and minimizing environmental incidents.

According to Zhu *et al*. (2008), environmental performance as a company's capacity to decrease air emissions, effluent waste, and solid wastes, while also decreasing the use of hazardous and toxic materials, lessening the frequency of environmental accidents, and enhancing the company's environmental condition. Additionally, environmental performance can be seen as a means of reducing substances and emissions that negatively affect the environment. Rao and Holt (2005) suggest that environmental performance can enhance the efficiency and cooperation among business partners, as well as reduce waste, increase environmental presence, generate cost savings, and improve the company's reputation.

In this study, the measures of environmental performance were derived from Epstein & Wisner's (2001) classification of such measures. These measures included categories such as financial, internal process, customer, and learning and growth. Among the

specific categories identified in the study were energy consumption, the establishment of an eco-friendly image and reputation, financial savings resulting from environmental efforts, and the generation of hazardous materials.

Statement of the Problem

The sugar industry in Kenya is a crucial contributor to the country's economy. However, the production of sugar has a negative impact on the environment. To address growing concerns about environmental conservation, sugar companies in western Kenya need to adopt green supply chain management (GSCM) practices to minimize their environmental footprint. Nonetheless, implementing GSCM practices in these companies faces various challenges. One of these challenges is a lack of understanding of GSCM practices among management and employees, as most firms stick to traditional manufacturing methods rather than prioritizing environmental impact. Additionally, limited regulatory frameworks enforce the mandatory adoption of GSCM practices by sugar companies. While Kenya has environmental regulations, the enforcement is weak, leading to non-compliance by most industries. Finally, the implementation and maintenance costs associated with GSCM practices have deterred some sugar companies from embracing them. Despite the potential cost savings, these firms are unwilling to risk hurting their bottom line. Against this backdrop, the study aims to examine the impact of GSCM practices on the environmental performance of sugar companies in Western Kenya.
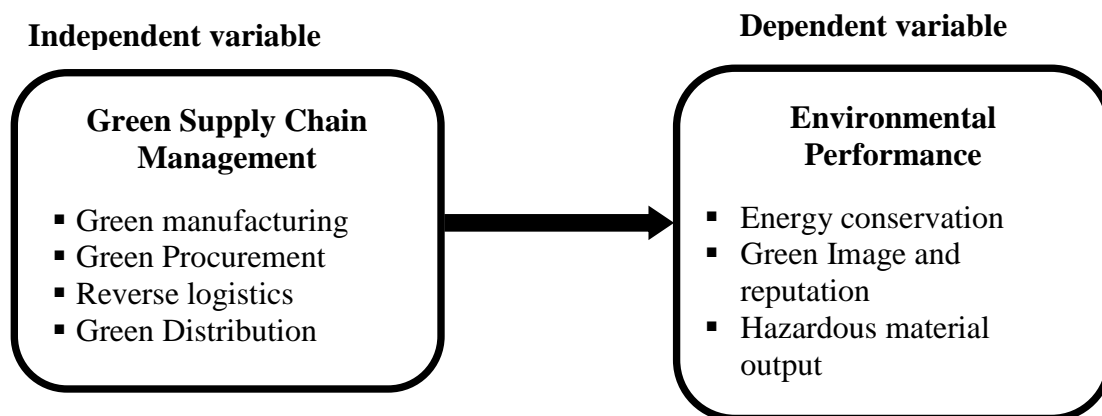
Conceptual Framework

Independent variable　　　　　　　　**Dependent variable**

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┌─────────────────────────┐              ┌─────────────────────────┐
│  Green Supply Chain     │              │   Environmental         │
│  Management             │              │   Performance           │
│                         │─────────────▶│                         │
│  ▪ Green manufacturing  │              │  ▪ Energy conservation  │
│  ▪ Green Procurement    │              │  ▪ Green Image and      │
│  ▪ Reverse logistics    │              │    reputation           │
│  ▪ Green Distribution   │              │  ▪ Hazardous material   │
│                         │              │    output               │
└─────────────────────────┘              └─────────────────────────┘
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Figure I: Expected link between GSCM and Firm's Environmental Performance
Source: Adapted from Ninlawan *et al*., (2010), Zhu & Sarkis(2004) and Epstein & Wisner's (2001)

As Zhu and Sarkis (2004) point out in the figure above, the independent variable, green supply chain management, is expected to predict the dependent variable, environmental performance. This relationship is projected to be moderated by Supply Chain Integration. The constructs of green supply chain management are green manufacturing, green procurement, green distribution, and reverse logistics (Ninlawan *et al* 2010), while supply chain integration is measured by assessing the level of cooperation, coordination and collaboration among supply chain partners.

Environmental performance is projected to improve in terms of energy savings, hazardous material production, green image and reputation, and product safety when supply chain partners work together to coordinate and share information on greener activities. GSCM is also intended to contribute to design for the environment (DFE) or eco-design, which means that corporations will focus on decreasing a product's environmental effects before it is manufactured, distributed, and used. The companies will engage in a continual improvement approach to reduce the environmental impact of their production activities.

Literature Review

Review of the Theoretical Literature

This review explores the underlying theories and guiding concepts of the study. The theory that will guide the research is developed, concepts and variables are defined, and variable dimensions are provided.

Stakeholder Theory

In this study, the term "stakeholder" refers to an individual or group that is affected by the financial operations of a firm, as defined by Freeman (2010). Stakeholder theory is one of the most significant theoretical philosophies in environmental management. (Buysse & Verbeke, 2003). Focus has shifted from developing and analyzing the justification for strategic decisions in green supply chains to the systematic coordination of targets by businesses with their stakeholders, including internal business operations, external stakeholders, and suppliers and customers. (e.g., public organizations).

According to the stakeholder approach, environmental management principles are essential to achieving credibility for all parties. (Donaldson &Preston, 1995). Firms need to establish mutual respect with their stakeholders, motivate them, and establish processes that will inspire everyone to take pride in the preservation of the environment. (Sharma & Vredenburg, 1998). In order to better align with stakeholders and enable them to contribute to environmental protection, businesses integrate their environmental monitoring with relevant stakeholders, according to the stakeholder theory. These efforts are successful when integrated mechanisms that support environmental management across concerned parties are in place. (Donaldson & Preston, 1995; Sharma &Vredenburg, 1988).

The concept of sustainability promotes top management awareness of stakeholder expectations for improved environmental performance because stakeholder pressure encourages businesses to adopt a variety of environmental measures. (Schaltegger, Hörisch, & Freeman, 2019). Stakeholder theory looks at how an organization interacts with its internal and external environments and how this affects the way the organization operates. The public at large are increasingly calling for government and business action in response to the threats of environmental deterioration. As a result, there is an increase in the demand for "green" products and suggestions for tighter environmental regulations. (Delmas & Toffel, 2004)

The Concept of a Green Supply Chain

Green supply chain management (GSCM) is the integration of environmental practices into supply chain activities, including product design, material sourcing and selection, manufacturing procedures, final product delivery to consumers, and product end-of-life management after its useful life. So it incorporates environmental issues with supply chain management. The integration of internal and external activity, as well as the transformation and flow of goods or services from raw materials to end consumers, are all included in the supply chain. (Bowersox and Closs 1996).

Empirical Literature Review

The study reviewed literature on the relationship between green supply chain management and environmental performance to enable identification of gaps to be addressed by policy and in the industry of sugar manufacturing in Kenya.

Al-Sheyadi, Muyldermans, and Kauppi (2019) investigated the complementarity of green supply chain management practices and its effect on environmental performance of the Omani manufacturing enterprises. With the aim of studying how internal and external GSCM strategies impacted both environmental impact and cost savings, their findings demonstrated a strong correlation between collective GSCM proficiency and associated environmental effect. Supporting the idea that combining GSCM approaches is more beneficial than single best practices, the study suggested that managers should prioritize implementing a bundle of GSCM procedures instead.

Ivanova (2020) did research on green procurement management in the context of SMEs in developing nations, with a focus on companies based in Kyiv and the surrounding region. The survey instruments used were subjected to structural equation modelling and factor analysis to evaluate the hypotheses. In light of this, it was determined that green procurement had a positive effect on society, the ecosystem, and SMEs' economic standings. Because it would improve their performance, the report advised SMEs from developing states to give adopting green supply methods top priority.

Li, Xue & Zhao (2021) conducted a global review on the practices of green supply chain management (GSCM) and analyzed their effects on environmental performance. Their study involved a literature review of GSCM and bibliometric analysis of publications, where they observed a significant growth in the literature on GSCM over the course of the last two decades. The review highlighted the various aspects of GSCM such as green purchasing, green logistics, and green innovation. The bibliometric analysis suggested that research on GSCM is widely spread across different disciplines and calls for a multidisciplinary approach to address the issue of green supply chain management.

Afum, Agyabeng-Mensah, and Owusu (2020) conducted a study to analyze the impact of green organizational culture in mediating the connection between environmental management practices (EMPs) and environmental performance of Ghanaian manufacturing SMEs. Interview data was collected from 157 manufacturing organizations, and the Partial Least Squares-Structural Equation Modeling approach was utilized to assess all hypothesized relationships. Their findings indicated that green

organizational culture and EMPs (green manufacturing and green procurement) had a significant impact on environmental performance. It was also observed that EMPs had a positive effect on green organizational culture, thus providing evidence that EMPs and environmental performance could be mediated by green corporate culture.

Le (2020) looked at the connection between GSCM methods and long-term performance in Vietnamese building materials manufacturing companies. For source data, a survey of 218 manufacturers of building materials in Vietnam was conducted. According to the research, green procurement had a positive impact on economic and social performance but no effect on environmental performance, whereas green design and manufacturing had positive and significant benefits on three categories of outcomes. Additionally, the results showed a positive and significant correlation between sustainable distribution and environmental sustainability.

In another study, Jaaffar and Kaman (2020) looked at environmental performance and GSCM techniques. The study focused on employee behavior in the Malaysian chemical industry. Using a theoretical framework of GSCM practices, an empirical study of GSCM practices and environmental sustainability was conducted. The results showed that employees' perceptions of environmental sustainability in terms of green purchasing practices had no significant relationship with product-related green design, packaging-related ecological design, or reverse logistics.

The study by García Alcaraz, *et al.* (2022) aimed to examine how green supply chain management (GSCM) practices affect the environmental performance of manufacturing companies in Mexico. Specifically, the research focused on the maquiladora industry and analyzed the relationship between GSCM practices, environmental impact (EI) and environmental cost savings (ECS). The results showed that the implementation of an environmental management system (EMS) had a significant effect on reducing EI ($\beta = 0.442$) and achieving ECS ($\beta = 0.227$). However, the use of eco-design (ED) did not have a direct effect on EI ($\beta = 0.019$) or ECS ($\beta = 0.006$), which may be attributed to the maquiladora industry's foreign ownership and focus on production rather than product design.

Fianko, Amoah, and Dzogbewu (2021) conducted a quantitative survey research design to evaluate the effects of internal and external green supply chain practices on environmental performance in construction firms. The sample consisted of 217 employees from fifty construction firms, and Structural Equation Modeling was used for data analysis. The results revealed that green design did not have a substantial positive relationship with environmental performance. Nevertheless, green design exhibited a positive effect on external green practices such as green purchasing and green construction, which in turn had a direct positive correlation with environmental performance. Consequently, green design through external green supply chain practices had a significant positive relationship with environmental performance. The study also identified that firm size moderates the relationship between green design, external green supply chain practices, and environmental performance in construction companies.

Tran, Phan, Ha and Hoang (2020) conducted an assessment of the influence of supply chain quality integration on green supply chain management, environmental

performance, and financial performance. The research analyzed data from 568 Vietnamese tourism businesses. Based on the findings, it was observed that supply chain quality integration had a constructive impact on green supply chain management and financial performance. Moreover, green supply chain management had a favorable impact on environment performance and financial performance. In addition, green supply chain management entirely played the role of mediator in the relationship between supply chain quality integration and financial performance. However, the size and institutional pressure did not play any moderating role in the relationship between green supply chain management and financial performance, and environment performance.

In conclusion, empirical studies have presented diverse findings on the influence of green supply chain management (GSCM) on environmental performance. Al-Sheyadi, Muyldermans, and Kauppis (2019) discovered a significant positive relationship between overall GSCM effectiveness and environmental impact. Similarly, Afum et al. (2020) found that green manufacturing and procurement had a significant impact on environmental performance. García Alcaraz et al. (2022) also reported that implementing an environmental management system (EMS) had a notable effect on reducing environmental impact. However, the study revealed a contradiction whereby the use of eco-design (ED) did not have a direct effect on environmental impact or environmental cost savings. Furthermore, Tran et al. (2020) concluded that GSCM had a favorable impact on both environmental performance and financial performance.

However, several other studies yielded varied outcomes, rendering it difficult to arrive at any definite conclusions. Notably, Fianko, Amoah, and Dzogbewu (2021) established that green design did not have a considerable positive connection with environmental performance. Le (2020) studied the relationship between GSCM techniques and long-term performance in Vietnamese manufacturing companies that produced building materials. As per the analysis, green procurement had a constructive impact on economic and social performance, but it had no effect on environmental performance. Conversely, green design and manufacturing had positive and noteworthy benefits across three outcomes categories. Furthermore, the findings indicated a positive and notable correlation between sustainable distribution and environmental sustainability. Moreover, there has not been any analogous research carried out in sugar manufacturing firms in Kenya. Despite the fact that it plays a significant part in the discharge of industrial waste into the river basins of Lake Victoria, which has led to a major environmental management problem in the country. The actual effect of GSCM practices on the environmental performance of sugar firms in Western Kenya remains uncertain.

Methodology

Research Design

The study was anchored on the positivist research philosophy. The main objective of positivist research is to produce causal or explanatory relationships that, in turn, enable prediction and management of the phenomenon under consideration. (Mir, & Greenwood,2021). The current study fits this paradigm because it seeks to establish the relationships that exist between GSCM practices, SCI and environmental performance of firms. According to Park, Konge & Artino, (2020), isolating and limiting the impact of

all factors so that only the important variables of interest are investigated is a key objective in positivist experimentation.

Since the purpose of this study is to establish correlations between variables, an explanatory research design was chosen. Explanatory research design is the most appropriate approach for a study that tries to establish both direct and complex indirect causal links among variables, according to Bairagi & Munot (2019). On the other hand, an explanatory study aims to justify and explain the descriptive data. It attempts to answer "why" and "how" questions, whereas descriptive studies may explore "what" questions (Baskerville, & Pries-Heje,2010). It expands on descriptive and exploratory research to pinpoint the true causes of a phenomenon. Explanatory study seeks out causes and motivations and offers data that can be used to confirm or reject an explanation or prediction. It is carried out to identify and document some connections between various components of the phenomenon under investigation. (Rahi, 2017)

Area of Study

The research was carried out in Western Kenya, where the majority of sugar mills are located. Chemelil Sugar Company, West Kenya Sugar Company, Nzoia Sugar Company, Sony Sugar Company, Kibos Sugar and Allied Industries, Butali Sugar Mills Limited, Sukari Company, and Busia Sugar Company all participated in the study. The sugar mills evaluated were those that are currently milling and have an environmental management program in place. There were eight sugar companies surveyed.

Reliability Test

A pilot study was done with twenty (20) employees, accounting for 10% of the total responders. A pilot research sample should be 10% of the sample expected for the bigger parent study, according to Johanson & Brooks (2010). Connelly (2008), who also suggested a 10% sample size for the study, agrees. These people were not a part of the study and were left out of the final analysis. The questionnaires were examined for validity and reliability, allowing any necessary adjustments to be made prior to the start of the study.

The degree to which an experiment, test, or any measuring process provides the same results in multiple trials is referred to as reliability. The goal of reliability is to determine the consistency and accuracy of replies. The optimum motivation is to double-check the instrument's stability by giving it to survey respondents twice. When working with top executives, like in this study, this is more difficult (Sekaran, 2016). Cronbach's Alpha was utilized to determine the instrument's reliability in this investigation (Cronbach, 1951). According to Ercan, *et al*, (2007), a study is considered appropriate if the dependability coefficient is more than 0.7. Each of the independent, and dependent variables were tested for reliability. The results are displayed in the table below:

Table 1. Cronbach's Alpha Reliability Test Statistics

Item	Cronbach's Alpha	Cronbach's alpha based on standardized items	No. of items
Green manufacturing	.941	.940	5
Green procurement	.916	.915	5
Reverse logistics	.789	.791	5
Green distribution	.740	.742	5
Environmental performance	.837	.836	5
Average	0.8446	0.8448	

Because all Cronbach's alpha coefficients were over 0.70, the data collecting tool provided a highly satisfactory score, as shown in table 1. Alpha coefficients greater than 0.70, according to Ercan *et al.,* (2007), imply that the acquired data have a relatively high level of internal consistency and can be extrapolated to reflect the opinions of respondents in the target group. To determine if the instrument had any flaws, the data was cross-checked. As a consequence of the pilot study's findings, the majority of queries were clear and relevant.

Data Analysis

A blend of descriptive and inferential statistics was used to analyze the data. Frequencies and percentages were used in descriptive analysis. When applicable, the study used measures of central tendency like mean, mode, and median, as well as measures of dispersion like range and standard deviation. The extent to which sugar firms adopt supply chains that are environmentally friendly as well as their level of environmental performance, was assessed using descriptive analysis of source data. To measure the link between environmentally friendly supply chain management techniques and performance, as well as test the hypotheses, inferential statistics were used. With environmental performance as the dependent variable, GSCM practices as the independent, multiple linear regression was used. Individual significance was determined using the t-test. The null hypothesis was rejected in both situations above if the p-value < 0.05; otherwise, the null hypothesis was not rejected.

Regression Models

The proposed model for objective one is as below:

$$Y = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i}$$

Where:

X_1= Green Manufacturing,
X_2=Green procurement
X_3=Reverse Logistics
X_4=Green Distribution
ε =Error Term

Normality Testing

Normality was determined using skewness and kurtosis. The distribution was considered normal if the skewness and kurtosis values were within the range of -2.0 to 2.0 (George, & Mallery, 2010). According to Table 4, the skewness and kurtosis values for each variable were within the acceptable range. The normality assumptions were therefore satisfied.

Table 2. Testing for Normality Requirements

	N	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Green manufacturing	127	3.0958	1.01564	-.096	.215	-.849	.427
Green procurement	127	3.1549	.88321	-.077	.215	-.570	.427
Reverse logistics	127	3.1798	.94202	-.197	.215	-.688	.427
Green distribution	127	3.4646	.85104	-.273	.215	-.563	.427
Environmental performance	127	3.4252	.87532	-.278	.215	-.640	.427

Homogeneity of Variances Testing

The uniformity of variance was determined through Levene's test for similarity in variances. The p-value for Levene's test should be greater than 0.05 in order to satisfy the requirement of uniformity of variance, according to Glass (1966) and Ho (2013). The homogeneity of variance assumption is violated if the p-value < 0.05. The idea of homogeneity of variance makes sure that each independent group's distribution of outcomes is comparable to or equal to another. If independent groups are not similar to one another in this way, it might lead to false findings. According to the p-values found for Levene's test, the homogeneity of variance has not been violated, so the proportions of the outcome measures in each independent group are similar and comparable.

Table 3. Homogeneity of Variances Test Results

	Levene Statistic	df1	df2	Sig.
Green manufacturing	.823	19	105	.675
Green distribution	1.034	19	105	.430
Reverse logistics	1.034	19	105	.430
Green distribution	.915	19	103	.566

Results and Discussion

Assessing the significance of Green Supply Chain Management Practices

Green distribution, reverse logistics, green production, and green purchasing were the four constructs that were used to assess the GSCM as an explanatory variable. A paired sample T-test study was used to determine the significance of the GSCM practice constructs, with the following findings:

Table 4. Paired samples correlations

		N	Correlation	Sig.
Pair 1	GM & Environmental Performance	127	.468	.000
Pair 2	GP & Environmental Performance	127	.516	.000
Pair 3	RL & Environmental Performance	127	.480	.000
Pair 4	GD & Environmental Performance	127	.293	.001

The table above shows that, at a significance level of $p<0.05$, there was a positive and significant correlation between all indicators of green supply chain management strategies and environmental performance.

Effect of GSCM practices on Environmental Performance of Sugar Firms

Assessing how green supply chain management practices impacted the environmental performance of sugar companies in Western Kenya was the study's main objective. Reverse logistics, green distribution, green manufacturing, and green procurement were taken into account in the research as a function of the GSCM practices by sugar companies. The average score of all items for each instance was used to compute the construct scores, which were then used to create a multiple regression model.

The study went on to determine whether GSCM constructs had an effect on the environmental performance of the surveyed sugar firms in western Kenya after testing the assumptions of multiple regression and ensuring that the measures of GSCM practices were reliable and could be validly used to measure what they were intended to measure. The findings were summarized as shown below:

Table 5. Effect of GSCM practices on EP of sugar firms in Western Kenya

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	.804	.034		23.555	.000		
	Z score (GM)	.296	.034	.440	8.627	.000	.995	1.005
	Z score (GP)	.296	.035	.439	8.522	.000	.973	1.028
	Z score (RL)	.258	.035	.383	7.453	.000	.978	1.022
	Z score (GD)	.155	.035	.231	4.503	.000	.987	1.013
a. Dependent Variable: Performance								

Multicollinearity is the term used to describe the presence of a strong correlation between two or more independent variables in a regression model. This is a potential problem in multiple linear regression that needs to be addressed. Multicollinearity is problematic because it lessens the statistical significance of an independent variable. Low levels of collinearity pose no threat to the regression model. The multicollinearity assumption, however, states that the VIF threshold value should be 10 or less (Paul, 2006), and it was used to test for non-dependence of the independent variables because it is challenging to ascertain the precise contribution of individual predictors when independent variables are highly correlated. To evaluate multicollinearity, VIF and its inverse, the tolerance, were used. The tolerance shown in the regression table above fluctuated between 0.97 and 0.99, according to Yu, Jiang, and Land (2015), implying that there was no multicollinearity between the independent variables. Similarly, the result of the regression model showed no autocorrelation; the Durbin Watson statistic was 2.006. The general rule is that the suggested Durbin Watson statistic should lie between 1.5 and 2.5.

The results show that green manufacturing (GM), green procurement (GP), Reverse logistics (RL) and green distribution (GD) had beta standardized coefficients and p values of $\beta = 0.440$, $p < .05$; $\beta = 0.439$, $p < .05$ and $\beta = 0.383$, $p < .05$ and $\beta = 0.231$, $p < .05$ respectively. These means all the beta coefficients, β, which are the degrees to which the independent variables each explain the dependent variable, are positive and significant. The standardized β coefficient of green manufacturing shows that a unit standard deviation of GM causes 0.440 standard deviations in environmental performance of the firms while a unit standard deviation of green procurement, reverse logistics and green distribution causes 0.439, 0.383 and 0.231 standard deviations in environmental performance of the sugar firms.

Similarly, for the un-standardized coefficients, a unit % age change in green manufacturing is likely to result in a change in sugar firm's environmental performance by 0.296% in the positive direction while a unit % age change in green procurement is likely to lead to change in environmental performance of sugar firms by 0.296 % in the positive direction. Additionally, a unit % age change in reverse logistics activity and green distribution by the sugar firms is likely to lead to change in their environmental performance by 0.258% and 0.155% respectively in the same direction. The model summary statistics is shown in the table below:

Table 6. Summary statistics of Effect of GSCM on Environmental performance

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.827[a]	.684	.674	.38483	.684	66.115	4	122	.000	2.006
a. Predictors: (Constant), Zscore (GD), Zscore (GM), Zscore (RL), Zscore (GP)										
b. Dependent Variable: Environmental Performance										

R^2 is 0.684 and is significant. Similarly, the adjusted R^2 is 0.674 and also significant. The shrinkage in this case is 0.01 (0.684-0.674) which is below the level of 0.5 recommended by Field (2013). This indicates that the model is valid, has good predictability, and predicts variance of performance at 68.4 percent, insinuating that green manufacturing (GM), green procurement (GP) reverse logistics (RL) and green distribution (GD) all together explain 68.4 percent of the sugar firms' environmental performance. The analytic model that may be developed from this cause-and-effect situation is as follows:

Sugar firms' EP = 0.804+ 0.296GM+0.296GP+0.258RL+0.155GD
EP = Environmental performance
GM = Green manufacturing
GP = Green procurement
RL = Reverse logistics
GD = Green distribution

A hypothesis testing was carried out on the constructs of green supply chain management using Friedman's two-way analysis of variance at a significance level of 0.05. This test was used because the data was ordinal (Likert scale). The test can also be used to determine if there are statistically significant differences for comparisons of multiple groups. The results in the table below were obtained. The null hypothesis was rejected.

H0₁: There is no significant effect of green supply chain management practices on environmental performance of sugar firms in western Kenya.

Table 7: Hypothesis testing on the relationship between GSCM practices & EP

	Null Hypothesis	Test	Sig.	Decision
1	The distribution of GM, GP, RL, GD and Environmental performance are the same	Related Samples Friedman's Two-Way Analysis of Variance by Ranks	.000	Reject the null hypothesis

The findings that GSCM practices were positive and significant predictors of environmental performance of sugar firms are in line with those of Khaksar, *et al* (2016), who conducted an investigation into how strategies of GSCM affect environmental performance Iran's the cement industry and discovered that there was a positive and significant correlation. Al-Sheyadi, Muyldermans, and Kauppi (2019) also found a strong positive correlation between environmental impacts and collective GSCM competency. According to Afum *et al.* (2020), green organizational culture, green manufacturing, and green procurement were also important indicators of environmental performance. Zhu and Sarkis (2004) found that GSCM practices have a positive and significant impact on environmental and operational performance in their investigation into the associations between operational processes and performance among early implementers of

environmentally friendly supply chain management techniques in Chinese manufacturing firms.

In their investigation into whether GSCM practices contribute to competitiveness and economic performance in South East Asian firms, Rao and Holt (2005) reported that GSCM practices increase efficiency and synergy among business partners while also contributing to the improvement in environmental aspects of performance. Green *et al*. (2012) were in agreement that adopting GSCM practices by manufacturing firms improves environmental and economic performance, which has a positive impact on operational performance.

In addition, Geng, Mansouri, and Aktas (2017) concur that GSCM approaches enhance performance in four areas: social, operational, environmental, and economic. Jermsittiparsert *et al* (2019) confirmed that environmental performance is significantly and positively linked to GSCM strategies. In a similar vein, Korir (2014) discovered by applying GSCM techniques, Nairobi's automobile industry improved its environmental performance. Finally, Laari, Töyli, and Ojala (2018) discovered that Finnish logistics service providers' financial and environmental performance were positively correlated with GSCM practices, but not with financial performance. They also found out that these outcomes were influenced by a competitive strategy and sustainable supply chain management. Despite the fact that this study's findings are in line with those of previous ones, there is no doubt that none of the four GSCM practices that were used in the current study—green manufacturing, green procurement, green reverse logistics, and green distribution were examined in the earlier ones.

The study's findings also indicate some Contradictions. Green procurement has an impact on economic and social performance but has no impact on environmental performance, according to Le, (2020), whereas Younis, *et al.,* (2016) established that green purchasing and reverse logistics have no significant impact on environmental performance of firms in the UAE manufacturing industry. This can be explained by the fact that the research was conducted in a variety of settings. Another contradiction was by Eltayeb, Zailani, and Ramayah (2011) who found that green purchasing had no significant impact on the environmental performance of ISO-14001 certified enterprises in Malaysia. This means that green procurement may not always lead to improved environmental performance, and in certain situations, it may not even predict environmental performance at all, or possibly have a negative impact.

Another reason for the contraction could be the sampling method utilized in these investigations. Earlier research employed single constructs of a variable on the sample, however, the current study used census and was robust in constructs for each variable. A study by Jaaffar and Kaman (2020) found that reverse logistics was not significantly correlated with the environmental performance of Malaysian chemical-related industries. This could be due to the fact that Malaysian companies are more focused on eco-design, which reduces the need for recycling materials by designing products in such a way that their environmental consequences are considered before final production.

Summary, Conclusions and Recommendations

Summary of the Findings and Conclusion

In summary, the study established that green supply chain management practices used by sugar firms in Western Kenya have a positive and significant effect on their environmental performance meaning that when the firms enhance the use of GSCM practices, their environmental performance while improve with the same intensity. Consequently, the null hypothesis for the objective was rejected.

In conclusion, this study provides an overview of how Green Supply Chain Management can enable businesses to maximize their environmental performance. By adopting sustainable practices, businesses can reduce their carbon footprint, enhance operational efficiency and create a competitive edge while complying with regulatory obligations. As companies opt to become environmentally responsible, Green Supply Chain Management will remain a critical tool in managing environmental impact and achieving sustainability goals.

Study's Recommendations

The study recommends that Kenyan sugar firms keep employing environmentally conscious practices throughout their operations, from the procurement of raw materials through the process of development of products up until they are delivered to the final consumer. This would guarantee that manufacturing enterprises' negative environmental effects, such as the acceleration of global warming brought on by greenhouse gas emissions, are kept to a minimum. Additionally, sugar firms have to continue to work toward regional and global environmental recognition like ISO 14001, which will help them compete in both domestic and foreign markets. In the current or any other manufacturing context, future study should focus on moderation or mediation in the interaction between GSCM, lean management, and firm environmental performance. This will help to clarify the theories that underpin this research, particularly the stakeholder theory. Corporate policy should also be aligned with initiatives that address global warming and foster environmental sustainability.

Contributions of the Study to academia

The research offers a platform for academic deliberations, which can serve as a starting point for further investigations. It allows scholars to comprehend how the integration of environmental concerns in supply chain management has evolved into a distinct research and business field. The study highlights green supply chain management (GSCM) as an essential strategy for sustainable initiatives, which can contribute to a company's competitive advantage and overall profitability. It is crucial for future researchers to recognize that implementing green supply chains requires comprehensive and collaborative best practices, from product inception to end-of-life recycling. Ultimately, the study confirms that a company's long-term survival is contingent on greening its supply chains, which can lower operating costs and increase business sustainability.

Limitations of the Study

Numerous shortcomings in this study were found during the research process. First, the study's use of selective sampling may have omitted participants whose viewpoints would have considerably benefited in the formulation of theories and the testing of hypotheses. However, the acquired data was examined and cleaned beforehand to analysis, taking into account non-responses and outlier responses, in order to increase the accuracy and validity of the results.

Second, the study concentrated on sugar producer firms in western Kenya since it would have been expensive to cover the whole country. However, the results are transferable to other production sectors. Lastly, the instrument for gathering data comprised structured questions only that were administered purposively to respondents by research assistants who were experts in the area. This may have left out important opinions of other employees in the firms. Nevertheless, the sampling method used is assumed to representative enough to make valid generalizations according to Creswell (2013).

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Original Research

The Role of Budget Deficit and Government Debt in Financing-Economic Growth of Selected Developing Countries

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Abstract

Investigation of budget deficit and government debt relationship with economic growth is one of the important topics in macroeconomic literature; Hence, the present study examined the role of budget deficit and government debt on financing the economic growth in 40 developing countries between 2010-2019. In this regard, the economic growth was defined as a function of financial development, budget deficit, government debt, government expenditure, human capital, inflation rate, trade freedom, and the interaction of budget deficit and government debt with financial development. To examine the relationships between variables, the panel data econometric model and the feasible generalized least squares method were used. The estimation results showed that in developing countries, financial development had a positive and budget deficit and government debt had a negative and significant effect on the economic growth. Also, the interaction effect of budget deficit and government debt with financial development on economic growth was negative and significant that showed budget deficit and government debt play a negative role in positive relationship between financial development and economic growth. In addition, government expenditure, human capital, and trade freedom had a positive and significant effect on economic growth, while the inflation rate effect on economic growth was not significant.

Keywords: Budget Deficit, Government Debt, Economic Growth, Developing Countries, Panel Data.

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Introduction

Based on growth theories, financial development influences economic growth through two different but complementary channels involving capital accumulation and an increase in productivity. The first channel focuses on the ability of the financial system to mobilize savings for productive investments, as well as increasing capital accumulation and production. The second channel focuses on the significance of new financial technologies. New financial technologies decrease the asymmetry of information, which is a barrier to the efficiency of financial resource allocation and the monitoring of investment projects (King & Levine, 1993).

Empirical studies on financing-economic growth indicated that financial development could stimulate economic growth while its effect varies in developed and developing countries (Rioja & Valev, 2004). The correct understanding of financing-economic growth is required for the economic planning and policy-making of developed and developing countries. Financing is a required condition for economic growth, but it is not enough. In order to take advantage of the economic benefits related to financial development, countries should establish an appropriate environment for stimulating economic growth. This issue requires an increase in institutional quality, as well as the decrease and stability of the inflation rate.

In most developing countries such as Iran, the presence of governments, whether quantitatively (volume of activities) or qualitatively (depth of activities) in economic and social fields, has always been increasing, considering that the private sector lacks the necessary efficiency and effectiveness. In this regard, the government in these countries has played a key role in achieving significant goals such as economic growth. The role of governments in the economy has various levels. The need to discuss the financial system of the government increases with the increasing role of government in the economy since governments use various tools of the financial system such as debt and budget in order to achieve economic goals (Gill & Pinto, 2005).

As mentioned, financial development is a required condition for economic growth, and developing countries should evaluate the effect of this variable along with the variables of government debt and budget deficit on economic growth to use the economic benefits of financial development. In this regard, such countries can identify the effect of neutralizing this variable on growth and the approaches to the improvement of optimal benefits from financial development. Most of the studies have separately considered the effect of the budget deficit and government debt on economic growth and disregarded their interactive effect on financial development. In this regard, this study investigates the role of the budget deficit and government debt in financing- economic growth in developing countries. This study is of significance in two ways: -1Evaluating the factors affecting economic growth, which provides the context for pursuing the programs and policies for stimulating economic growth in developing countries, and 2- Analyzing the interactive effect of the budget deficit and government debt with financial development on economic growth which determines the platforms of applying the effects of financial development.

Theoretical foundations

The government's financial policies are highly significant for stabilizing, reducing economic fluctuations, reallocating resources, redistributing wealth, etc. With the increase in the budget deficit and government debt, the concerns about the role of financial policy in the economy increase as the increase of budget deficit and the accumulation of government debt, as well as its financing through borrowing, can leave various effects on macroeconomic variables. The high level of government debt is considered a barrier to economic growth, while its settlement through borrowing can stimulate inflation. According to the Keynesian standpoint, government debt can reduce national savings and capital accumulation. Nevertheless, the Ricardian view states that government debt equals taxes, and if consumers are futuristic, government debt will have no effect on national savings. Government debt is regarded as a concern when the budget deficit is so big that the debt-to-GDP ratio increases. In this case, the government debt affects financial development and forced succession increases to the extent that balancing the budget requires the establishment of inflation and imposition of additional taxes (Eskandaripour, Mahmoudinia, & Yousefi, 2019). Output is a function of activities in the private sector and the government in the short term when the level of economic output is assumed stable. Eq. 1 shows that production (Y) equals the total private sector consumption (C), private sector investment (I), net government investment (G) and net export (X). In other words, Eq. 1 indicates that production is achieved from the sum of private sector consumption, private sector investment, and net government activities. Based on Eq. 2, the net government budget deficit (G) equals the difference between spending (S) and revenues (R). If the central bank makes no intervention in the monetary policy framework, the net budget deficit must be financed by borrowing (government debt).

$$Y = C + I + G + X \qquad (1)$$
$$G = S - R \qquad (2)$$

Since the levels of production and consumption are constant, the increase in government investment results in a reduction in private sector investment, net exports, or their combination. The increase in government borrowing leads to the reduction of private sector investment which is called the "outsourcing effect" and reflects the shift from private sector investment toward government investment. The increase in government borrowing from foreign sources reduces net exports and results in an increase in the money supply in the short term. Fiscal expansion enhances the money demand and results in increased interest rates (Congressional 2020). The government can select the establishment of a budget deficit in the short term for several reasons. Financing the budget deficit through increasing government debt increases the spending level in the entire economy. According to most economists, this can be an appropriate tool in the short term to develop a stimulating effect in a specific industry or the entire economy. In this approach, the government can apply increased spending and decreased taxes in order to provide job opportunities, increase private sector spending, and decrease the severity of economic recession periods. The efficiency of financing the budget deficit with the help of creating debt decreases when it leads to the "outsourcing effect" or when the government financing fails to create a new economic activity and merely substitutes for

the private sector budget. The reduction of budget deficit when the economy is acting close to full potential or with full potential can prevent the "outsourcing effect" of private sector investment which results in many positive consequences in the long term. Furthermore, deficit financing can be applied as part of a structural budget-balancing strategy which changes the level of taxes and government spending in order to reduce the effect of business cycles. In addition, smoothing the budget changes probably results in reduced adverse consequences of deficit economic shocks for businesses and society (Driessen, 2019). In the long term, when economic output is influenced by supply-side policies, the effect of government borrowing on economic growth depends on how the borrowed amounts are used in comparison to the use of savings (e.g., increased private sector investment or net exports) while no borrowing has been conducted. As Eq. 3 shows, economic growth or change in production (YΔ) is a function of human power (L: the number of people and their working hours), physical capital (K: such as equipment, machinery, etc.) and capabilities or technical progress (A) which determine human resources productivity and physical capital productivity.

$$\Delta Y = f(\Delta L, \Delta K, \Delta A) \qquad (3)$$

Assuming that human resources are not sensitive to fiscal policies, the effect of government debt on economic growth depends on how additional government activities can affect physical capital, human capital productivity, and physical capital productivity in comparison to the case where borrowed amounts are spent on increasing private sector investment or net exports. If the government activity (financing of government spending by creating debt) increases the above-mentioned factors more than the replaced activity, debt financing will leave a positive effect on economic growth. The long-term economic potential will reduce if the government activity has less effect on the above-mentioned factors than the replaced activity. A change in the level of government debt results in the movement of economic resources during periods of time, which are sometimes known as temporal transitions. The current resources of the government increase, and the future resources of the government decrease by disseminating debt by the government. Borrowing is limited by the money available for investment at a given point in time. Such limitation means that the amount of government debt to production cannot increase unlimitedly. Thus, the government debt will be unsustainable if the government debt-to-output ratio increases continuously in the long term. This occurs when the growth of debt accumulation prevents economic growth, which can leave adverse consequences, including reduced production, increased unemployment, higher inflation, higher private interest rates, and a currency depreciation (Heller, 2005).

Method

In the present study, the variables of economic growth, financial development, budget deficit, moderator of a budget deficit model, government debt, moderator of government debt model, government spending, the human capital of education type, inflation rate, and trade freedom were used according to a study by Ehigiamusoe & Lean, (2020) to evaluate the relationship between budget deficit and government debt in financing-economic growth of developing countries. The required data were collected from the World Bank and the International Monetary Fund for 40 developing countries during 2010-2019. The

names of the studied countries are shown in Table 1. These countries and time periods were selected according to the availability of data.

Table 1. Names of selected developing countries

Row	Country	Row	Country	Row	Country	Row	Country
1	Benin	11	Ghana	21	Moldova	31	Philippines
2	Burkina Faso	12	Guinea	22	Madagascar	32	Russia
3	Bangladesh	13	Honduras	23	Mexico	33	Rwanda
4	Belarus	14	Indonesia	24	Mali	34	Sudan
5	Cameron	15	India	25	Mozambique	35	Senegal
6	Columbia	16	Iran	26	Niger	36	Chad
7	Dominica	17	Kenya	27	Nigeria	37	Thailand
8	Algeria	18	Kyrgyzstan	28	Nepal	38	Turkey
9	Ecuador	19	Laos	29	Pakistan	39	Ukraine
10	Egypt	20	Morocco	30	Peru	40	South Africa

In order to study the relationship between the variables, the experimental model was defined as Eqs. 4 and 5:

$$gdp_{it} = \beta_1 + \beta_2 fin_{it} + \beta_3 def_{it} + \beta_4 fd1_{it} + \beta_5 gov_{it} + \beta_6 edu_{it} + \beta_7 cpi_{it} + \beta_8 trd_{it} + e_{it} \tag{4}$$

$$gdp_{it} = \beta_1 + \beta_2 fin_{it} + \beta_3 deb_{it} + \beta_4 fd2_{it} + \beta_5 gov_{it} + \beta_6 edu_{it} + \beta_7 cpi_{it} + \beta_8 trd_{it} + e_{it} \tag{5}$$

In the above-mentioned equations, gdp represents economic growth (gross domestic product per capita in US dollars), fin represents financial development (ratio of credits paid to the private sector to GDP), and def shows budget deficit (ratio of budget deficit to GDP), fd1 represents the moderator of budget deficit model (the interactive effect of budget deficit with financial development), deb indicates government debt (the ratio of foreign debt accumulation to GDP), fd2 indicates the moderator of government debt model (the interactive effect of the government debt with financial development), and gov shows government spending (the ratio final government expenditure to GDP). In addition, edu represents human capital of education type (enrollment rate at the secondary level), cpi shows inflation rate (based on consumer price index (2010=100) and trd shows trade freedom (ratio of total exports and imports to GDP). The analyses of the present study are based on the econometric model of panel data. Panel data refer to the data which include N cross-sections in T year. In other words, such data are a combination of cross-sectional data and time series. If the time series equal all the cross-sections, the panel data will be balanced type, and if the time series are not equal for all the cross-sections, the panel data will be unbalanced. In general, Eq. 6 represents a model with panel data:

$$Y_{it} = \alpha_{it} + \sum_{k=1}^{m} \beta_{kit} X_{kit} + e_{it} \tag{6}$$

Eq. 6 shows the cross-section and $i = 1,2,...,N$ shows the year. Furthermore, Y_{it} represents the dependent variable for the i-th cross-sectional unit in the year t and X_{kit} represents the k-th independent variable for the i-th cross-sectional unit in the year t. In addition, e_{it} shows the error term (Gujarati, 2004). Evaluating the stationary of the variables is conducted using the Levin-Lin-Chu unit root test, which is a combination of the advanced Dickey-Fuller test and time trend. In order to determine the type of data (pool or panel), the Leamer test was used. Further, the Hausman test was applied to determine the panel data model (fixed and random) and the Wooldridge test was also used to check the presence of serial correlation. The Pesaran test was used to check the presence of cross-sectional correlation, and the Likelihood Ratio was applied to evaluate the variance of heterogeneity.

Results

This section compares the average of significant variables such as GDP per capita, financial development, the budget deficit (surplus) and foreign government debt in Iran and selected developing countries. Figures 1 to 4 present the average of the above-mentioned variables, respectively. According to Figure 1, GDP per capita in developing countries has had a relatively stable trend, while in Iran, it has reached a lower level with a fluctuating and downward trend compared to developing countries during the last year. The difference between GDP per capita in Iran and developing countries has dropped over time, not due to the increase in GDP per capita in developing countries but due to the decrease in GDP per capita in Iran. The average GDP per capita equals 5630 dollars in Iran and 3370 dollars in developing countries during the studied period.
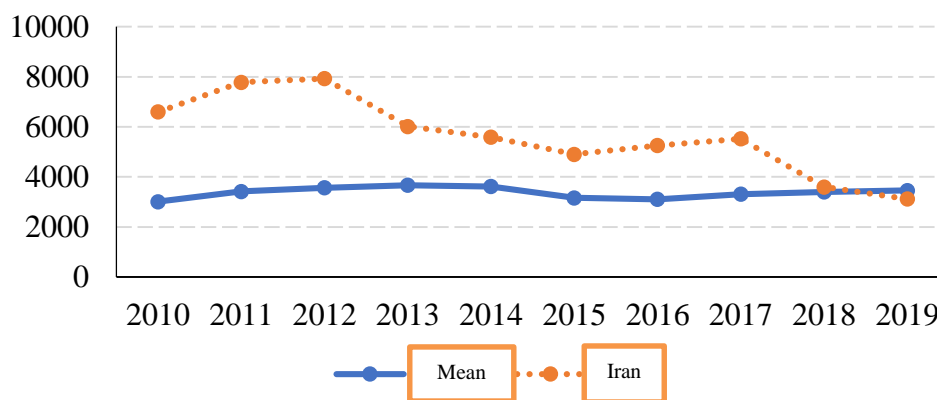

Figure 1. GDP per capita (US dollars)

Figure 2. indicates that the ratio of credits paid to the private sector to GDP in Iran has always been higher in comparison to developing countries. The difference has increased during recent years due to the upward trend of this ratio in Iran and its relatively stable trend in developing countries. The average ratio of credits paid to the private sector to GDP has been equal to 52.6% in Iran and 36.2% in developing countries during the studied period.
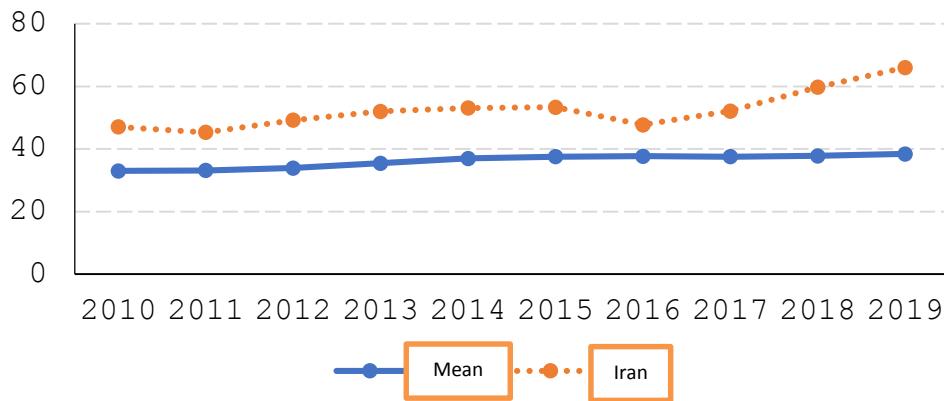
Figure 2. The ratio of credits paid to the private sector to GDP (percentage)

The ratio of budget deficit (surplus) to GDP in Iran and developing countries during 2010-2019 is shown in Figure 3. As can be observed, developing countries have always had a budget deficit in the studied period while Iran has experienced a budget surplus at the beginning of this period and a budget deficit in the middle and end of the studied period. The ratio of budget deficit (surplus) to GDP in Iran has a considerable downward trend. In recent years, this ratio in Iran has surpassed that of developing countries. Nevertheless, the ratio of budget deficit to GDP has been equal to -1.3% in Iran and -3.4% in developing countries.
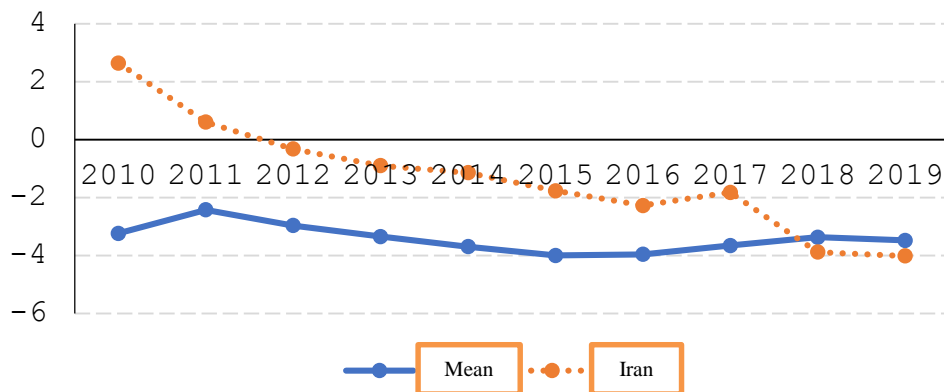

Figure 3. Ratio of budget deficit (surplus) to GDP (percentage)

The ratio of foreign debt to GDP in Iran and developing countries during the studied years is shown in Figure 4. Based on this figure, the ratio of foreign debt to GDP has an increasing trend in developing countries and a decreasing trend in Iran. In addition, the difference between the ratio of foreign debt to GDP in Iran and developing countries has been very large, so the average ratio of foreign debt to GDP in Iran is 2.2% in Iran and 36.6% in developing countries.
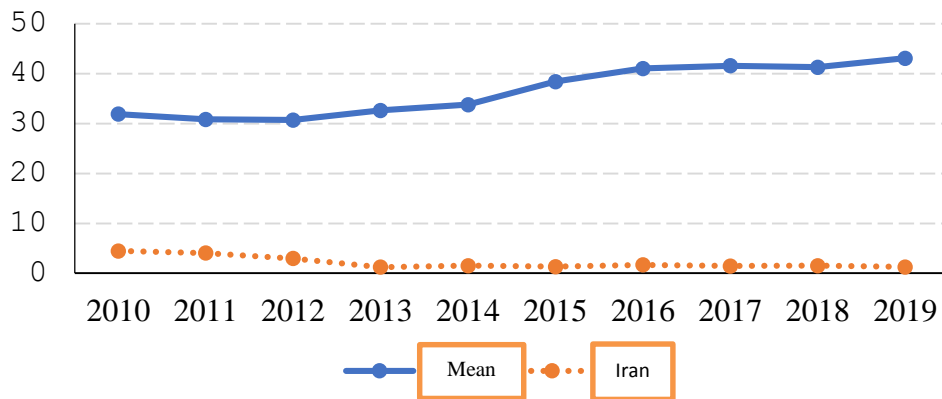
Figure 4. Ratio of foreign debt to GDP in Iran and developing countries (percentage)

As mentioned, the Levin-Lin-Chu test was applied to investigate the stationary of the variables, and the results of this test are presented in Table 2. Based on the results, the null hypothesis or the presence of a single root in all the variables is rejected, and all of them are at the stationary level. In other words, all of the variables are I(0), and there is no need to conduct the co-integration test.

Table 2. Results of the Levin-Lin-Chu test

Variable	T statistics	P-value
Per capita income	-13.62	0.0000
Financial development	-11.31	0.0000
Budget deficit	-8.29	0.0000
Financial development × budget deficit	-7.41	0.0000
Government debt	-21.83	0.0000
Financial development × government debt	-8.88	0.0000
Government spending	-15.95	0.0000
Human capital	-7.27	0.0000
Price index	-9.63	0.0000
Trade openness	-10.73	0.0000

Results of the first model test and estimation: budget deficit

Table 3 shows the results of pre-estimation tests in the first model or Eq. 4. The results of the Leamer test for determining the type of panel data indicated that the null hypothesis as the existence of pool data is rejected and the alternate hypothesis as the existence of panel data is accepted. The results of the Hausman test indicated that the fixed effects model is preferred for the estimation of the first model. Based on Pesaran, Wooldridge and Likelihood Ratio tests, there is a cross-sectional correlation, serial correlation, and variance heterogeneity in the first model, respectively.

Table 3. The results of pre-estimation tests in the first model

Test	Statistics	P-value	Result
Leamer (F statistics)	79.78	0.0000	The null hypothesis (pool data) is rejected
Hausman (X^2 statistics)	56.33	0.0000	The null hypothesis (inefficiency of the fixed effects model) is rejected
Pesaran (z statistics)	12.84	0.0000	The null hypothesis (lack of cross-sectional correlation) is rejected
Wooldridge (F statistics)	627.29	0.0000	The null hypothesis (lack of serial correlation) is rejected
Likelihood Ratio(X^2 statistics)	711.84	0.0000	The null hypothesis (lack of variance heterogeneity) is rejected

Since there was a serial correlation, cross-sectional and variance heterogeneity in the research model, the Feasible Generalized Least Squares (FGLS) method was used for the estimation. The results related to the first model estimation using the FGLS method are shown in Table 4. Based on the X2 statistic and its probability level, the model is well fitted. In addition, the R2 coefficient indicates that about 70% of the changes in per capita income can be explained by the independent variables of the first model.

Table 4. Results of the first model estimation

Variable	Coefficient	Z statistics	p-value
fin	2.335	5.29	0.000
def	-0.314	-2.18	0.030
fd1	-2.712	-5.67	0.000
gov	7.862	2.46	0.014
edu	5.345	8.83	0.000
cpi	-2.223	-0.85	0.394
trd	0.357	5.02	0.000
$R^2 = 0.693$		(0.000) X^2 =527.10	

Based on the results in Table 4, financial development has a significant positive effect on economic growth, but the budget deficit has a significant negative effect on economic growth. Furthermore, the interactive effect of budget deficit with financial development on economic growth is significantly negative, indicating that budget deficit weakens the positive effect of financial development on economic growth. According to the results of the first model, government spending, human capital and trade freedom have a significant positive effect on economic growth, while the effect of the inflation rate on economic growth is insignificant. As can be observed, government spending and human capital are the most significant drivers of economic growth in developing countries.

Results of the second model test and estimation: government debt

Similar to the first model, the pre-estimation tests were estimated in the second model or Eq. 5, the results of which are reported in Table 5. The results of the Leamer and Hausman tests indicated that the data are of panel type in the second model, and the fixed effects model is more appropriate for estimating this model. In addition, the results of the Pesaran, Wooldridge, and Likelihood Ratio tests indicated the presence of cross-sectional correlation, serial correlation and variance heterogeneity, respectively.

Table 5. Results of pre-estimation tests in the second model

Test	Statistics	P-value	Result
Leamer (F statistics)	80.59	0.0000	The null hypothesis (pool data) is rejected
Hausman (X^2 statistics)	36.92	0.0000	The null hypothesis (inefficiency of the fixed effects model) is rejected
Pesaran (z statistics)	11.078	0.0000	The null hypothesis (lack of cross-sectional correlation) is rejected
Wooldridge (F statistics)	388.31	0.0000	The null hypothesis (lack of serial correlation) is rejected
Likelihood Ratio(X^2 statistics)	727.86	0.0000	The null hypothesis (lack of variance heterogeneity) is rejected

In this model, the FGLS method is applied for estimating the second model due to the existence of serial correlation, cross-sectional dependence, and variance heterogeneity. The results of the second model estimation using the FGLS method are shown in Table 6. The model estimation was conducted well based on the X2 statistic and its probability level. In addition, the R2 coefficient shows that 75% of the changes in per capita income can be explained by the independent variables related to the second model.

Table 6. Results of the second model estimation

Variable	Coefficient	Z statistics	P-value
fin	1.869	4.29	0.000
deb	-2.090	-2.79	0.005
fd2	-1.972	-3.87	0.000
gov	8.334	2.78	0.000
edu	8.095	8.39	0.000
cpi	-0.228	-1.52	0.128
trd	0.251	4.24	0.000
R^2 =.0.725		(0.000)X^2=355.68	

Based on the results of Table 6, financial development has a significant positive effect on economic growth in the second model, while government debt has a significant negative effect on economic growth. Here, the interactive effect of debt on financial development on economic growth is significant negative, implying that government debt weakens the positive effect of financial development on economic growth. In the second

model, government spending, human capital and trade freedom have a significant positive effect on economic growth, while the effect of the inflation rate on economic growth is insignificant.

Conclusion and suggestions

The present study aimed to investigate the role of the budget deficit and government debt in financing the economic growth of developing countries. In order to achieve the research objective, economic growth was defined as a function of financial development, budget deficit, government debt, government spending, human capital, inflation rate and trade freedom, according to Ehigiamusoe & Lean (2020). Furthermore, the interactive effect of budget deficit on financial development and the interactive effect of government debt on financial development on economic growth were regarded. The required data were collected from the World Bank and the International Monetary Fund. The research model was estimated using the econometric panel model and the FGLS method for 40 developing countries during 2010-2019. The results of the model estimation indicated that financial development has a significant positive effect on economic growth in developing countries, while the budget deficit and government debt have a significant negative on economic growth. In addition, the interactive effect of budget deficit with financial development and government debt with financial development on economic growth is significant negative, indicating that budget deficit and government debt play a negative role in the positive relationship between financial development and economic growth. Government spending, human capital, and trade freedom have a significant positive effect on economic growth, while the effect of the inflation rate on economic growth is insignificant. The obtained results are consistent with most of the previously conducted studies (except for the inflation rate). Although government financial policies in developed countries are highly critical for stabilizing, reducing economic fluctuations, reallocating resources, redistributing wealth, etc., in most developing countries, such as Iran, the government budget deficit and the accumulation of government debts are so large that influences the financial development. In addition, the forced succession increases so much that balancing the budget needs the tools such as borrowing, creating inflation and imposing additional taxes. In this regard, it is regarded as a barrier to the positive effect of financial development on economic growth. Based on the results of this study on the positive effect of financial development on economic growth, economic planners and policymakers in developing countries are recommended to pay more attention to financial development and consider the private sector the center of the financial development process. The negative effect of budget deficits on economic growth makes it necessary to consider the budget balance. A budget deficit is not inherently a negative phenomenon but requires management. In this regard, it is suggested to finance the budget deficit through tax revenues. Regarding the negative effect of government debt on economic growth, economic policymakers should consider the optimal level of government debt, prevent the creation of long-term debts, and spend short-term debts to invest in infrastructure projects. Due to the positive effect of government spending, human capital, and trade freedom on economic growth, government spending should be conducted to maintain financial discipline and increase efficiency and effectiveness. In addition to the revision in educational policies, the approach of education should be changed to a hybrid education (scientific-practical), and the contexts for liberation from

the single-product economy should be provided to prevent trade deficit by developing the exports.

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