Exchange Rate Volatility, Oil Revenue Implications, and Their Impact on the Construction Supply Chain Sustainability Using SEM

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ABSTRACT

The study seeks to describe the effect of exchange rate risk (ERR) and oil revenue implications (ORI) factors on the sustainability performance of the construction supply chain. Going beyond the scope of macroeconomic reserves and secondary data analysis, the study utilizes online accessible data and the structural equation model (SEM) approach to describe the performance of the three pillars of sustainability within the construction industry, namely the economic (ESU), environmental (ENS), and social (SUS) aspects. Using the SmartPLS version 4.1 in the path analysis of the data, the findings emerge to be complex. The effect of exchange rate risk is found to be harmful to the environmental and social aspects of sustainability performance but statistically insignificant to the economic aspects of sustainability performance. Significantly and surprisingly, ORI factors are found to be positively enhancing the economic perspective of sustainability performance and show that the fiscal policy of the oil industry provides stability and continuity of construction projects. Contrary to the anticipated outcomes, the SEM analysis shows that ORI factors are harmful to the environmental perspective of sustainability performance but bear no consistent influence on the SUS construct within the total sample of the data.

Keywords: Supply Chain, Construction Sustainability, Oil Revenue, Exchange Rate Risk, Smart PLS.

INTRODUCTION

ERR, also described as currency risk, within the economics and finance field emerges when unexpected changes in the value of a currency influence a company's earnings, costs, and/or value (Harris & Rajgopal, 2022; Hassan & Zhang, 2021). The weakening of a currency increases the affordability of a company's exports, whereas strengthening increases the prices of these exports (Umeaduma & Dugbartey, 2023). As such, key risk subjects, such as multinationals, import-export businesses, and other international investors, are vulnerable due to transaction and investment agreements and costs denominated in various currencies (De Paula et al., 2025; Elias et al., 2023). ERR takes three basic forms (Gopinath et al., 2020):

transaction exposure, related to a company's bills and/or loans denominated within a foreign currency (Harris & Rajgopal, 2022); operating exposure, characterized by long-term changes within a company's influence and sensitivity of inputs and prices; and translation exposure, describing the accounting changes required during the consolidation of subsidiaries (Barbera et al., 2020; Shani et al., 2024).

Together, these factors tend to influence cash flow and market value even when the business performs the same way, thus the significance of managing currency volatility (Reyad et al., 2022). In the event of oil-dependent economies, ORI remains a key cornerstone of the economy (Okwueze et al., 2025). The funds that are mostly derived through the export of crude petroleum have historically supported the Iraq Economy and are the key component of government funds (Bamber et al., 2023). The size of ORI is measured through production capacity, control of the nation over its resources of crude petroleum, and the world prices of the petroleum and derivatives (Yang et al., 2022). ORI represents the largest component of the GDP of Iraq and is used to finance government spending. The dependence on ORI is essential for financing government spending and ensuring that the economy is stable, and through that, the stability of ERR remains (Mnatsakanyan, 2024).

As a fact, the dependence of the Iraqi economy on exported oil revenues makes the economy go through expansions and contractions. Moreover, the international volatility of petroleum prices has direct implications for ORI, and any changes are immediately reflected in the performance of the economy. The accumulation of reserve funds through surplus oil revenues increases the stability of the Iraqi dinar. These reserves include stocks of gold, other currencies, special drawing rights, IMF reserve positions, and other international assets (Aizenman et al., 2020). As a matter of fact, international reserve funds are kept for the sake of liquidity and managing unforeseen risks (Sheludko, 2025). The ORI is very important within the rentier states of the world, such as the Iraqi government, because ORI is central in determining the GDP and government expenditure behavior of a national economy (Al-Sultani et al., 2025; Sharifi & Majidi, 2025).

Oil crude is used both as a good and a financial instrument, playing a crucial role in the accumulation of funds within trading countries (Mohammed et al., 2020). The importance of the financial role of oil crude derives from the disparity observed in the level of revenues and value addition at the production level (Lu et al., 2024). World trade brings forth the appropriate allocation of financial resources, thus ensuring growth within the economy (Kaplinsky & Kraemer-Mbula, 2022). In the Republic of Iraq, the exports of oil crude stimulate growth within the economy through ORI's facilitation of production structure imbalances, financing development projects, job creation, and balancing balance of payments deficits. ORI shows remarkable dependence on international prices for oil crude exports, and growth within the current account balance surplus increases with increases in exports and dwindles with low prices that compose the largest share of government revenues (Al-Saedi, 2025).

An economy that relies very greatly on a specific export sector remains very susceptible to external changes. The preservation of sufficient reserves is essential to mitigate such challenges and ensure stability within the economy (Vinokurov et al., 2022). The buildup of reserves is a result of balance-of-payment surplus, while the deficit caused by the reduction of ORI is financed through the existing reserve to ensure that the economy is stable. The construction industry remains a backbone of the overall economic growth performance, but the inclusion of sustainability within the management of the construction industry's supply chains remains a significant challenge (Ghufran et al., 2021). Pressures driven by the environment and the community force the organisation to pursue the ESU, ENS, and SUS factors and ensure that they are achieved. The construction industry's supply chains remain complex and are characterised by a high level of vulnerability and a high degree of pollution of the environment, contributing between 30-40% of the world's carbon and 30% of the waste generated within the EU environment (Ekanayake et al., 2021; Ekanayake et al., 2022).

This paper investigates the effect of ERR and ORI on the sustainability of the construction supply chain, which is measured using ESU, ENS, and SUS. Using SEM, the relationship between the macro-economic factors and the three aspects of sustainability is considered. ERR could pose risks of uncertainty related to project financing, cost management, and stability of supply. Conversely, ORI could lead to gains in liquidity and economic performance but may not contribute much to ENS and SUS. The paper aims to clarify the joint effect of ERR and ORI on the sustainability performance of oil-dependent economies and seeks the answers to the following questions:

RQ1: What is the relationship between ERR and ESU, ENS, and SUS in construction supply chains?
RQ2: How does ORI influence ESU, ENS, and SUS in construction supply chains?

LITERATURE REVIEW

The relationship between supply chain management (SCM) and ERR and currency fluctuations has also managed to raise a substantial level of interest among scholars and policymakers. Badhan et al. (2024) indicate that changes that occur within ERR pose a significant challenge to organizations that practise international SCM. If the ERR increases or depreciates unpredictably, the prices of goods, delivery times, and business processes are affected. As a result, the manufacturing, automobile, and information and communications industries are under immense pressure to ensure that their SCM remains stable. This indicates that the effective management of ERR is important. Hariharan (2021) also go deeper to explain the techniques used by small, medium, and large organizations to handle currency risk.

The data includes information gathered from 200 professionals engaged in SCM practices in the automotive, IT, retail, and manufacturing industries. The data analysis using the SPSS software includes the use of the chi-square test, ANOVA, and regression and correlation analysis. The data shows that the two most effective methods of managing ERR are through hedging and contracting strategies, whereas the deployment of forecasting tools increases the capacity of organisations to avoid the loss of potential revenues. Nonetheless, small and medium enterprises are hampered by a lack of resources, which makes the adoption of these tools ineffective, thus exposed to ERR variability. The work of Ngo et al. (2024) examines the cumulative influence of competitive intensity and risk of ERR on the field of SCM and outsourcing practices. The work focuses on factors such as pricing and ERR uncertainty, offshore outsourcing, and the influence of ERR uncertainty on the utilisation of outsourcing practices. The work shows that volatility of ERR dampens the adoption of outsourcing practices.

The relationship between the revenues generated by natural resources and SCM has also been considered. Sheng et al. (2023) analyze the use of resources in the Chinese SCM framework and argue that the rapid growth of the Chinese economy increases the demand for resources. Using the methods of input–output and the structural path model, the authors demonstrate the procyclicity of resources such as crops, minerals, coal, oil, gas, and metals, starting with the mining stage and concluding at the end consumer level. The authors conclude that the production and construction industries are the chief drivers of the utilised resources, accounting for over two-thirds of the resources used. The authors also demonstrate that a large share of these resources is channelled through the exports route and state the dependence of the world's supply chains on the Chinese mining of resources.

Barker et al. (2020) describe the unprecedented drop witnessed in the international prices of crude oil during the year 2020 and the challenges inherited in the international oil SCC framework. The drop has been attributed to oversupply, storage capacity challenges, geopolitical issues, and hedging within the trade domains. This led to sharp disruptions within the oil production, movement, and logistics networks and heightened the sensitivities within the energy chains during a crisis of unexpected demand changes. The concept of sustainable development encompasses three dimensions that are closely intertwined. (Abdul-Abbas et al., 2024). These dimensions include the environmental, economic, and social aspects, as depicted in Figure 1. Additionally, there is a fourth dimension that pertains to municipal and local policies (Decision-Making Body) (Van der Waldt, 2024).

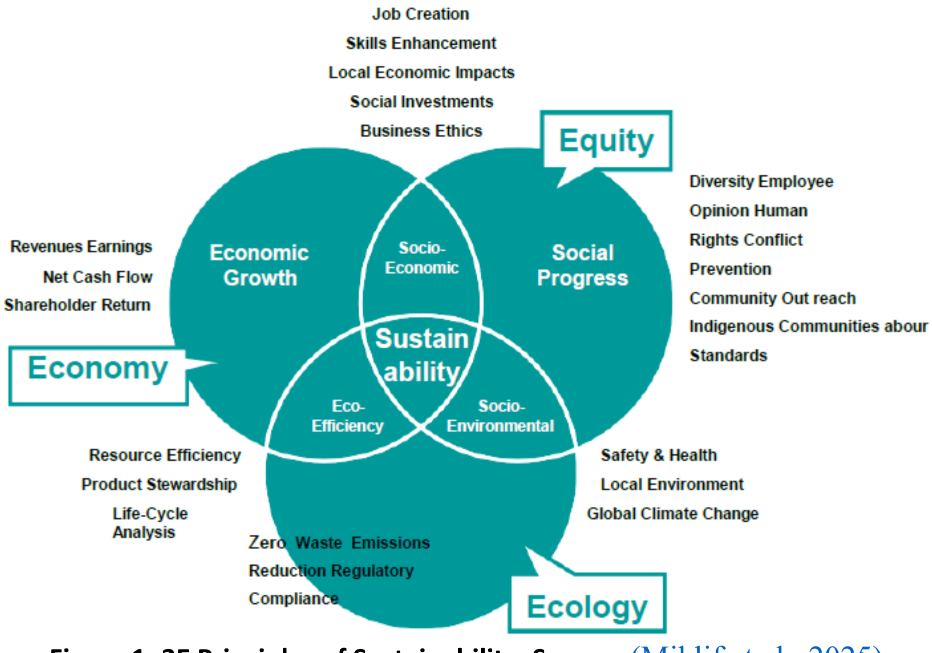

Figure 1: 3E Principles of Sustainability. Source: (Miklif et al., 2025)

Sustainability studies, such as those by Al-Hakeem et al. (2026); Alshammari and Alshammari (2023); Hussain et al. (2024) indicate that sustainable solutions promote green Innovative that has a positive impact on sustainability. Khan et al. (2021) & Alabdily et al. (2024); Alabdily et al. (2025). founds that green process innovation improves sustainability levels, underscoring the importance of innovative approaches to achieving sustainability goals. These studies emphasize the need for organizations to carefully manage environmental stewardship, social responsibility, and economic viability to achieve sustainable development (Abdulameer et al.,2023; Alsharifi et al.,2026).

There are many reasons why sustainability is crucial for the future of our planet, including **Climate Change**, which is one of the most serious threats facing humanity. Sustainability is essential for mitigating and adapting to the effects of climate change. **Resource Depletion**, the unsustainable exploitation of natural resources, such as water, forests, and minerals, jeopardizes the Earth's ability to meet its current and future needs. Sustainability aims to ensure the availability of resources for future generations. Sustainability aims to restore and preserve the environment for future generations. The Sustainable Development Goals are essential for building more sustainable, inclusive, resilient, and inclusive societies. Sustainability is also key to addressing climate change and adapting to its impacts. Furthermore, the over exploitation of resources, such as water, forests, and minerals, hinders the planet's ability to meet its own needs (Goswami, 2024; Abdulameer et al.,2024).

METHODOLOGY

This study makes use of primary data, and a structured questionnaire has been designed for the study. The questionnaire has been designed after identifying appropriate constructs that have been used in pre-existing literature and are well-established, ensuring reliability and content validity of the questionnaire. Multiple items representing each variable of the model are used to ensure that the items are robust and accurate. The paper also identifies five important variables: three are dependent ESU, SUS, and ENS and two are independent—ORI and ERR. Items representing ESU, and the items are derived to check aspects of investment and sustainability, production growth, and contribution of construction to the value addition of the company. The SUS, being the other dependent variable, is derived through items that check aspects of SUS's contribution towards the company, such as employee engagement, consumer responsibility, corporate and societal responsibility, and follows compliance.

This research offers a theoretical and methodological basis for a holistic analysis of the interaction between exchange rates fluctuations and the impact of oil revenues on the sustainability of the construction sector's supply chain. For such purposes, the advanced statistical method – Structural Equation Modeling (SEM) – is used as it is efficient in estimating the causal relationships between latent and observed indicators. In addition, it enables the researchers to test the model fit, reliability, and other aspects of model building. Environmental sustainability indicators (ENS) refer to the complex set of quantitative and qualitative characteristics aimed at measuring the level of institutional commitment to modern environmental norms and regulations. Thus, this category includes such variables as:

(i) expenditure on environmental protection activities, (ii) efficiency of carbon footprint management in all stages of the construction process, (iii) ways of decreasing the generation of solid waste and recycling materials, (iv) high level of compliance with occupational safety standards both on-site and off-site in terms of pollution and other hazards.

In addition, it encompasses some other indicators relating to rational use of natural and material resources. These indicators act as latent variables in the SEM structure with the corresponding measurement weights estimated in the measurement model.

Prior to evaluating the structural relationship between latent variables in the proposed model, structural validity, internal consistency, and overall fit should be confirmed. For these purposes, the internal oil revenue indices (ORIs) are developed that reflect the overall and partial influence of revenues resulting from the extraction, production, and sale of oil in the analyzed organization or industry. Such indices characterize the ability of this institution to invest in long-term strategies and make supply chains more resilient by using financial flow generated due to its economic activities. Internal oil revenue indices are included in the structural equation model as either independent or mediating variables, depending on the research hypotheses. The impact of these variables on environmental sustainability indicators and supply chain performance will be studied while taking macroeconomic factors into account and analyzing their influence on purchasing, stocking, and contracting decision with local and foreign suppliers.

Exchange rate volatility indices (ER) are developed to identify and measure the impact of the volatility of foreign exchange rates on the cost structure of the construction company/sector, on the expenses related to the import of construction materials, equipment, and international logistics operations. In addition, they characterize the extent to which the institution uses effective financial hedging strategies that help it to diminish the impact of exchange rate fluctuations and stabilize financing decisions. The interaction of operational factors (OFs) acting as independent or moderating variables with the oil yield indicators (OYs) and ENS indicators will be assessed by means of linear and non-linear regression models. The impact of the latter on ORIs and OFs will be controlled. The SEM allows the researcher to estimate all these relationships and analyze the impact of potential confounders and autocorrelations. Items representing ENS, and the items are used to check aspects of expenditure spent on the environment, management of carbon footprint, waste reduction, and compliance with safety and rational use of resources. ORI items are derived to check the effect of the revenues generated from the sale of oil generated within the company and are used to check the effect of the revenues generated. The ERR items are also derived to check the effect of exchange rate generated within the company, and the items are derived to check the effect of exchange rate generated within the company. The items are used to check the effect of exchange rate generated within the company. The items are used to check the effect of exchange rate generated within the company and are measured.

This framework is a methodologically and academically advanced approach for studying complex, multidimensional phenomena, particularly in capital-intensive sectors sensitive to external shocks, such as the construction sector, where macroeconomic risks intersect with environmental regulatory requirements and global logistical pressures. Integrating these three indices into a unified structural model not only tests theoretical hypotheses but also contributes to the development of Standardized measurement tools applicable in emerging contexts, enabling policymakers and supply chain managers to design proactive strategies that enhance operational resilience, economic and environmental sustainability, and the ability to adapt to structural fluctuations in global markets, ensuring the continuity of corporate performance in a dynamic and uncertain business environment.

The questionnaire was administered to a population of 300 professionals working within the public and private construction companies that exist within the Republic of Iraq. Based on the distributed questionnaire, a response rate of 271 cases was achieved, but after subjecting the completed questionnaire to a scrutiny of validity and relevance, a total of 243 questionnaires were found to be valid and used for the empirical analysis. Concerning the data analysis procedure, the authors used the SmartPLS option of PLS-SEM to perform the analysis using version 4.1 of the software, guided by the two-step methodology. At step one, the authors tested the measurement model for the objective determination of the instrument's reliability using Cronbach's alpha, composite reliability, and average variance extracted (AVE), with the aid of which convergent validity could be achieved. The authors used the HTMT ratio and the Fornell-Larcker criterion, both of which are widely applied within the framework of controlling discriminant validity and both of which are supported within the literature. At step two, the authors used the SmartPLS software to analyze the structural model for the objective of understanding the interrelationships that exist amongst ESU, SUS, ENS, ERR, and ORI. Bootstrapping with some factors as shown in Table 1.

Table 1: Variables and Items

Variables	Factor	Item
Economic Sustainability (ESU)	Sustainability investment (ESU1)	Investment in sustainability.
	Production growth (ESU2)	Growth in production capacity.
	Construction value-added (ESU3)	Value added by the construction sector.
Social Sustainability (SUS)	Employee involvement (SUS1)	Engagement and participation of employees.
	Consumer obligation (SUS2)	Responsibility toward consumers.
	Corporate social responsibility (SUS3)	CSR and company commitment to sustainability.
	Government regulation commitment (SUS4)	Government commitment to sustainability regulations.
Environmental Sustainability (ENS)	Environmental expense (ENS1)	Expenditures on environmental protection.
	Carbon footprint management (ENS2)	Strategies to reduce carbon footprint.
	Decreasing waste and losses (ENS3)	Reducing waste and operational inefficiencies.
	Adopting safety standard (ENS4)	Implementation of safety and environmental standards.
	Optimize resource consumption (ENS5)	Efficient use of natural resources.
Oil Revenue Implications (ORI)	Increasing oil revenue (Q1)	Increasing oil revenue increases the revenue base of the Iraqi economy.
	Declining oil revenue (Q2)	Declining oil revenue adversely affects the economic performance of Iraq.
	Need for alternative revenue sources (Q3)	There is a need for other sources of revenue to be explored as a supportive effort in meeting the budgetary needs of Iraq.
	Government efforts to explore alternatives (Q4)	The Iraqi government makes adequate efforts to explore alternative means of generating revenue in times of declining oil revenues.
	Efficient utilization of resources (Q5)	The Iraqi government utilizes the nation's natural resources efficiently.
Exchange Rate Risk (ERR)	Exchange Rate Impact on Financial Performance (ERR1)	"Exchange rate fluctuations significantly impact our company's financial performance."
	Use of Financial Instruments (ERR2)	"Our firm uses financial instruments (e.g., forward contracts, options, swaps) to manage exchange rate risk."
	Impact of Exchange Rate Risk on Profit Margins (ERR3)	"Exchange rate risk significantly impacts our profit margins, especially in foreign transactions."
	Volatility and Exchange Rate Management (ERR4)	"High volatility in exchange rates makes it difficult to effectively manage exchange rate risk."

RESULTS AND DISCUSSION

The reliability and convergent validity of the measurement model were tested through the following steps:

The reliability of the measurement model was tested by calculating the Cronbach's alpha and the composite reliability of the variables, defined using the formula ρ_a and ρ_c. The alpha values of the variables ENS, ERR, ESU, ORI, and SUS are shown to be 0.880, 0.828, 0.817, 0.851, and 0.915, respectively. The CR, along with the values of ρ_a and ρ_c, are shown to be 0.821, 0.890, 0.819, 0.855, and 0.980, with the latter two having the same value of 0.910, 0.880, 0.916, 0.910, and 0.937, respectively. The average variance extracted (AVE), a measure of the convergent validity of the measurement model, is shown to be 0.772, 0.649, 0.845, 0.770, and 0.789 for the measured model (Table 2).

Table 2: Reliability and Convergent Validity of the Variables

Variables	Alpha	CR (rho_a)	CR (rho_c)	AVE
ENS	0.880	0.821	0.910	0.772
ERR	0.828	0.890	0.880	0.649
ESU	0.817	0.819	0.916	0.845
ORI	0.851	0.855	0.910	0.770
SUS	0.915	0.980	0.937	0.789

EN: Environmental Sustainability, ESU: Economic Sustainability, SUS: Social Sustainability, ORI: Oil Revenue Implications, ERR: Exchange Rate Risk.

Items with factor loadings of less than 0.70 were removed from the present model. As shown in Table 3, the items of ENS revealed factor loadings of 0.810 to 0.940. The items of ERR showed factor loadings of 0.719 to 0.862. ESU consisted of two items termed ESU2 and ESU3 that revealed factor loadings of 0.924 and 0.915, respectively. ORI items, labeled as Q1 to Q3, showed factor loadings of 0.857 to 0.891. Lastly, the SUS items showed four items with the smallest and largest factor loadings of 0.845 and 0.921, respectively. The importance of the items and the large contribution of each item to the constructs are illustrated through these factor loadings.

Table 3: Loadings of the Selected Items

Variables	ENS	ERR	ESU	ORI	SUS
ENS1	0.940				
ENS2	0.810				
ENS3	0.880				
ERR1		0.860			
ERR2		0.862			
ERR3		0.719			
ERR4		0.773			
ESU2			0.924		
ESU3			0.915		
Q1				0.857	
Q2				0.891	
Q3				0.885	
SUS1					0.921
SUS2					0.917
SUS3					0.845
SUS4					0.866

The discriminant validity tests the difference between the constructs used in the model. The first way of doing so is the HTMT ratio, presented below in Table 4. The first condition is that the ratio of ENS and ERR is well below the required threshold of 0.85. The ratio of ENS and ESU is 0.053, proving a very high level of discriminant validity. The ratios of both ENS and ORI, and ENS and SUS are also low at 0.091 and 0.061, respectively. Turning to ERR, the ratios of the remaining constructs ESU, ORI, and SUS are 0.067, 0.122, and 0.172, all of which are well below the required ratio of 0.85. Lastly, the ratio of ORI and SUS is also low at 0.089.

Table 4. HTMT Correlations

Variables	ENS	ERR	ESU	ORI	SUS
ENS					
ERR	0.063				
ESU	0.053	0.067			
ORI	0.091	0.122	0.694		
SUS	0.061	0.172	0.114	0.089	

The second method used to check discriminant validity is the Fornell-Larcker criterion. The analysis of the criteria is shown in Table 5 below. The criteria require that the square root of the average shared variance of each construct should be higher than the inter-relationships of the constructs shown in the model. As shown below, the square root of the average shared variance of the constructs, shown along the diagonal of the table, are all higher than the inter-correlations of the constructs. The construct ENS, for example, has a square root of average shared variance of 0.878, which is higher than the inter-correlations of the construct and the other constructs shown in the Table 5.

The hierarchy of models shows the measurement model and the structural model of the research hypotheses using the SmartPLS program shown below. The measurement model includes the constructs shown and the items that measure the constructs and are linked to the constructs through the outer loadings. The inner nodes of the hierarchy of models show the Cronbach's alpha of the constructs shown.

Table 5. Fornell Larcker Criteria

Variables	ENS	ERR	ESU	ORI	SUS
ENS	0.878				
ERR	0.045	0.806			
ESU	0.049	0.024	0.919		
ORI	0.096	-0.101	0.081	0.878	
SUS	0.015	0.180	0.096	0.079	0.888

Figure 2 illustrates the outputs of the standard model within the framework of structural equation modeling (SEM), displaying the factorial loading coefficients, statistical significance (P-values), and Cronbach's alpha coefficients for the underlying variables under investigation. These variables include environmental sustainability (EN), economic sustainability (ESU), and social sustainability (SUS), along with the implications of oil revenues (ORI) and exchange rate volatility risks (ERR). The values presented in the figure confirm the statistical validity of the standard items and their conformity with the established criteria for validity and reliability in quantitative research, thus paving the way for subsequent testing of structural pathways and causal relationships.

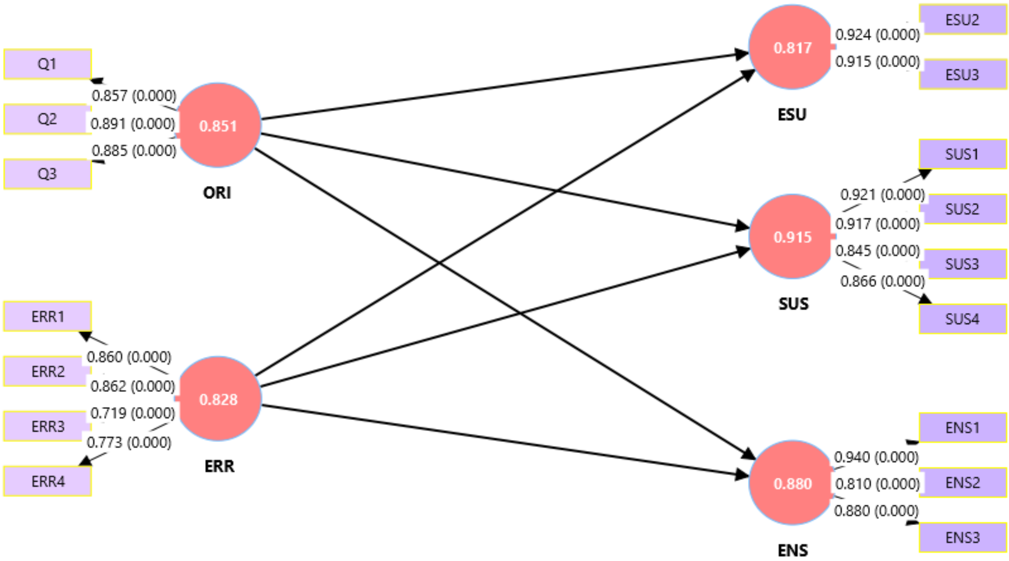

Figure 2: Loadings, P-Values and Cronbach's Alpha, EN: Environmental Sustainability, ESU: Economic Sustainability, SUS: Social Sustainability, ORI: Oil Revenue Implications, ERR: Exchange Rate Risk.

The relationship between ERR, ORI, and construction supply chain sustainability is modelled using SEM, and presented in Table 6 below. The first relationship tested is the effect of ERR on ENS (ERR → ENS). The path coefficient is -0.155 with a standard deviation of 0.015. This produces a T-statistic of -10.333 and a p-value of 0.000, meaning that ERR has a significant negative effect on ENS. This indicates that exchange rate variability makes the import of sustainable practices more expensive, thus affecting the prioritization of environmentally friendly practices. If the ERR is considered volatile, then the variability of ENS also has the same effect in the Iraqi environment and thus planning and management are required to manage the negative effect.

Conversely, the ERR → ESU relationship is not statistically significant. The coefficient of 0.083 has a p-value above the 0.05 significance level, thus lacking any practical significance for the relationship between ERR and ESU variables in the construction supply chain. The ERR → SUS relationship shows a negative and statistically significant relationship. The coefficient of -0.190 shows that after controlling for other variables, a one percent change in ERR negatively impacts SUS. This relationship is statistically significant at a significance level of 5 percent (p = 0.011). Perhaps a practical explanation is that the variability of ERR could affect the construction projects' labor costs and community support programs, thus affecting the level of Social Sustainability Outcomes.

Subsequent analysis focused on the effect of ORI on the three sustainability factors. Concerning the relationship between ORI and ENS, the coefficient is -0.101 with a T-statistic of -6.312, signifying a negative and significant relationship. This could be attributed to the fact that the dependence on oil revenues is positively related to the consumption of fossil fuels, thus increasing the carbon footprint of the construction supply chain. Consequently, the fluctuations of the latter could lead to a reduction in investment for sustainable practices. Thus, ORI has a negative effect on ENS. Moving to the relationship between ORI and ESU, the coefficient is positively significant at 0.590 and a p-value of 0.000 (Table 6) (Figure 3). Using the model to estimate the effect of a one percent change in ORI, it can be inferred that the financial strength of the construction industry increases, and the capability to handle large-scale projects through the creation of sustainable infrastructural structures is positively impacted. Lastly, the relationship ORI → SUS is not significant since the relationship between ORI and the construct SUS doesn't exist.

Table 6: Path Model Output

Paths of the Variables	Original Sample (O)	Standard Deviation	T Statistics	P Values
ERR -> ENS	-0.155***	0.015	-10.333	0.000
ERR -> ESU	0.083 not significant	0.065	1.288	0.198
ERR -> SUS	-0.190**	0.074	-2.563	0.011
ORI -> ENS	-0.101***	0.016	-6.312	0.000
ORI -> ESU	0.590***	0.056	10.597	0.000
ORI -> SUS	0.098 not significant	0.073	1.347	0.178

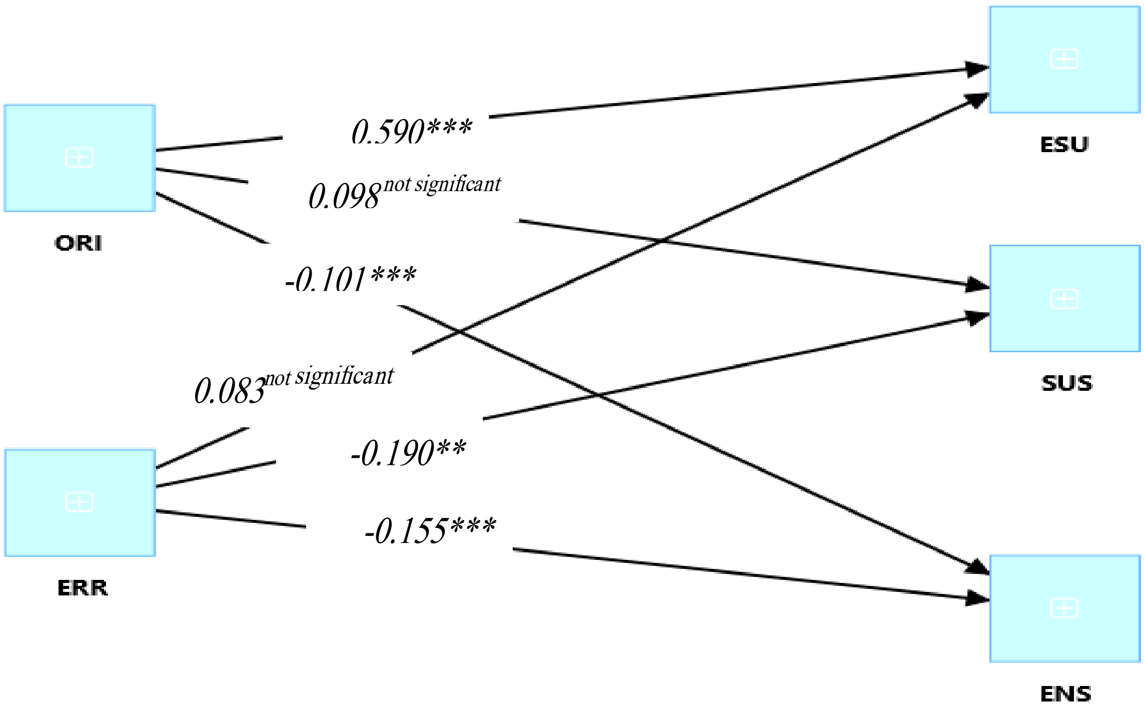

Figure 3. Path Model Output Diagram

CONCLUSION AND POLICY SUGGESTIONS

The chief aim of this research is to empirically analyze the influence of ERR and ORI on the sustainability of the construction supply chain across the three-dependent variables ESU, ENS, and SUS using data derived through a structured questionnaire. The SEM path analysis illustrates that ERR corrodes the two pillars of sustainability—environmental and social sustainability—while its influence on ESU is statistically insignificant. This often suggests that exchange rate volatility contributes to contractors', suppliers', and owners' reluctance to invest in environment-friendly projects and community programs and activities. ORI has a divergent effect. This construct is a very strong positive influence on ESU with a coefficient of 0.590 and a p-value of <0.001, signifying that the revenues generated from the sales of petroleum Products positively influence the financial stability of the construction industry and stimulate sustainable economics. Its influence is negative on ENS, however, with a coefficient of -0.101, signifying that the reliance of the industry and government on these revenues often increases the already observed pressures related to the environment, perhaps because of the massive dependence on fossil fuels and production of a considerable level of

CO2 emissions. ORI also has a statistically insignificant influence on SUS, signifying that the revenues derived are not linked to positive outcomes in the field of societal welfare. While oil, despite its nature as a central source of financing rather than a provider of direct production links, appears as a node with high exit centralization and rapid influence on the network through public spending and service channels (Alaarajy et al., 2024; Shani et al.,2024).The specificity of the economic development of the Iraqi case is based on a heavy reliance on oil which constitutes more than 90% of government revenues, and this specificity made economic growth susceptible to dynamics in oil prices, lack of economic diversification, and loss of the role in the contribution of non-oil productive sectors of the economy, including agriculture and industry. (Miklif et al.,2025) The paper provides a set of policy prescriptions that ought to be prioritized by the key actors engaged in macro-economic and industrial strategic planning and decision-making, and related sustainable management of the construction supply chain:

- The first recommendation is the implementation of FX-indexed sustainability clauses within public and large private deals, whereby a predetermined element of the deal's worth is dedicated to environmental and HSE deliverables and changes with exchange rate movements. This way, the programs and projects are not diminished if the local currency depreciates.

- The second is the promotion of multi-currency bidding, forward contracts, and natural hedges such as local sourcing and local payrolls, which shield the sustainability budget from exchange rate changes that could affect imported materials.

- The third recommendation is that formulae used for prices should be standardised so that the protection of profits and allocation of EHS resources are not further compromised.

Together, these initiatives recognize the importance of ORI to the functioning of the economic engine within the construction supply chains, even while mitigating the negative impacts of ERR towards ENS and SUS. The effect of these initiatives is that the supply chains become economically sustainable without having to comprise any environmental and social concerns.

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