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Research Article

The role of education in economic development in Saudi Arabia

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ABSTRACT

This investigation explores the significance of the role played by education in the economic development of Saudi Arabia, particularly at this juncture in pursuit of Vision 2030. The study explores the complex relationship between investments in education and economic growth in the global economy through examinations of education spending versus GDP from 2020 to 2024. A lot of government spending on education has helped many economic indicators but the results also point towards some areas where they can improve, more specifically in terms of resource efficiency and labour market need. The importance of curricula modernization, ongoing professional development for teachers, and stronger links with industry are highlighted in the report to ensure the significance and effectiveness of education. But to be effective, these policies must be accompanied by increased investments in STEM and vocational training, robust monitoring, and evaluation (M&E) systems, and the expansion of private-public partnerships. At the same time, the study reinforces the need for targeted educational programs specifically aimed at AI, career navigators to guide young people, and investments in R&D and innovation. Working on these areas can help Saudi Arabia to make the best of its educational investments and maintain economic growth and development.

Index Terms: demography of youth in Saudi Arabia, Economic growth, education spending, human capital factor, labour force, sustainability of economic development in Saudi Arabia.

Research background

The Kingdom of Saudi Arabia is witnessing a radical transformation in various sectors, and the role of education is emerging as one of the basic drivers of economic development. Education is an essential pillar for achieving the Kingdom's Vision 2030, as it seeks to empower a new generation of leaders and innovators. Education plays a pivotal role in enhancing national productivity, stimulating innovation, and increasing job opportunities. By investing in education, Saudi Arabia seeks to diversify its economy away from oil and strengthen its position as a global economic power. This strategy is part of the Kingdom's commitment to building a prosperous and sustainable society that contributes to the well-being of its citizens and enhances its long-term economic growth.

Full-scale economic and fiscal reforms of the Saudi government, under the way of the Saudi Vision 2030, is a move towards diversification of the economy and creation of more opportunities for everybody. It particularly is needed to build an education system according to the requirements of the market and create economic opportunities for everybody (Huber, 2023).

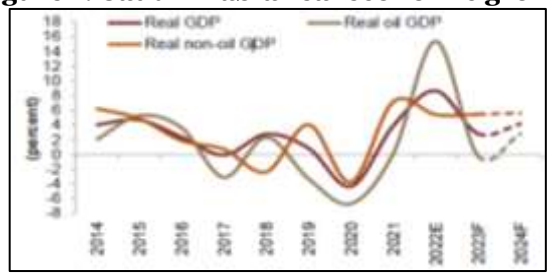
At the same time, the nonoil economy in Saudi Arabia is expected to continue its brisk growth, supported by sustained impulses from both investment and consumption (Reeve, 2024).

The authorities' structural reforms during the past years have started to bring improvements in the economy, fiscal position, and debt levels (Barakat, 2023).

However, the whole Saudi economy is expected to be in a recession in 2024 as a result of plummeting oil GDP, which represents about 40% of the total GDP. This is expected to be due to oil output cuts, given by the slower GDP growth observed in Q3 2023 (Country Analysis Brief: Saudi Arabia, 2023)

Taking everything into consideration, the economic scenario in Saudi Arabia for 2023-2024 remains strong in performance in the nonoil sector but registers a recession in the overall economy due to the fall in oil GDP. That is tuning the government to full swing and trying to overhaul the economy to make way vibrant and all-inclusive the society (Country Analysis Brief: Saudi Arabia, 2023).

Figure 1: Saudi Arabia real economic growth



Source: (Reeve, 2024)

This may be evidenced in the Figure showing exertions and strides within the economic structure of Saudi Arabia that balances between its traditional oil-dependent economy and its diversifying and stabilizing growth.

Research problem

Education plays a pivotal role in the economic development of any nation, and Saudi Arabia is no exception. As part of its ambitious Vision 2030, Saudi Arabia aims to diversify its economy beyond oil dependency by investing heavily in education and training.

Esmail (2020) highlights the significant relationship between education expenditure and economic development in Saudi Arabia. The study used a multi-regression model and found that increased government spending on education positively impacts economic growth. However, research and development expenditure did not show a significant effect, suggesting the need for more targeted investment in human capital,

Also, research by Hamdan and Hamdan (2020) examined the mediating role of oil returns in the relationship between investment in higher education and economic growth. The study found that while oil wealth drives investment in higher education, this investment alone does not directly generate economic growth. Instead, a diversified approach incorporating education reforms and knowledge creation is needed (Hamdan & Hamdan, 2020).

The implementation of Saudi Vision 2030 necessitates substantial reforms in the education system. Allmnakrah and Evers (2020) argue that to diversify its economy, Saudi Arabia must train its workforce in various disciplines and critical skills. The study emphasizes the need for innovative teacher training and curriculum development to align with Vision 2030 goals.

It is evident that the Saudi government is working towards building a resilient and strong education base for everyone in the country (Mohiuddin et al, 2023). The same forms part of the strategic core pillars of the Vision 2030 plan, whose objective is to ready the future labour force and reengineer the education system in line with the labour market needs (Alhawsawi & Jawhar, 2023).

According to Ryan (2023), the MoE's role is to educate the ever demography of youth in Saudi Arabia and equip them with necessary employable skills. The government also aims to enhance the role of the private sector in the country's education system as one of its economic transformation agendas (Mohiuddin et al, 2023).

These infer that there may likely be a deliberate input towards making developmental approaches of the education system fit within the ever-evolving demands of the labour market. Additionally, higher education in Saudi Arabia has significantly contributed to the country's transition to a knowledge-based economy (Ahmed, 2023).

Research by Singh (2022) also highlights that education and training in Saudi Arabia can be used to pursue economic, socio-economic, and health objectives without necessarily threatening environmental degradation. These happen to be in line with the broader aspirations of the Saudi Vision 2030, which seeks to empower the Saudi society through education, training and e-learning, before eventually leading to generation of employment opportunities on a sustainable basis (Ahmed, 2023).

Literature also suggests that the government of Saudi Arabia specifically seeks to empower women educationally and economically, although existing research to ascertain such claims is limited (Ryan, 2023). These infer that there will be considerations in the policy approach that seek to address the issue of equity in access to educational opportunities as a growth and development strategy.

Research Aims

From the discussion herein, the following may be considered research aims:

- To establish how different education levels (primary, secondary, and tertiary) impact economic development in Saudi Arabia.

- Provide policy recommendations geared toward validating the role of education in the promotion of the sustainability of economic development in Saudi Arabia.

Research Questions

- How does an education at the (primary, secondary, and tertiary) level to impact its economic development?
- What are the policy recommendations on hand that one may derive in order to improve the role of education in promoting the sustainability of the process of economic development in Saudi Arabia?

Significance of the Study

• Theoretical significance

This paper provides a theoretical approach to the relationship between the educational level of the labour force and economic development in Saudi Arabia. By linking the sector specificity and mechanisms in which education shapes economic growth, this paper adds to the literature on human capital theory and economic development. Furthermore, the analysis takes the differentiated role of levels of education from primary to tertiary in the shaping of economic landscapes in a fast-growing economy. The study is also critical to providing a localized approach that will show how factors like culture and social and policy-related factors in Saudi Arabia change the education–economy nexus. These findings can be generalized to similar settings, thus expanding the existing theories on economic development to encompass non-Western settings.

• Practical Significance

At a practical level, this study will have very beneficial implications for the policy implementers, educators, and economic planners of Saudi Arabia. By identifying and emphasizing the specific educational inputs and policies that most effectively cause economic growth, this study has practical recommendations that can be implemented to improve the aggregate performance of the national education system towards the realization of the economic growth and development objectives. It lays a foundation for resource investment in the education sector that maximizes economic returns and consequently informs the national development plans such as Vision 2030. Furthermore, this study can help in formulating targeted educational programs that would bridge the labour market with the evident skill gap, hence leading to improved skillset and workforce productivity. The results will provide businesses with the information on how to bring the outcomes of education into line with the economy and, therefore, assure growth in the economy of Saudi Arabia that is sustainable and inclusive.

Related studies

Education plays a crucial role in economic development, as evidenced by the contexts provided as follows:

The study of Grant (2017), The report "The Contribution of Education to Economic Growth" by Catherine Grant defines education as a wholesome input for economic development and, specifically, mentions that education, as a human capital factor, is found to have a profound influence over labor's productiveness and either way expands the economy from rudimentary levels of production. Primary education has been proven to have a significant impact on an individual's earning and the gross domestic production. Studies reveal that an additional year of schooling increases personal income by 10% and gross domestic production by 0.37% annually. These social returns of primary education are much higher than their private returns, and hence it is vital for poverty reduction and improvement in food security. Secondary education further fuels economic development since it is seen to prepare a person to learn new information, technologies, and production methods. The paper makes the point that even though universal primary education is required, it has to be supplemented with widespread secondary education to make a meaningful contribution to the accumulation of human capital, especially in low-income countries. Tertiary education also has undoubtedly played a crucial role in economic development, but it is relatively essential for advanced countries as it enhances innovation and high-level skills. The quality of education and not merely the quantity is vital because cognitive skills are vividly related to long-run economic growth. Thus, policies targeted to improve educational achievement rather than access, are recommended to achieve the full potential of education for economic development. No doubt, education becomes the key source of high economic returns, hence a profitable investment. Every dollar invested in education is found to generate ten dollars to fifteen in economic growth. Eventually, education finds itself as a basic and sure answer towards sustainable development, poverty reduction, healthy lives, and prosperous nations.

The study of Gogoi (2022), This essay's goal is to examine the connection between economic progress and education. The report presents a thorough analysis of the contribution of education to economic development using data from several research. No nation can succeed economically in the long run without making large expenditures in human capital. One way to see education is as an important component of development and as a necessary step toward the larger goal of enhanced human potential, which is the essence of development. People's comprehension of the world and themselves is aided by it. It enhances their standard of living and offers several social advantages to both people and the community. It is crucial for fostering entrepreneurship and technological advancements, as well as increasing people's productivity and creativity. It is also essential for improving income distribution and ensuring social and economic advancement.

The study of Pal (2023), By providing a thorough grasp of how education affects economic growth, particularly in the manufacturing, earnings, and agricultural sectors, this research adds to the body of information already in existence. It emphasizes how crucial education is to inclusive and sustainable growth and how ongoing investment in education is necessary to guarantee long-term socioeconomic advancement. Most people agree that the most crucial instrument for a nation's socioeconomic progress is education. It serves as a catalyst for increasing production and advancing technology. The stages of economic growth and education levels are positively correlated. The secondary, tertiary, and quaternary sectors of the economy open up and grow as the population's level of education rises, creating more employment possibilities and increasing the amount of the nation's gross domestic product overall. This study used qualitative research methodologies to investigate the relationship between education and economic development, concentrating on the manufacturing, earnings, and agricultural sectors. Through observations and document analysis, the study investigated the complex relationships that exist between education and these industries. The results demonstrated how education may have a transformational effect on promoting equitable and sustainable economic growth. By embracing new inputs and technology, education also plays a critical role in increasing agricultural and industrial production, which raises worker salaries. Knowledgeable people make more money, spend more on their families' health and well-being, and live longer, all of which contribute to the advancement of society.

Research Methodology

The current study highlights the importance of economic development facilitated by education. It analyses the link between education expenditure and Gross Domestic Product (GDP) in Saudi Arabia over the periods of 2020-2024. Multiple regression analysis would be employed to test the influence of education expenditure on economic growth.

Table 1. : Gross Domestic Product (GDP) with Education Expenditure Percentage from 2020 to 2024

Year	GDP (Billion SAR)	Education Expenditure (Billion SAR)	Education Expenditure as % of GDP
2020	1020	98	9.61%
2021	990	186	18.79%
2022	955	185	19.37%
2023	1114	189	16.97%
2024	1251	195	15.59%

Source: The unified national platform, government budget

From the above table, it is clear that the percentage of GDP spent on education in 2021 and 2022 are above 19%, which is extremely high. It is an increment by a very high percentage at a time when the economy is at a downturn due to the challenges of COVID-19, indicating the strategic prioritization of funding education at a time of economic downturn. The 2023 and 2024 percentages have, however, decreased slightly but are still much higher than the estimations for 2020 before the country suffered the effects of the pandemic. This is an affirmation of the role that education in the Kingdom plays in driving the necessary economic recovery in both the short and long perspectives. A closer look at such percentages would tell the reader how educational investments are maintained and, in fact, adjusted with the state of the economy.

Results

- The answer to the first question, which is: **How does an education at the (primary, secondary, and tertiary) level to impact its economic development?**

Ordinary Least Squares (OLS) method is used to analyze the relationship between variables. The results are presented in the following tables:

Table 2.: Model Summary

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate	Durbin-Watson
1	0.975	0.951	0.941	1.733	1.533

The Model Summary table summarizes the overall fit of the regression model. The desired value of the R-value is 0.975, which shows very good correlation of the independent variable, which is expenditure in education, with the dependent variable, GDP. For the R^2 value of 0.951, it can be said from the value that 95.1% of the variation in GDP can be predicted by the model. This high value of R^2 connotes that it is a very effective model in capturing the relationship between education expenditure and GDP. The higher R^2 is 0.941 because it is adjusted for the number of predictors in the model. The standard error of the estimate is 1.733, stating the average distance by which the observed values fall. Lastly, with a Durbin-Watson statistic of 1.533, there is no significant autocorrelation in the residual, which indicates the independence of errors.

Table 3: ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	878.262	3	292.754	97.461	0.000
Residual	45.057	15	3.004		

The ANOVA table is a very useful tool to test whether the regression model is statistically significant. The table decomposes total variability in the dependent variable (GDP) into terms attributable to the regression model and to residual error. One can see that the "Sum of Squares" column shows the total variance for each source. Squares of the total are the total variation of the dependent variable, and so the regression sum of squares is a measure of variation explained by the model, while the residual sum of squares is the variation not explained by the model, and amount to 45.057. The total is equal to 923.319. The previous two are summed in that, and so this is the reason why the total represents a total variation of the dataset.

The "df" column shows degrees of freedom associated with each source of variance. They are equal to 3 in the first case—it concerns the regression, as are pieces of information which we can manipulate to calculate the residual. They amount to 15 and equal the number of observations minus the number of predictors minus one. The total does amount to 18 and equals to that of the latter amounts. The "Mean Square" column amounts to the sum of squares divided by the respective degrees of freedom. It is 292.754 in the case of the regression, and 3.004 for the residual. This means that the amount of variation explained by the model is much greater than unexplained variation.

The "F" statistic amounts to 97.461 and tests the null hypothesis that the model with no predictors is just as good as the one with the predictors. The value of the F-statistic is highly significant at the 0.000 level, but more precisely, the value is indicated in the "Sig." column. This P-value of probability is very telling that receiving such a large value of F-statistic when the null hypothesis is true is really less and then supports the rejection of the null hypothesis. Precisely, the model significantly improves our knowledge of the dependent variable in comparison to models in which no predictors are present.

In summary, the ANOVA table is strong evidence that the regression model explains a significant share of the variability in GDP, which is equivalent to the significant relationship of investment in education with the development in the economy of the Kingdom of Saudi Arabia; hence, this would further underscore the importance of investing in education as a key driver of economic growth.

Table 4: Coefficients

Model	Unstandardized Coefficients	Std. Error	Standardized Coefficients	t	Sig.
(Constant)	167.520	41.633		4.024	0.001
Education Expenditure	-24.244	5.938	-0.892	-4.083	0.001

The Coefficients table gives additional information on all estimated parameters of the regression model: constant (intercept) and coefficient for the predictor of education expenditure. The table is useful in the interpretation of the general and specific relationships of the independent and dependent variables.

1. **Unstandardized Coefficients: Constant (Intercept):** The 167.520 is the constant term—the predicted value of the GDP once all the predictors are zero. This has no useful interpretation at this context though it's giving us a base value for the model. **Education expenditure:** The education expenditure coefficient is -24.244. It shows how GDP is explained by education expenditure. The negative sign shows that, contrary to expectation, with an increase of expenditure on education, GDP is moving downward. This unexpected result might be due to various reasons such as inefficient use of provided funds, lag effect for investment in education, or other economic devastations that characterize the period under consideration, such as the COVID-19 pandemic.
2. **Standard Error:** The standard error represents the estimate and indicates that the coefficient's value will, on average, differ from the true average value of the response variable by this number. We get a standard error for the constant, 41.633 and for education expenditure 5.938 by which we get to derive an estimation of the precision of coefficient estimates. The smaller the standard error up against the value of the coefficient, the higher the precision of the estimation.
3. **Standardized Coefficients (Beta):** The standardized coefficient for the education expenditure, -0.892, enables us to consider the relative importance of all predictors included in the model with respect to the dependent variable. It shows the number of standard deviations the dependent variable will change when the predictor variable is increased by one standard deviation. A larger absolute value reflects a stronger effect. In this case, the negative standardized coefficient confirms the inverse relationship between expenditure on education and GDP.
4. **Significance and p-value of the t-Statistic:** The t-statistic tests whether the coefficient is significantly different than zero. For the constant the t-value is 4.024, for the education expenditure t-value is -4.083. In

either case, the t-values give extremely low p-values of 0.001, so the test statistic of both the constant and the coefficient of education expenditure is significant at the 1% level. This implies that the relationship between education expenditure and GDP is likely not due to randomness.

5. **Interpretation and Implications:** The negative coefficient on education expenditure, however, highlights the necessity to further look into the effectiveness and the efficiency of spending on education in Saudi Arabia. A possible explanation for this might be resource misallocation, a mismatch maybe, between educational outcomes and labor market needs, or, a short-term economic effect that is outweighing education benefits, so that policymakers have to further examine the channels through which education expenditure affects economic performance. Potential also to proceed on other variables like the quality of education regarding the level of expenditure targeted; is it on primary or higher education, and perhaps complementary policies that can be applied to enhance the positive effect of education on economic performance.

The negative sign on education spending tells a lot about the education spending in the Kingdom of Saudi Arabia. The first set of results, on the one hand, supports the negative association that points out the complicated web of economic interactions and the need for comprehensive strategies that result in optimal outcomes for an investment in education economically. Further research and policy change are both required for actually unleashing the full potential held by education as a driver of sustainable economic growth.

- The answer to the second question, which is: **What are the policy recommendations on hand that one may derive in order to improve the role of education in promoting the sustainability of the process of economic development in Saudi Arabia?**

All the above analysis and the complicated relationship between expenditure on education and GDP in Saudi Arabia give rise to the following policy recommendations to come up with the potential contribution of education in sustainable economic development:

1. Resource allocation: To ensure that the expense allocated for the education sector is spent effectively and efficiently, that is, investments in resources are focused on areas that have potential returns. These areas are STEM, vocational training, and tertiary.
2. Monitoring and evaluation: The education spending impact tracking mechanism should be put in place. The economy should come up with a system that can monitor and evaluate the impact of education spending on the various economic indicators which become a guide to areas that are successful or the ones that need improvement.
3. Curriculum development: Updated curriculum to match the new economy, with an emphasis on the orientation of the learner in critical thinking, more problem-solving techniques, and equipping him with digital literacy.
4. Teacher training: Training must be continuous to ensure a quality of teaching and the outcomes. The provision of the most recent pedagogical tools and techniques to teachers is the bedrock of a high-quality education system.
5. Convergence with industry: The collaboration between the institutions and the industries so that these graduates have the skills required in the market. This can be in the form of internships and apprenticeships and co-research.
6. Career guidance: A career guidance system that is implemented, guiding the students in being able to choose careers and education that best fits the demand in the market.
7. Funding for research: More funding towards research and development in universities or any other institution. This encourages innovation and scientific research by defining new technologies and processes giving rise to growth in the economy.
8. Innovation hubs: Universally, innovation hubs or incubators need to be installed that can further help students and researchers to develop start-ups and entrepreneurial activities.
9. Adult Education: Develop programs of adult education and lifelong learning so the working population can adapt easily to the volatile economic conditions and technological changes.
10. Online Learning: Resources to Develop online Learning resources for flexible and convenient educational opportunities at any age so that each citizen can acquire skills and knowledge as needed.
11. Devolution: To help devolve educational governance that can allow officials at the local level and even educational institutions to work independently can be a contributing factor in this regard as that may lead to more justified and region-fit educational strategies.
12. Public-Private Collaboration: Engage public-private collaboration in education to leverage resources and expertise from the private sector in enhancing educational governance, infrastructures, and delivery.
13. Access to education: Ensuring access to quality education for all citizens, including members of marginalized and disadvantaged groups. This includes closing the gap between genders and between cities and rural/remote areas.
14. Financial Assistance: Scholarship, grants, and financial aid must be provided to those from low-income families in order to facilitate them in acquiring education.

15. Education for Sustainability: Introduce at all levels of education associated with its process the concept of sustainability to improve general conception about it and behavior for better future students' culture.
16. Green Technologies: Enable and support education and training for green and sustainable technologies and practice to allow students to fit into new jobs associated with the green economy expansion.
17. Digital Infrastructure: Investors are required in digital infrastructure that can support the e-learning systems so that the students and lecturers have equal access to needed technological tools.
18. EdTech innovations: Stimulate the development and widespread implementation of educational technologies (EdTech) that will have the potential of proper implementation leading to the improved learning experience and, therefore, educational improvement.

Ensuring that these policy recommendations are implemented will help optimize Saudi Arabia's investments in the field of education to sustain economic development, such that education will play an important role in the growth and prosperity of the nation. All of this must be further researched and developed, so that the policy fine-tuning produced is to be continuously adapted to changes in economic conditions and technologies.

Conclusion

The research underscores the importance of education to advancing economic development in Saudi Arabia and as part of achieving Vision 2030. Although government spending on education is on the higher side, education does not lower the GDP in a straightforward manner, suggesting positives and areas where we can do better. The results suggest that primary, secondary, and tertiary education play a role in generating economic growth, and that the efficiency of educational investments should be evaluated to maximize results.

Recommendations

1. Resource Allocation: Invest smartly in STEM, technical, and tertiary education that gives the most returns.
2. Monitoring and Evaluation: Establish strong mechanisms to analyze the progress of education expenditure on economic variables.
3. Curriculum Development: Update curricula to encourage critical and analytical thinking, problem-solving ability, and digital literacy.
4. Teacher Training: Provide continuous training for teachers to maintain high teaching standards.
5. Industry Collaboration: Develop industry connections with close linkages to align skills with market requirements.
6. Career Guidance: Establish career guidance systems to support students in making market-oriented decisions.
7. Funding for Research: Offer more funds for R&D to accelerate innovation and technological evolution.
8. Innovation Hubs: Establish innovation hubs to encourage entrepreneurship and the growth of start-ups.

Suggestions

1. Policy Adaptation: Policy alterations for education should be systematic and ongoing, depending on the economic status and technological advances.
2. Comprehensive Strategies: Develop long-term strategies that cover everything from resource allocation to curriculum development to industry collaboration.
3. Research and Development: Promote ongoing research to improve and expand research models and their contribution to economic development.
4. Stakeholder Engagement: Encourage the inclusion of all stakeholders in education policy-making and delivery, from government to the private sector, educational institutions, and communities.
5. Sustainability Focus: Ensure that education policies prove beneficial not only for economic growth but also for sustainable development.

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