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# THE ROLE OF INFRASTRUCTURE IN THE ECONOMIC DIVERSIFICATION OF OMAN VISION 2040

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**Abstract:** Oman has been focusing on non-oil sectors in diversifying its economic agenda for its 2040 vision, and apart from human capital, the role of infrastructure as one of the non-economic determinants has been identified to be crucial in attracting foreign investment to enhance the economic goals of the nation. In this paper, the effect of infrastructure and the *Tanfeedh* Programme on economic growth are examined using data that is collected through a survey questionnaire during the period between July 2020 and January 2021. This was activated by the development of a research model that represents the interrelationships between the strategic factors. This study adopts a quantitative research design with a deductive approach to explore the purpose of this study. Survey questionnaires were conducted among 200 respondents who are involved directly and have relevant knowledge and experience with the economic diversification agenda and the *Tanfeedh* Programme. The respondents comprise two segments consisting of government staff under the *Tanfeedh* programme as the first group while the second group consists of private companies' employees who have been dealing with the government's diversification agenda. The data are analysed in two phases involving the use of IBM SPSS Statistics version 24, and Partial Least Square Structural Equation Modelling (PLS-SEM). The preliminary analysis and PLS-SEM analysis from the study indicate that the enablers of infrastructure along with the other two factors referred to as industrial development and the *Tanfeedh* programme are the right strategic factors for the economic progress of Oman.

**Keywords:** Infrastructure; Economic diversification; Economic growth; *Tanfeedh* Programme, Oman vision 2040

## 1. Introduction

On the whole countries with a single source of income might face most global fluctuations in the prices of their source. In the case of the Sultanate of Oman, and given its dependence over the past decades on oil as a primary source of income, the greatest challenge facing the Omani economy is the sharp decline in oil prices due to its connection and contribution to the gross domestic product. In 2016, during the ninth five-year plan, Oman established a program focusing on several sectors to enhance economic diversification and to address total dependence on oil, as well as to help the local economy. The programme aims to increase the contributions of non-oil sectors to enhance the gross domestic product of Oman by benefiting from the outputs of these sectors, and thus providing new job opportunities for job seekers. The tenth five-year plan (2021-2025) aims to focus on improving the implementation programme to enhance economic diversification by improving



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Vol. 8, No. 2, p. 85-104
31 December 2023
(ISSN 2716-5876)

several agendas on the economic activities including developing and sustaining human capital and developing the infrastructure to attract foreign investment.

Many studies define economic growth as the increase in the amount of goods and services produced per capita by the population over a period of time. It is also defined as the increase in the economy of a country or region, specifically in the value of goods and services produced by that country (Roser, M., 2021). In general, economic growth is the change in quantity from zero to one, the production, manufacture, or development of a new product such as antibiotics, vaccines, computers, telephone, or even development in infrastructure services which is a major change in the concept of growth. According to Coccia (2018), throughout history, economic growth has been quantified in terms of gross national product (GNP) or gross domestic product (GDP), although alternative metrics are sometimes used. The most accurate measure of growth is real GDP, which eliminates the effects of inflation. Growth is measured by the World Bank using gross national income (GNI) rather than gross domestic product (GDP) and growth in an economy is always modeled as a function of physical capital, human capital, labor supply, technology, and infrastructure (Fal'tsman, 2018). On one hand, economic growth can be positive, zero, or negative, and positive economic growth is recorded when the average annual rhythms of macro indicators are higher than the average rhythms of population growth (Nguyen, 2017). On the other hand, economic diversification consolidates the economic and macroeconomic foundations of a country (Abdennour, 2019). In this case, if one form of investment yields low revenues, other investment tools can function to compensate. Thus, diversification requires changes to be implemented in the economic and macroeconomic infrastructure.

Accordingly, at the beginning of the establishment of the *Tanfeedh* programme and to improve the country's economic conditions for Oman Vision 2040, the Omani government selected several sectors that are considered the main economic pillar which consists of fisheries, transport, manufacturing, tourism, mining, and logistics, and later added several other sectors. The findings of this study provide useful information for formulating strategies that will enhance Oman's economic diversification program and the efficiency of non-economic determinants specifically the infrastructure sector. The findings also provide further information on whether the results will contribute to the realignment of existing policies to promote a more favorable environment and sustainable development in Oman.

## 2. Problem Statement

Oman's overreliance on natural resource exportation means that its economy is tied to the rise and fall of oil and gas prices. Low oil prices and lockdown measures implemented in 2019 and 2020 to control the spread of the COVID-19 pandemic have certainly exacerbated Oman's economic woes. The Sultanate's overreliance on oil has become even more problematic given the 2020 fall in global oil prices, which strained both the country's GDP expansion and its fiscal and current account balances. The low level of economic diversification can be harmful because the concentration of economic activities around natural resources makes this resource-rich country vulnerable to economic shocks related to volatile commodity prices and resource stock depletion (Mohammed et al., 2020). In terms of economic resources, Oman began as a highly resource-dependent country, hence for the



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Vol. 8, No. 2, p. 85-104
31 December 2023
(ISSN 2716-5876)

country to diversify away from natural resources and develop a highly productive non-resource sector remains challenging. What drives successful economic diversification in Oman? Do economic and non-economic determinants influence the economic diversification of Oman?

Taking the examples of another part of the world, to succeed in terms of economic diversification and growth, Oman should focus on developing and improving its infrastructure. Mamatzakis (2008) confirms that infrastructure is an important element in the economic activity in Greece, and he also estimates that public infrastructure reduces costs in most manufacturing since it promotes the growth of resource productivity. Efficient and advanced infrastructures support economic growth and improve quality of life, and it is important for national security (Baldwin & Dixon, 2008). The researchers also state infrastructure has an overall impact on people's lives and various aspects in terms of regional and economic competitiveness growth, production, labour productivity, environment and well-being. Moreover, in general, good infrastructure can cause timely delivery of tasks and cost savings, increase safety, and enhance information network development (Bristow & Nellthorp, 2000). Snieska and Bruneckiene (2009) identified infrastructure as one of the indicators of the competitiveness of countries. In general, infrastructure which includes road transport, telecommunications, and newly built property are defined as indicators of production success. The present study aims to examine the effects of infrastructure as one of the non-economic determinants under the agenda of economic diversification, implementation program and industrial development, on the economic growth of the Sultanate of Oman.

## 3. Literature Review

Since the economic diversification matter is relatively new in Oman, issues and contributions to the continuity and sustainability of growth in the nation relating to the diversification agenda are limited and few. Kasem and Alwin (2019) focus on the economic diversification agenda but they do not include the effects these agendas could have on the economic growth of Oman. However, they found that the most important key enablers that can drive economic diversification are the development of industry, workforce, and infrastructure. Diversification is considered appropriate because, in the event of low oil prices, governments often reduce their capital and commercial spending when they find no sources of revenue (Al-Amri & Marey-Perez, 2021). Although this measure helps the government to reduce its deficit, the impact on the economy is massive because the private sector is highly dependent on government expenditure. Thus, if there is a contraction in government expenditure, a contraction in private sector activities follows (El Mahmah & Kandil, 2019).

Currently, Omani's economic policy aims to diversify the production base, strengthen the role of the private sector in the economy, and build human capacity to achieve structural changes in the economy. This means that the country has had to embark on the liberalisation process, and expansion of non-oil industries especially, to enable the development of new industries. The plan aims to raise the share of the oil sector by only 9 percent of GDP by 2020 (from 5 percent) to main the industries such as manufacturing, education, tourism,



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Vol. 8, No. 2, p. 85-104
31 December 2023
(ISSN 2716-5876)

transportation and logistics, mining, agriculture, and fisheries (Al-Sarihi, 2020). In tandem with the plan, Oman formed a national committee on 18th September 2016 with the name *Tanfeedh* which stands for National Programme for Enhancing Economic Diversification to speed up the shift from oil-based economies. *Tanfeedh* was launched to build on the successes of previous plans, concentrating on target industries, and it is part of the 9th Five-Year Development Plan (2016-2020). The Royal Decree (1/2016) has identified the targeted sectors which consist of manufacturing, education, tourism, transportation and logistics, mining, agriculture, and fisheries (Al Harthy, 2017). The main objective of the *Tanfeedh* policy is to increase production, and create more jobs for these sectors, hence raising the GDP of the Sultanate.

The role of infrastructure in economic development is vital, and without adequate infrastructure, modern commerce characterised by production specialisation and exchange across markets would find it difficult to operate (Azam & Abu Bakar, 2017). Infrastructure, including logistics and transportation, are key non-oil sectors that contribute to the overall well-being and sustainability of the economy (Babayev, 2019). Economic diversification requires a large variety of productive capabilities such as infrastructure, knowledge, institutions, and others, within these countries (Hidalgo & Hausmann, 2009). These productive capabilities allow countries to produce high value-added and complex products, recombine capabilities and further diversify and grow. Infrastructures are the basic physical structures that are needed for the operation of a society and these may include industries, buildings, roads bridges, and health services (Shuibo et al., 2015). In developing countries, infrastructure that connotes roads, energy supply, communication facilities, utilities, and transportation may determine production and transaction costs, thus influencing incentives for the attraction of FDI into a country (region) (Isukul et al., 2019). Therefore, one of the most important steps that a government can take to diversify its economy is to focus on the fundamental aspects, such as investing in infrastructure. In the context of Oman and the economic growth of the nation, this paper addresses matters surrounding economic diversification by focusing on infrastructure as the non-economic determinant, while the *Tanfeedh* programme is also examined.

## 4. Conceptual Framework

Figure 1 depicts the conceptual framework of the present study on the relationships between the drivers of economic diversification, and economic growth.

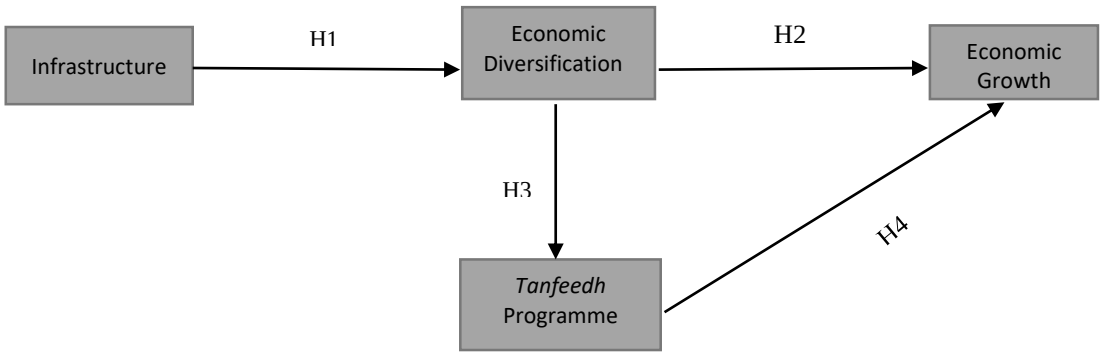


Figure 1. The Conceptual Framework of Infrastructure to influence the economic growth



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Vol. 8, No. 2, p. 85-104
31 December 2023
(ISSN 2716-5876)

Based on the interrelationships between the variables or constructs in the conceptual framework in Figure 1, the following hypotheses statements are formulated.

H1: Infrastructure has a significant influence on economic diversification.
H2: Economic diversification has a significant influence on economic growth.
H3: Economic diversification has a significant influence on the *Tanfeedh* programme.
H4: The *Tanfeedh* programme significantly influences economic growth.

## 5. Method and Analysis

This paper highlights infrastructure as a non-economic determinant that has an impact on the economic growth of Oman, while the *Tanfeedh* programme acts as a mediating factor in the relationship between infrastructure and economic growth. Therefore, the sampling population of this study is personnel who are involved directly and have relevant knowledge and experience with the economic diversification agenda and the *Tanfeedh* programme. The present research utilised a questionnaire survey to collect data which was conducted during July 2020 and January 2021. The preliminary data analysis explains how the various data cleaning and descriptive statistics techniques work, and how they are applied to the instruments of the study. The analysis also includes Cronbach's alpha to maintain consistency, and data analysis for the pilot study was carried out by utilising SPSS software version 20.0.

Table 1 shows the structure of the questionnaire for this study. The questions are organised into five sections with four major constructs formulated based on the research objectives and the framework of this research. The analysis begins with a brief overview of the sample respondents and their responses. This is followed by diagnostic data analysis which involves checking for the normality of the data and the existence of potential outliers in the data. The reliability measurement of each of the variables is evaluated using Cronbach Alpha.

Table 1. Structure of Questionnaire

| Part | Variables | Items |
|---|---|---|
| A | Demographic Profile | 14 |
| B | Drivers of Economic Diversification<br>a) Infrastructure (Non-Economic Determinant) | 24 |
| C | Economic Diversification | 12 |
| D | *Tanfeedh* Programme | 9 |
| E | Economic Growth | 6 |

### *5.1 Data Analysis and Findings*

This present study uses Partial Least Square Structural Equation Modelling (PLS-SEM) to determine the measurements and subsequently test the relationship between variables defined by the theoretical model (Hair et al., 2014). Moreover, PLS-SEM forms part of the



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Vol. 8, No. 2, p. 85-104
31 December 2023
(ISSN 2716-5876)

multi-variant analytical method popular portfolio (Shiau et al., 2019). The selection of PLS-SEM in this study can be determined and used based on the research objectives, the modelling of the structural model, the types of measurement model specification, data characteristics and the model evaluation (Hair et al., 2019).

*5.2 Demographic Analysis*

Table 2 shows details of the survey distributed to respondents, the number of responses, the response rate and the number of surveys accepted. A total of 385 questionnaires were distributed to employees from 51 different institutions comprising government agencies, and private companies. After verifying and checking all returned questionnaires, 200 have been returned making a percentage of 51.9. Of the total of 200, 101 (50.5 percent) respondents are from government agencies, and the remaining 90 (49.5 percent) respondents are employees of private companies.

Table 2. Summary of Responses

| | **Total** |
|---|---|
| Survey Distributed | 385 |
| Number of Responses | 200 |
| Survey Incomplete | 0 |
| Usable Surveys (Response Rate) | 200 (51.9%) |

The profiles of the respondents involved in this study consist of the following information; the positions, education level, managerial experience, years of involvement in the *Tanfeedh* programme, types of organisation, and others. Table 3 shows the positions of the respondents in various organisations. The results show that most managers (44 percent) are directors or executives, while 23 percent of the participants are either owners, founders, Chairman or Chairmen of the Company. At the same time, 16% of respondents are general managers/senior managers. The least involved in this study were the staff who worked as administrative/executive directors (4 percent). This suggests that all respondents may be in a position with leadership skills to manage.

Table 3. Respondents' Position in the Organisation

| **Position** | **Percentage (%)** |
|---|---|
| Manager / Executive | 44.0 |
| General/Senior Manager | 16.0 |
| Chief Executive Officer | 8.5 |
| Deputy Director/Vice President | 4.5 |
| Managing / Executive Director | 4.0 |
| Owner/Founder/Chairman/President | 23.0 |

Regarding the length of service in the managerial position, table 4 shows that nearly half of the respondents (54 percent) have served less than 10 years in a managerial position in their organisations. In addition, 17 percent of respondents have been serving their respective organisations for more than 21 years in managerial positions. The reasonably long



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Vol. 8, No. 2, p. 85-104
31 December 2023
(ISSN 2716-5876)

length of service in a managerial position indicates that they may have a significant amount of experience in managing economic diversification.

Regarding the years of experience in dealing with the National Economic Diversification Program *Tanfeedh*, Table 5 shows that more than half of the respondents (52.3%) participated in the Tanfeedh program for less than two years. Approximately 42.2 percent of respondents have dealt with the *Tanfeedh* program between 2 to 4 years, while 1.5 % have been involved in the *Tanfeedh* programme for more than 4 years. These findings indicate that all respondents are probably in a position to have experience implementing or monitoring the implementation of the *Tanfeedh* program.

Table 4. Respondents' Experience in the Managerial Position

| **Years of Experience** | **Percentage (%)** |
|---|---|
| Less that 5 years | 26.0 |
| 6-10 years | 28.0 |
| 11-15 years | 18.5 |
| 16-20 years | 10.5 |
| 21 years or more | 17.0 |

Table 5. Respondents' Experience in the *Tanfeedh* Programme

| **Years of Experience** | **Percentage (%)** |
|---|---|
| Less than 2 years | 52.3 |
| 2 – 3 years | 36.7 |
| 3 – 4 years | 9.5 |
| More than 4 years | 1.5 |

Table 6 shows the types of organisations that respondents currently belong. The results show that the majority of respondents (50.5%) are government employees, while 23.5% consist of small and medium (SMEs) entrepreneurs. A small percentage of employees are affiliated with government-linked companies (9.5 percent), and 5.5% are from foreign companies (5.5 percent). The place of work of the rest is not disclosed.

Table 6. Affiliation of Respondents

| **Types of Organisation** | **Percentage (%)** |
|---|---|
| Government Agency | 50.5 |
| Small and Medium Enterprises (SMEs) | 23.5 |
| Government-linked Company (GLCs) | 9.5 |
| Foreign Company | 5.5 |
| Others / Unspecified | 11.0 |

Respondents were asked about their organisation's years of operation. The results in Table 7 revealed that there is an equal proportion of organisations established in a period of 6 to 15 years and more than 25 years. The results also show that 14 percent of the organisations were established for 16 to 25 years. Meanwhile, only a small percentage (3.5 percent) of organisations have been in operation for less than 5 years.



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Vol. 8, No. 2, p. 85-104
31 December 2023
(ISSN 2716-5876)

Table 7. Organisations' Years of Operation

| Years of Operation | Percentage (%) |
|---|---|
| Less than 3 years | 3.5 |
| 3 - 5 years | 3.0 |
| 6 - 15 years | 22.5 |
| 16 - 25 years | 14.0 |
| More than 25 years | 22.5 |
| Others / Unspecified | 34.5 |

The geographical location of organisations was determined by this study. Table 8 shows that the majority of organisations in which respondents work are located in the capital, Muscat (55 percent). On the contrary, there is a small percentage (7 percent) of organisations that operate in smaller cities such as Salalah, Duqm, and Sohar. The rest of the geographical locations of the organisations are not mentioned.

Table 8. Location of Organisational Operation

| Location | Percentage (%) |
|---|---|
| Muscat | 55.0 |
| Duqm | 4.0 |
| Salsalah | 2.0 |
| Sohar | 1.0 |
| Others/Unspecified | 38.0 |

The ownership structure of the organisation is divided into several types ranging from organisations that are locally owned, foreign-owned, or established by local and foreign partners. Table 9 shows that almost half of the organisations (46.5 percent) comprising respondents who were working in organisations wholly owned by the Omanis, while 15.5 percent are jointly owned by the Omanis and foreign partners. Meanwhile, foreign-owned organisations accounted for only 2.5 percent. The owners of 35.5 percent of the remaining organisations have not been identified.

Table 9. Ownership Types of the Organisations

| Ownership Types | Percentage (%) |
|---|---|
| Omanis | 46.5 |
| Non-Omanis | 2.5 |
| Both Omanis & Non-Omani | 15.5 |
| Others / Unspecified | 35.5 |

Participants were also asked about the services and products that are offered by their organisations, their products or services, and the market in which their products/services are sold. Table 10 shows that 26 percent of respondents' report that their organisation's products/services are localised and sold only in the local market. Conversely, organisations that targeted domestic and international markets with their products and services accounted for the largest proportion (38.5 percent), while 35.5 percent of respondents did not specify the direction of their products/service markets.



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Vol. 8, No. 2, p. 85-104
31 December 2023
(ISSN 2716-5876)

Table 10. Products/Services Orientation

| Products/Services and Market | Percentage (%) |
|---|---|
| Local / Domestic | 26.0 |
| Both Local & Export | 38.5 |
| Others / Unspecified | 35.5 |

In terms of the distribution of industry sectors, organisations are classified into three main industries. As shown in Table 11, (40 percent) account for the respondents who work in the services sector, and approximately 24 percent of the organisations are involved in both manufacturing and service sectors. A large part of the respondents (37%) did not specify which industrial sector their organisations belong.

Table 11. Industry Sectors

| Sectors | Percentage (%) |
|---|---|
| Manufacturing | 7.0 |
| Services | 39.5 |
| Both Manufacturing & Services | 16.5 |
| Others/Unspecified | 37.0 |

Table 12 shows that the vast majority of respondents (63.8 percent) reported that their organisations were in unspecified industries. In addition, the results show that 21.6% of respondents work in the manufacturing industry, while a small percentage of them work in other industries such as transportation, food, and agriculture.

Table 12. Types of Industry

| Industries | Percentage (%) |
|---|---|
| Manufacturing | 21.6 |
| Transportation | 4.0 |
| Food | 4.0 |
| Agriculture | 3.5 |
| Energy | 3.0 |
| Others/Unspecified | 63.8 |

### *5.3 Normality*

This section describes the summary statistics of the data from the indicators of each of the constructs. According to Hair et al. (2019), the normal statistical values of deviation and mutation range from ±3.00. Table 13 shows that the assessment of normality of the metric variables in this study contains empirical measures of a distribution's shape characteristics (skewness and kurtosis). The standard tests of skewness and kurtosis values for all constructs are between ±3.00, which is within the acceptable range of normal distribution. Following this suggestion, the data appear to show sufficiently normal.



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Vol. 8, No. 2, p. 85-104
31 December 2023
(ISSN 2716-5876)

Table 13. Normality Assessment Result

| Constructs | Skewness (±3) | Kurtosis (±3) | Normality Assumption |
|---|---|---|---|
| Infrastructure | -1.114 | 1.542 | Normal |
| Economic Diversification | -0.260 | 0.725 | Normal |
| *Tanfeedh* Programme | -0.680 | 0.388 | Normal |
| Economic Growth | -0.318 | -0.230 | Normal |

### *5.4 PLS-SEM Analysis Results*

Partial Least Squares (PLS) were used in this study to test the model as well as provide a systematic assessment of the PLS-SEM results as recommended by Hair et al. (2019). In addition, the techniques enable the testing of hypotheses related to the relationship of the latent variables, while Henseler et al. (2016) recommend the use of SEM techniques to estimate some specific models.

#### *5.4.1 Evaluation of Reflective Measurement Model*

Based on Ringle et al. (2015), a reflective measurement model is used to assess the extent to which a variable is loaded on its underlying construct, and to confirm the underlying relationship of the variable with its factors (Byrne, 2010). The reflective measurement model can be validated using its reliability and validity analysis (Hair et al., 2019). The following section evaluates and examines the findings for each analysis which is used to calculate the reliability and validity of the measurement model for this study.

##### *5.4.1.1 Internal Consistency Reliability*

Reliable measurement consistency is obtained if many measurements are taken (Hair et al., 2019). Therefore, the primary indicator of the internal consistency of the scale is reliability, while the key to understanding reliability is consistency, and composite reliability (CR) is considered to be another measure of internal consistency (Zikmund et al., 2013). To determine the measure's reliability, Cronbach's alpha test is employed with a lower limit of 0.70 (Hair et al., 2010). The composite reliability value ranges from 0 to 1, with a higher value indicating greater reliability. Hair et al. (2014) suggest that the composite reliability value of 0.60 to 0.70 is considered acceptable, whereas the value of 0.70 and 0.90 is considered adequate.

Table 14 shows that Cronbach's alpha values for all constructs range between 0.857 and 0.892, which exceed the 0.7 thresholds recommended by Hair et al (2014). Composite reliability values that range between 0.895 and 0.913, indicate an adequate internal consistency which is greater than 0.7 as suggested by Gefen et al., (2000). As a result, the internal consistency reliability for the measurements is deemed acceptable and reliable.



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Vol. 8, No. 2, p. 85-104
31 December 2023
(ISSN 2716-5876)

Table 14. Internal Consistency Reliability Results of Initial Model

| Constructs | Measurement Items | Cronbach's Alpha (CA) | Composite Reliability (CR) |
|---|---|---|---|
| Economic Diversification | C1 – C12 | 0.875 | 0.896 |
| *Tanfeedh* Programme | E1 – E9 | 0.892 | 0.913 |
| Economic Growth | F1 – F6 | 0.857 | 0.895 |
| Non-Economic Determinants | B23 – B46 | n.a. | n.a. |

Note: Economic diversification, the *Tanfeedh* programme, and economic growth are 'reflective' constructs. Contrary, the non-economic determinants are 'formative' constructs (infrastructure). Therefore, Cronbach's alpha and Composite reliability are not relevant (n.a.) for this type of construct.

### *5.4.1.2 Indicator Reliability*

The best way to define indicator reliability is the degree to which a variable or set of variables is reliable concerning the outcome research attempts to measure (Urbach & Ahlemann, 2010). The indicator's reliability is determined by the magnitude of the outer loadings applied to the constructs. The indicator reliability value can be calculated by multiplying the square of the standardised outer loadings, also known as the communality of an item. All indicators' outer loadings should be statistically significant, with a common guideline of 0.05 level or greater than 0.707 (Chin, 1998). Table 15 presents the outer loadings, outer weights, and VIF of the infrastructure indicator as a formative construct or items in each of these indicators.

Table 15. Outer Loadings, Outer Weights, and Variance Inflation Factor (VIF)

| Constructs | Items | Outer Loading | Outer Weight | VIF |
|---|---|---|---|---|
| Infrastructure | B36 | 0.880 | 0.351 | 2.763 |
| | B37 | 0.955 | 0.752 | 3.224 |
| | B38 | 0.472 | -0.117 | 1.860 |
| | B39 | 0.561 | -0.242 | 3.703 |
| | B40 | 0.284 | 0.106 | 2.209 |
| | B41 | 0.666 | 0.201 | 2.427 |

### *5.4.1.3 Convergent Validity*

The results of the convergent validity for the initial measurement model are shown in Table 16. The results indicate that all constructs have very high composite reliability, ranging from 0.898 to 0.922. The AVE values for all factors are greater than 0.5. As a result, the overall item reliability and convergent validity of the measurement items could be considered sufficient.

### *5.4.1.4 Discriminant Validity*

The discriminant validity assessment has the purpose of confirming that the reflective construct has the greatest relationship with its indicators in the PLS model (Hair et al., 2019).



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Vol. 8, No. 2, p. 85-104
31 December 2023
(ISSN 2716-5876)

Using SEM-PLS, three ways are used to measure the discriminant validity of the cross-loading matrix, Fornell–Lacker criterion, and heterotrait-monotrait ratio (HTMT). Table 16 describes the findings of the Fornell–Lacker criterion assessment and the correlations between constructs at the lower left triangle. The square roots of the AVE for the reflective constructs are economic diversification (0.729), Tanfeedh programme (0.752), and economic growth (0.773). This finding indicates that a discriminant validity exists based on the Fornell-Larcker criterion.

Table 16. Fornell-Lacker Criterion Result

| | Economic Diversification | Industry Development | *Tanfeedh* Programme | Economic Growth |
|---|---|---|---|---|
| Econ. Diversification | **0.729** | | | |
| *Tanfeedh* Programme | 0.456 | 0.500 | **0.752** | |
| Economic Growth | 0.596 | 0.481 | 0.542 | **0.773** |

### *5.4.2 Evaluation of Formative Constructs (Infrastructure)*

This section evaluates the construct validity of the formative constructs under the categories of infrastructure as a non-economic determinant. The PLS-SEM algorithm estimates the outer weights of indicators, which indicate the contribution of each formative indicator to the latent variable's variance. Weights assigned to indicators are used to demonstrate construct validity. Hair et al. (2019) mention that the indicator weights are typically standardised between -1 and +1, but can be lower or higher than this, indicating an abnormal result (e.g., due to collinearity and/or small sample sizes). A relationship with a weight close to zero indicates a weak relationship, whereas relationships with a weight close to +1 (or -1) indicate strong positive (or negative) relationships. If the confidence interval for an indicator weight contains zero, then the indicator is not statistically significant and should be removed from the measurement model (Cenfetelli & Bassellier, 2009). Table 17 shows that for non-economic determinants, it can be seen that the infrastructure construct has only two significant indicators, which are B38 and B40. All of the VIF values are low, with none of them exceeding 5.0 (VIF < 5.0). Hence, it is self-evident that removing formative indicators with VIF values greater than 5.0 will aid in avoiding the multicollinearity issue among these indicators, which can limit serious problems in model parameter estimation.

Table 17. Outer Weights, Outer Loadings and VIF of the Formative Construct

| **Constructs** | **Item** | **Outer Weight** | **Outer Loading** | ***t* -statistic** | ***p*-value** | **VIF** |
|---|---|---|---|---|---|---|
| Infrastructure | B36 | 0.414 | 0.866 | 2.698 | .009*** | 3.533 |
| | B37 | -0.025 | 0.673 | 0.148 | .883NS | 3.351 |
| | B38 | -0.156 | 0.535 | 1.069 | .290NS | 1.897 |
| | B39 | 0.110 | 0.817 | 0.566 | .574NS | 3.545 |
| | B40 | 0.479 | 0.821 | 4.145 | .000*** | 1.883 |
| | B41 | 0.317 | 0.815 | 2.154 | .036** | 2.658 |



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Vol. 8, No. 2, p. 85-104
31 December 2023
(ISSN 2716-5876)

### *5.4.3 Evaluation of Structural Model*

According to Urbach and Ahlemann (2010), once the reflective measurement model has been validated successfully, the researcher can run the PLS algorithm to compute the model parameter estimates. Therefore, structural model assessment is used to determine whether the hypotheses of the structural model are supported by the data in a particular study. By the recommendations of Hair et al. (2017) this study evaluates the structural model and, the paper will evaluate the mediation relationship proposed in the research model.

### *5.4.4 Coefficient of Determination ($R^2$)*

According to Hair et al. (2014), the $R^2$ value ranges from 0 to 1, with higher values indicating a higher level of model predictive accuracy. However, the rules of thumb for an acceptable $R^2$ value are difficult to define as it is dependent on the model's complexity and the research field. Chin (1998) suggests that $R^2$ values of approximately 0.670, 0.333, and 0.190 for endogenous variables can be described as substantial, average, or weak, respectively. According to Hair et al. (2015) and Henseler et al. (2009), $R^2$ values of 0.75, 0.50, and 0.25 indicate substantial, while according to Hair et al. (2015) and Henseler et al. (2009), $R^2$ values of 0.75, 0.50, and 0.25 indicate substantial, moderate, and weak, respectively. These rules of thumb indicate that a higher $R^2$ value improves the structural model's predictive ability. Table 18 presents the values of $R^2$ and the adjusted $R^2$. The $R^2$ for economic growth was 0.446, indicating that 44.6 percent of the variations in this construct were due to the variations in the reflective constructs, namely economic diversification, and the *Tanfeedh* programme. Further, $R^2$ for economic diversification was 0.691, which is contributed by the variations in the formative construct namely infrastructure.

Table 18. Coefficient of Determination (R2 ) Result

| **Constructs** | **$R^2$** | **Adjusted $R_2$** |
|---|---|---|
| Economic Diversification | 0.691 | 0.679 |
| *Tanfeedh* Programme | 0.152 | 0.148 |
| Economic Growth | 0.446 | 0.437 |

### *5.4.5 Effect Size ($f^2$)*

In regards to effect size ($f^2$), Table 19 shows that economic diversification has a small effect size on economic growth, and a moderate effect size on the *Tanfeedh* programme of 0.131, 0.469, and 0.179, respectively. Meanwhile, the effect size of the *Tanfeedh* programme on economic growth is small and moderate, respectively. In addition, for the formative construct, infrastructure has a moderate effect size on economic diversification.

Table 19. Effect Sizes ($f^2$) Result

| | **Economic Diversification** | **Economic Growth** | **Industry Development** | **Tanfeedh Programme** |
|---|---|---|---|---|
| Econ. Diversification | | 0.131 | 0.469 | 0.179 |
| *Tanfeedh* Programme | | 0.174 | | |
| Infrastructure | 0.262 | | | |



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Vol. 8, No. 2, p. 85-104
31 December 2023
(ISSN 2716-5876)

### *5.4.6 Predictive Relevance ($Q^2$)*

$Q^2$ is the most appropriate metric to determine the predictive importance of the internal model and how well the model estimates missing data (Hair et al., 2019). Based on this, $Q^2$ shows how well the empirical data can be reconstructed with the help of the model and PLS parameters (Fornell & Cha, 1994). Finally, Table 20 reveals that the $Q^2$ values for all constructs were larger than zero, indicating that economic diversification, the *Tanfeedh* programme, and economic growth have provided unequivocal support for the model's predictive relevance regarding the endogenous constructs.

Table 20. The Predictive Relevance ($Q^2$) Result

| **Constructs** | **SSO** | **SSE** | **$Q^2$ (= 1-SSE/SSO)** |
|---|---|---|---|
| Economic Diversification | 955.0 | 504.867 | 0.471 > 0 |
| Economic Growth | 1146.0 | 851.519 | 0.257 > 0 |
| *Tanfeedh* Programme | 1719.0 | 1584.821 | 0.078 > 0 |

### *5.4.7 Direct (Path Coefficient) Results*

The evaluation of the path coefficients between the model's latent variables is the next step in the structural model's evaluation. The PLS-SEM algorithm is used to estimate the path coefficients, which represent the hypothesised relationships linking the constructs. The values of path coefficients are standardised from -1 to +1, with coefficients closer to +1 indicating a strong positive relationship and coefficients closer to -1 indicating a strong negative relationship, even though path coefficient values close to +1 or -1 are statistically significant as shown in table 21.

Table 21. The Path Coefficients of the Initial Structural Model

| **Hypotheses** | **Path Coeff.** | ***t*-stat** | ***p*-value** |
|---|---|---|---|
| Infrastructure → Economic Diversification | 0.438 | 5.682 | .000*** |
| Economic Diversification → Economic Growth | 0.332 | 5.504 | .000*** |
| Economic Diversification → *Tanfeedh* Programme | 0.390 | 5.794 | .000*** |
| *Tanfeedh* Programme → Economic Growth | 0.354 | 4.776 | .000*** |

Note: *** denotes significance at 0.001 level; ** denotes significance at 0.05 level.

### *5.5. Indirect (Mediation) Analysis Results*

In the PLS path model, mediation occurs when a third variable intervenes between two other related constructs and absorbs the effect of an exogenous variable on an endogenous construct. The current study used a non-parametric bootstrapping method to determine the significance of a mediating effect that is well-suited for the PLS-SEM method (Hair et al., 2017; Preacher & Hayes, 2008). Xinshu et al. (2010) developed a procedure for analysing mediation that distinguishes between two types of non-mediation (direct-only non-mediation and no-effect non-mediation) and three types of mediation (i.e. complementary mediation, competitive mediation, and indirect-only mediation). They argue that the indirect effect must



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Vol. 8, No. 2, p. 85-104
31 December 2023
(ISSN 2716-5876)

be significant to indicate the presence of a mediating effect, in which case the mediator absorbs a portion of the direct effect, and the mediator absorbs a portion of the direct effect. The calculation of the specific indirect effects and total effect for the reflective constructs involving economic diversification, the *Tanfeedh* programme, and economic growth is tabulated in Table 22.

Table 22. Calculation of Specific Indirect Effects and Total Indirect Effects

| **Effects** | | **Calculation** |
|---|---|---|
| a) | Indirect Effects | a × b = 0.565 × 0.141<br>= 0.079<br>d × e = 0.390 × 0.354<br>= 0.138 |
| b) | Total Indirect Effect | a × b + d × e = 0.079 + 0.138<br>= 0.217 |
| c) | Total Effect | c + a × b + d × e = 0.332 + 0.079 + 0.138<br>= 0.549 |

Table 23 reveals the results of total effects that depict infrastructure as a non-economic determinant statistically and significantly influences economic growth. In addition, economic diversification and the *Tanfeedh* programme positively influence economic growth. Among these predictors, it shows that economic diversification has the strongest total effects on economic growth. The result also shows that infrastructure is an important factor that must be considered by the Government of Oman in line with the economic diversification agenda. Concerning the government's aspiration, the results also seem to confirm that the economic diversification agenda is the right economic strategy for the implementation of the *Tanfeedh* programme because this construct has the highest total effect on the *Tanfeedh* programme.

Table 23. Total Effects and Its Significance Value

| **Hypotheses** | **Total Effects** | ***t*-stat** | ***p*-value** |
|---|---|---|---|
| Infrastructure → Economic Growth | 0.241 | 4.798 | .000*** |
| Economic Diversification → Economic Growth | 0.549 | 9.969 | .000*** |
| *Tanfeedh* Program → Economic Growth | 0.354 | 4.776 | .000*** |
| Infrastructure → Economic Diversification | 0.438 | 5.682 | .000*** |
| Infrastructure → *Tanfeedh* Programme | 0.171 | 3.698 | .000*** |
| Economic Diversification → *Tanfeedh* Programme | 0.390 | 5.794 | .000*** |

Note: *** denotes significance at .001 level; ** denotes significance at .05 level; NS denotes not significant.

The mediating effects shown in Table 24 reveal that the indirect effect of the association between economic diversification and economic growth via the *Tanfeedh* programme is also significant (β = 0.138, *t*-stat = 3.489, *p*-value < .05), and this association is significant at 1 percent level. The findings of the mediating effects indicate that the *Tanfeedh* programme partially mediates the influence of economic diversification on the economic growth relationship since both the direct and indirect effects are significant. In addition, since the direct and indirect effects are both positive, it signals a complementary partial mediation on the association between economic diversification and economic growth. Complementary



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Vol. 8, No. 2, p. 85-104
31 December 2023
(ISSN 2716-5876)

partial mediation is often called a 'consistent' model or a 'positive confounding' model (Xinshu et al., 2010).

Table 24. Mediating Effects

| Hypotheses | Indirect Effects | *t*-stat | *p*-value |
|---|---|---|---|
| Econ. Diversification → *Tanfeedh* Program → Economic Growth | 0.138 | 3.489 | .001*** |

Note: *** denotes significance at .001 level; ** denotes significance at .05 level; NS denotes not significant.

The next step is to identify actionable strategies based on the sizes of the formative construct's weights. Table 25 displays the items of the formative constructs that need to be addressed. The result clearly shows that three (3) items significantly influence the infrastructure construct, identified as B40 (public-private partnership has sped up the development of infrastructure in the country), B36 (the government is working to diversify Oman's economy by building modern infrastructure), and B39 (the infrastructure being built in the country is based on the well-crafted development plan), were the most contributing indicators that define this formative construct. Meanwhile, B41 item (adequate funding has been allocated by the government for the development of infrastructure), B38 (the government makes sure that adequate policies are formulated for the development of infrastructure), and B39 (the infrastructure being built in the country is based on the well-crafted development plan) were the least contributing indicators to infrastructure.

Table 25. Actionable Strategies Items for Economic Growth from Formative Constructs

| Formative Constructs | Items | Loadings | Description |
|---|---|---|---|
| **Infrastructure ($\beta = 0.438^{***}$)** | B40 | 0.483*** | – Public-private partnership has sped up the development of infrastructure in the country |
| | B36 | 0.413*** | – The government is working to diversify Oman's economy by building modern infrastructure |
| | B41 | 0.316*** | – Adequate funding has been allocated by the government for the development of infrastructure |
| | B39 | 0.110NS | – The infrastructure being built in the country is based on a well-crafted development plan |
| | B38 | -0.157NS | – The government makes sure that adequate policies are formulated for the development of infrastructure |
| | B37 | -0.025NS | A business-friendly government tends to develop infrastructure (e.g., transportation) that will attract investment |

Note: *** denotes significance at 0.001 level; ** denotes significance at 0.05 level; NS denotes not significant.

### *5.6 Hypotheses Testing*

The path coefficients between constructs are measured to validate the proposed hypotheses aligned with the structural model. Hypothesis $H_1$ conjectures that infrastructure as a non-economic determinant has a significant influence on economic diversification in the Sultanate of Oman. Next, economic diversification is predicted to significantly influence the economic growth in Oman ($H_2$) and the *Tanfeedh* programme ($H_3$) implemented by Oman's government. Results in Table 26 reveal that the economic diversification agenda in Oman



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Vol. 8, No. 2, p. 85-104
31 December 2023
(ISSN 2716-5876)

positively and significantly influences its economic growth (β = 0.332, *t*-stat = 5.504, *p*-value < .05) and *Tanfeedh* programme implementation (β = 0.390, *t*-stat = 5.794, *p*-value < .05), all are significant at 1 percent level. These results lead to support the hypotheses $H_2$, $H_3$, and $H_4$. Further, this result of the path coefficient value indicates that the economic diversification agenda is the main enabler of the *Tanfeedh* program in Oman.

Table 26. Hypotheses Testing Results

| Hyp | Hypotheses Statement | Path Coefficient (β) | *t*-statistics | Decision |
|---|---|---|---|---|
| $H_1$ | Infrastructure → Economic Diversification | 0.438 | 5.682*** | Supported |
| $H_2$ | Economic Diversification → Economic Growth | 0.332 | 5.504*** | Supported |
| H4 | Economic Diversification →*Tanfeedh* Programme | 0.390 | 5.794*** | Supported |
| $H_6$ | *Tanfeedh* programme → Economic Growth | 0.354 | 4.776*** | Supported |

Note: *** denotes significance at .001 level; ** denotes significance at .05 level; NS denotes not significant.

## 6. Discussion and Conclusion

The main objective of the present study is to identify the impact of infrastructure as a non-economic determinant of the economic diversification agenda and to formulate a comprehensive framework linking several strategic factors namely economic diversification, and the *Tanfeedh* programme towards economic growth in the Sultanate of Oman.

It is found that infrastructure as a non-economic determinant shows a significant influence on the economic diversification agenda. Further, the result suggests that economic diversification positively influences the economic growth of Oman. The influence of economic diversification on economic growth in this study corroborates with the majority of past studies that found economic diversification is the primary driver of long-term economic growth (such as Azretbergenova & Syzdykova, 2020; Mania & Rieber, 2019). This result indicates that economic diversification presents benefits for the country such as creating employment opportunities, encouraging structural change, and nurturing economic development which finally enhances economic growth. Besides, the result also reveals that the *Tanfeedh* programme positively influences the economic growth of Oman. This result is consistent with a finding on economic policy to position the *Tanfeedh* programme as a national policy that reveals economic policy has a great influence on economic progress at the macro and micro levels (Jingyu et al., 2019; Fenghua et al., 2019; Honghai et al., 2018).

The empirical evidence also consistently demonstrates that infrastructure has the greatest cumulative effect on economic growth and economic diversification. Based on extensive experience in other developed countries, Oman's government needs to direct foreign direct investment (FDIs) toward accelerating the provision of adequate infrastructure and transportation facilities and promoting diversification in key low-tech industries such as agriculture and textiles. While this would improve the average quality of manufacturing exports, it would also help create jobs for the Omanis. The findings of the study will be helpful for the Sultanate of Oman to achieve its 2040 vision unit in reformulating the current policy



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Vol. 8, No. 2, p. 85-104
31 December 2023
(ISSN 2716-5876)

that will improve the level of economic diversification of the country and at the same time, delink the government revenues from the oil and gas sector. To conclude, this study paves the way for future research into other economic diversification-related issues, not only in Oman but also in other Gulf Cooperation Council (GCC) neighbouring countries. Given the study's success in empirically connecting all constructs, it can serve as a useful jumping-off point for further discussion using the proposed framework. Additionally, the study discusses the limitations encountered during the research process including the relatively small scope of survey respondents, and made useful recommendations for future research.

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Vol. 8, No. 2, p. 85-104
31 December 2023
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31 December 2023
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