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Exploring the link between diversification strategy and economic performance in the Moroccan real estate sector: A Data Envelopment Analysis approach

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ABSTRACT

Objective – This study examines the relationship between diversification strategy and company economic performance in the Moroccan real estate sector. The research focuses on measuring the impact of diversification on technical and Scale efficiency using the Data Envelopment Analysis (D.E.A.) method. The objective is to provide empirical evidence regarding the performance differences between diversified and undiversified companies in the Moroccan real estate industry context.

Methodology –Data was collected on sales, inventory, and personnel expenses to construct the input-output ratio from a sample of 60 companies in the Moroccan real estate sector. Diversified and undiversified firms were identified based on their business activities. The Data Envelopment Analysis (D.E.A.) method was then applied to measure these companies' technical and Scale efficiency.

Findings – The results reveal that diversified companies in the Moroccan real estate sector exhibit significantly higher economic efficiency, around 40% compared to 31% for undiversified firms. Moreover, diversified firms demonstrate superior pure technical efficiency with a score of 47%, while undiversified firms lag at 36%. However, the two groups have no significant difference in scale efficiency. These findings highlight the positive impact of diversification on overall efficiency and suggest the potential benefits of adopting diversified strategies in the real estate industry.

Novelty – This study contributes to the existing literature by exploring the relationship between diversification and performance in the particular context of the real estate industry in Morocco. The findings of this study have practical implications. Managers and policymakers can utilize the results to understand the potential benefits of diversification and consider incorporating this strategy into their business models.

Type of Paper: Empirical/ Review

JEL Classification: L10, R15, R30, M21

Keywords: Economic performance, D.E.A., diversification, Morocco, real estate sector, technical and Scale efficiency, slack

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1. Introduction

Studies have shown a strong link between diversification strategy and economic performance regarding economies of Scale and scope (Aguiar et al., 2020; Hoang et al., 2021; Le, 2019; Mydland et al., 2020; Piscitello, 2004).

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Several companies have demonstrated successful diversification and growth, such as Menara Holding, which transformed from a family-owned S.M.E. to a national-scale holding group. This paper seeks to contribute to the existing literature by examining the relationship between diversification strategy and economic performance, specifically focusing on firm technical efficiency. While previous studies have explored the impact of diversification on firm performance in various industries, limited research has specifically focused on the real estate sector in Morocco. By addressing these research gaps, the study aims to provide valuable insights into the implications of diversification strategy on technical efficiency and overall economic performance in the particular context of the Moroccan real estate sector.

A diversification strategy involves expanding business activities into new markets or developing new products/services to reduce risks and capture growth opportunities. Construction companies in the real estate sector play a significant role, utilizing their expertise and technical skills to provide innovative solutions. Firms often pursue growth through various forms of diversification, such as vertical, horizontal, or conglomerate diversification (Jewell et al., 2014; Paulraj & Saravanan, 2012). Companies aim to enhance their competitive position in national and international markets by diversifying their revenue streams and project portfolios.

However, it is important to recognize diversification's potential risks and challenges. Integration costs and increased complexity resulting from diversification efforts can lead to diseconomies if not managed effectively. Therefore, understanding the relationship between diversification strategy and firm technical efficiency becomes crucial for decision-makers in the real estate industry.

2. Literature Review

2.1 The Relationship between diversification and economic performance

Building upon the existing literature, this paper aims to contribute to understanding the relationship between diversification strategy and technical efficiency in the Moroccan real estate sector. By critically reviewing and synthesizing the findings of previous studies, this research seeks to address the gaps and limitations in the literature, providing a more comprehensive and context-specific analysis.

Since the 1970s, social scientists have sought to establish the relationship between diversification and firm performance (Shyu & Chen, 2014). Financial performance, for instance, is measured by ratios: Return On Investment (R.O.I.) Return On Equity (R.O.E.), or Economic Value Added (E.V.A.) (Krivokapic et al., 2017; Olasupo, 2015), economic performance measures the components of price and non-price competitiveness (S. X. Li & Greenwood, 2004) and organizational performance measures social and societal performance. Yet, researchers have no consensus on the definition of economic performance. It can encompass productivity studies, notably through the total factor productivity (T.F.P.) indicator, and studies in terms of economic efficiency, which focus on technical efficiency (input-output combination) and allocative efficiency (input-price combination). Olasupo, (2015) attempted to integrate economic variables into financial variables, including the impact of gross margin, financial performance ratios, and sales growth on firm performance in the I.T. sector using longitudinal (panel) data. International diversification has an economic advantage, particularly the realization of economies of scale due to vast markets in the world (Penrose, 1995). Hence, we can conclude that diversification helps optimize operations, create synergies and maximize profit (Besanko et al., 2009).

Diversification allows a company to develop its products and services and enter new markets Oladimeji & Udosen, 2019). It is a form of corporate strategy that aims to increase profitability through a large volume of sales from new products or markets (Dust et al., 2014). It is essentially a growth strategy that differs from

mergers and acquisitions or joint ventures, often involving the same technical, financial, and commercial resources used in the original product line. Nonetheless, diversification may require new skills, techniques, equipment, and facilities (Paulraj & Saravanan, 2012).

Several other studies have explored the impact of diversification on firm performance, particularly in terms of technical efficiency. (Aguiar et al., 2020) Diversified firms tend to exhibit higher levels of technical efficiency than undiversified firms, supporting the notion that diversification positively influences operational performance. Similarly, (Hoang et al., 2021) demonstrated that diversification strategies contribute to enhanced technical efficiency in the context of the manufacturing sector.

However, it is important to note that there are also conflicting findings in the literature. (Savitha et al., 2019) demonstrated that diversification has adverse effects on the technical efficiency of insurers. Mydland, Kumbhakar, Lien, Amundsveen, and Kvile (2020) found no significant relationship between diversification and technical efficiency in the Norwegian manufacturing industry. These contrasting results suggest the need for a more nuanced and contextual understanding of the relationship.

Diversification also promotes a strategic fit, the degree to which an entity matches its resources and capabilities with opportunities in the external environment (Thompson, 2018). Economic performance roughly includes several themes such as productivity, efficiency, competitiveness, competitive advantage, synergy, etc. Industrial economics assumes that diversified firms benefit from coordination effects, such as economies of Scale and scope, information economy, stable returns, more efficient allocation of internal resources, and knowledge sharing, in several product markets (Zhou et al., 2014).

Diversification can be geographic, horizontal, vertical or conglomerate. There are many reasons for pursuing this strategy: investment diversification aims to obtain profitability or acquire skills; reinforcement diversification aims to guarantee the security of upstream supplies or downstream outlets; redeployment diversification seeks future growth; and survival diversification anticipates the decline of a strategic area of activity, (Strategic Business Unit), or ensures the company's long-term survival (La diversification stratégique, 2016). Strategic diversification modalities are related or unrelated (Dhandapani & Upadhyayula, 2015; Helfat & Eisenhardt, 2004; Shyu & Chen, 2014). These strategies correspond to acquiring bargaining power with stakeholders, transferring expertise, technology, marketing capacity, or management knowledge, exploiting the common use of a brand or reputation, gaining efficiency in the use of resources, capabilities or skills, reducing risk, achieving economies of scale and scope, and realizing synergies (Yuliani, et al., 2013). It is about creating value in an uncertain environment (Nyaingiri & Ogollah, 2015).

Diversification's positive or negative impact on company performance is not palpable (Le, 2019). (Krivokapic et al., 2017) the relationship between risk-adjusted returns measured by Return On Equity (R.O.E.) and Return On Assets (ROA) ratios and line of business diversification and performance is significant and positive in the insurance industry. Diversified insurers outperform non-diversified insurers; these authors advocate the need for diversification, increased size, capitalization, and grouping. On the other hand, (Bhatia & Thakur, 2018) demonstrated the bidirectional causal relationship between diversification and performance. The association between diversification and performance is highly significant because one leads to another. Diversification provides compelling opportunities to increase performance while higher profitability motivates management to diversify. Diversified companies enjoy a diversification premium. The entropy index on panel data measured this.

Mehmood et al. (2019) studied the impact of diversification and financial structure on firm financial performance in a sample of 520 manufacturing firms from Pakistan, India, Sri Lanka, and Bangladesh. The

authors used 14 years of panel data from 2004 to 2017. The authors found that product and geographic diversification significantly affect financial performance. In addition, they realized that capital structure and dividend policy significantly impact financial performance. As for Pandya & Rao, (2011), they showed mixed results on the impact of diversification on performance. On average, diversified firms perform better than non-diversified firms in terms of risk and return. The authors stratified the firms into performance classes. The results showed that non-diversified firms have higher returns among the best-performing class, but these returns come with high risks. In contrast, highly diversified firms have lower returns and much lower variance. The results also showed that diversified firms outperform non-diversified firms in risk and return in the low and medium-performance categories.

M. Li & Wong, (2003) support the empirical assertion that resource development and utilization through concentration and linked diversification and management of the institutional environment through unlinked diversification are important for the economic performance of firms in emerging economies, but must be considered together. On the other hand, Piscitello, (2004) attempts to operationalize the concept of corporate coherence as a dynamic interconnection between the firm's technological competencies and its downstream activities. The author presents empirical evidence illustrating that economic performance is positively influenced not by diversification per se but by coherence, i.e., in terms of the firm's ability to generate and explore synergies of various forms.

Wong et al., (2021) study the performance of diversified activities of China's construction firms. The authors conclude that increasing the degree of diversification has a negative impact on growth and R.O.E., while one-phase lag diversification promotes the growth of Chinese real estate firms. China's real estate market is gradually cooling down under the policy: "Houses are for living, not for speculation." (Haran et al., 2020), test how firm-specific attributes, including market capitalization, capital structure, diversity, and investment orientation, positively impact the performance of listed European real estate firms. Using serial (panel) data from 2007 to 2017 on a sample of 113 firms in the construction sector. The results show that sector-specific companies outperform diversified companies; investors should seek diversification through portfolio approaches rather than company-level strategies. Table 1 presents the main theoretical contributions on the relationship between diversification and performance.

Table 1 : Selective literature review

Authors	Themes	Data	Sector
(Olasupo, 2015)	Impact of gross margin, financial performance ratios and sales growth on company performance	Cross-section	I.T.
(Krivokapic et al., 2017)	Relationship between risk-adjusted returns measured by Return On Equity (R.O.E.) and Return On Assets (ROA) ratios and industry diversification and performance	Panel 2004-2014	Inssurance
(Bhatia & Thakur, 2018)	Bidirectional causal relationship between diversification and performance	Panel	Indian companies
(Mehmood et al., 2019)	Impact of diversification and financial structure on financial performance	Panel 2004-2017	Manufacture Several countries
(Pandya & Rao, 2011)	Empirical evaluation of the association between diversification and performance according to performance classes and the risk-return trade-off	-	Différentes entreprises
Piscitello, (2004)	Economic performance is positively influenced not by diversification per se but in terms of coherence (synergies).	-	-
M. Li & Wong, (2003)	Resource development and utilization through concentration and unlinked diversification are important for economic performance	-	Companies of China
Wong et al., (2021)	Diversification has a negative impact on growth and R.O.E.	Panel 2015-2019	Construction Chinese

Authors	Themes	Data	Sector
Haran et al., (2020)	To what extent do firm-specific attributes such as market capitalization, capital structure, diversity, and investment orientation positively impact the performance of listed firms?	Panel 2007-2017	companies Construction European companies

To further develop the arguments, it is crucial to consider the theoretical frameworks and methodological approaches employed in previous studies. (Piscitello, 2004) emphasized the importance of economies of Scale and scope as mechanisms through which diversification can enhance technical efficiency. Additionally, studies have employed various analytical techniques, such as data envelopment analysis (D.E.A.) and stochastic frontier analysis (S.F.A.), to measure technical efficiency and assess the impact of diversification (Zaoudi, 2021; Zaoudi et al., 2017).

3. Research Methodology

3.1 Data Collection and Sampling

The sample includes 60 Moroccan companies in the construction sector through 2019/2020. The study adopts a quantitative research method. We stratify our database into two groups: diversified companies and non-diversified companies. We developed the D.E.A. model to establish the frontier of production possibilities and identify best practices in the construction sector. We measured technical efficiency (variable and constant) and scale efficiency.

The model includes three variables; the sales represent the output variable. The capital (in terms of inventory) and the labor (in terms personnel expenses) represent the mix inputs, which evaluate the company's size. The type of benchmark data is cross-sectional data, representing a point in time, in this case, the year 2019/2020. Table 2 illustrates the variables of this research.

Table 2 : output et mix-inputs

Output	Turnover
Input 1	Inventory (In monetary unit)
Input 2	Labor (personnel expenses) - (In monetary unit)

3.2 Modèle D.E.A.

The Data Envelopment Analysis (D.E.A.) method is an operational research and linear programming method. It has the particularity of not requiring the form of the function, unlike the Stochastic Frontier Analysis (S.F.A.) method, which requires constructing the form of the function such as the Cobb Douglas or trans-logarithmic form. The D.E.A. method determines efficiency benchmarks and locating each decision-making unit (DMU) concerning the production possibilities frontier. The key of the program for each unit (DMU) is as follows:

$$\text{T. E.}_k = \frac{\sum_{r=1}^{s} u_r \, y_{rk}}{\sum_{i=1}^{m} v_i \, x_{ik}}$$

T.E. is the technical efficiency of unit k using m inputs to produce s outputs
Yrk is the quantity of output r produced by organization k
xik is the quantity of input i consumed by organization k;
ur is the weight of output r;
vi is the weight of input i;

n is the number of organizations to be evaluated;
s is the number of outputs;
m is the number of inputs.

V.R.S. model, Primal equation

Maximize $\sum_{r=1}^{s} u_r\, y_{rk} + c_k$

Subject to: $\sum_{i=1}^{m} v_i\, x_{ij} - \sum_{r=1}^{s} u_r\, y_{rj} - c_k \geq 0$ j= 1…n

$\sum_{i=1}^{m} v_i\, x_{ik} = 1$

$u_r, v_i > 0 \quad \forall r = 1...s;\ i = 1...m$

We used the package Win4deap software developed by Centre of Efficiency and Productivity Analysis (C.E.P.A.) and X.L.S.T.A.T. (for other statistics and charts).

4 Results

4.1 Descriptive statistics

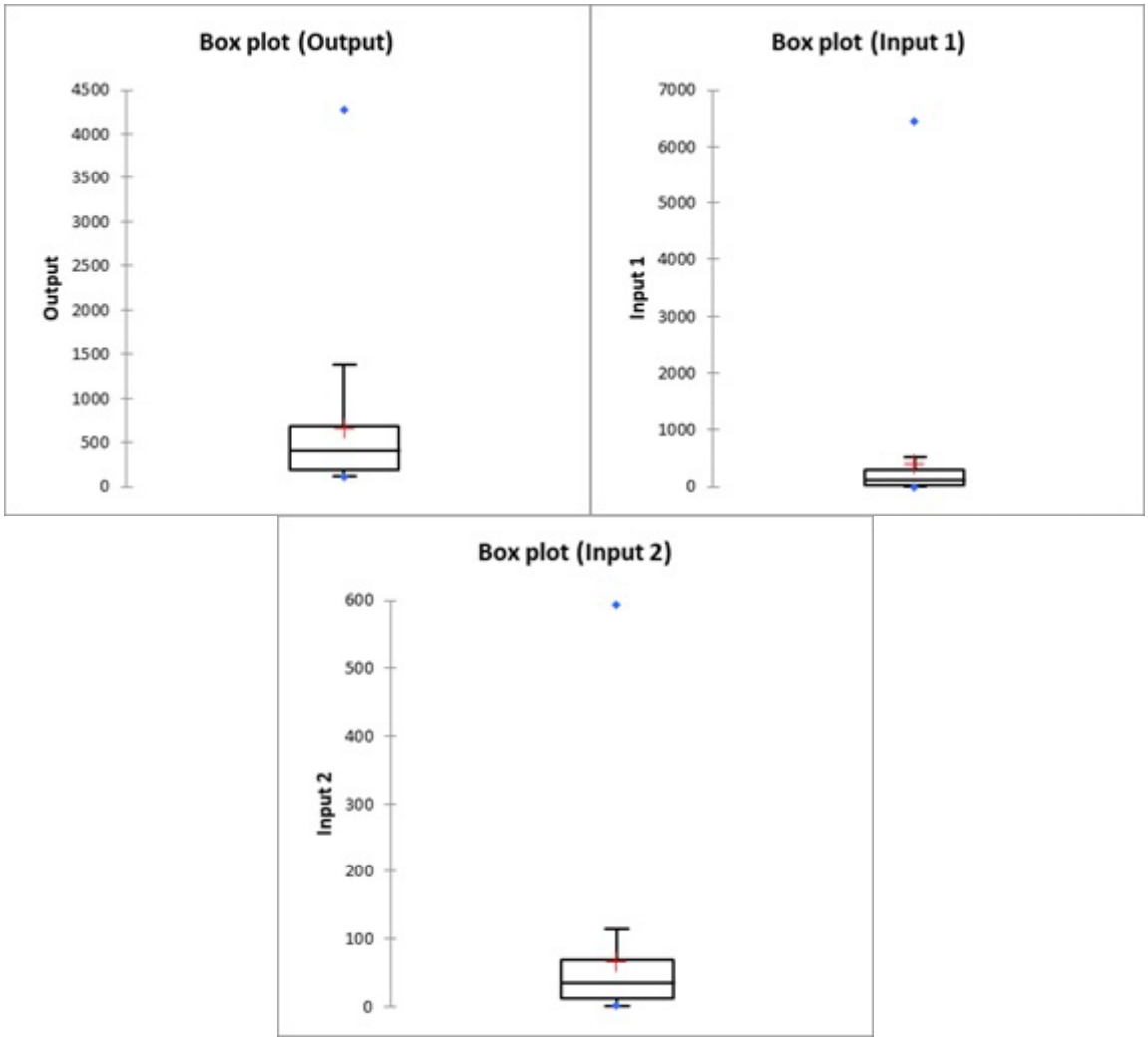
In this research, diversification refers to developing new fields and markets, including geographic diversification. Generally, construction businesses develop a range of products, such as aggregates, concrete, and cement, but other companies develop products and projects of construction serving several sectors, namely tourism, industries, aesthetic, government projects, etc. Many companies expand their services to other cities and regions, and eventually, some construction companies develop a new range of services unrelated to the company's core business. We considered diversification in its broad term; however, companies producing several products of the construction sector were not considered as diversified unless the substitute and complementary products are sufficiently diversified, including products for the non-construction sector. Table 3 shows descriptive statistics of the 60 real estate businesses pointed out in this research.

Table 3 : Descriptive statistics

Statistique	Output	Input 1	Input 2
Observations	60		
Diversified businesses	31		
Non diversified businesses	29		
Minimum	112,682	0,081	1,006
Maximum	4283,557	6444,233	594,233
Median	406,821	119,723	34,962
Mean	656,735	399,812	65,554
SD (n-1)	809,178	1086,469	99,159
Var. Coef.	1,222	2,695	1,500
Skewness (Fisher)	2,812	4,570	3,429

Output and inputs are expressed in monetary values, although they do not reflect price efficiency. The variables are measured in million MAD. The coefficient of variation is positive, significant, and greater than 1, so the S.D. is greater than the mean, thus, the data is featured by a greater degree of variability. According to the Fisher skewness coefficient, the distribution for the three inputs is right-tailed; small values outweigh large ones. For instance, the output is set between 100 and 600 million.

Figure 1 : Box plot (output and inputs variables)



4.2 Data Envelopment Analysis in the Real Estate Sector

Table 4 shows the results of economic, technical efficiency, and Scale efficiency. We assumed that this program was input-oriented, so a minimization of inputs in this sector might result in gaining more efficiency for a given output. The second assumption set for this program is the variable return to Scale. We estimate that businesses do not operate at their optimal size and evolve in imperfect competition structures. Nevertheless, three scores are estimated, Constant Return to Scale Technical Efficiency (C.R.S.T.E.), Variable Return to Scale Technical Efficiency (V.R.S.T.E.), and Scale Efficiency (S.E.). C.R.S.T.E. corresponds to economic or total efficiency, V.R.S.T.E. corresponds to pure efficiency, and Scale refers to the size of the enterprise.

Table 4: Results of efficiency (economic, technical, and Scale)

	CRSTE	VRSTE	SCALE
Diversified businesses (Real Estate)	39,2%	46,6%	85,8%
Undiversified businesses (Real Estate)	30,2%	36,3%	84,4%

C.R.S. is decomposed into V.R.S. and scale efficiency. The obtained ratios represent three types of efficiency applied to the construction sector for diversified and undiversified firms, respectively:

The total efficiency of diversified firms is significantly greater than that of undiversified firms: around 40% for diversified firms against 31% for undiversified firms. Pure technical efficiency also differs considerably between diversified and undiversified firms, with a score of 47% against 36%, respectively. However, scale efficiency is not showing a significant discrepancy between the two groups.

For diversified companies, 40% C.R.S.: Real Estate firms would minimize their mix-inputs by 60%, while maintaining the output constant. 47% V.R.S.: better management of these firms allows a decrease of 53% while keeping the same number of outputs (Sales). That is to say, 57% represents a loss of the real estate sector for this output level. 86% Scale efficiency: real estate promoters can improve their performance by adjusting their size (in terms of inputs) by 14%, with the output being constant. With different scores, the same interpretations apply to undiversified firms. Companies with 100% C.R.S. are completely efficient; the efficient frontier represents them; they represent the best practices in this market.

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Most companies in the construction sector are operating under increasing return to Scale (I.R.S.); which is considered a strength for this industry. However, a detailed database analysis reveals an interesting trend: firms with higher output tend to operate under decreasing returns to Scale (D.R.S.), while smaller firms operate under increasing returns to Scale. This finding suggests that larger-scale companies, which are often more diversified, operate at a decreased efficiency level compared to their smaller counterparts.

This observation aligns with similar trends observed in foreign manufacturing sectors. For instance, studies conducted in the United States have shown that larger construction firms tend to experience diminishing returns to Scale or non-significant efficiency, indicating reduced efficiency as they grow (Nguyen & Lee, 2002). Similarly, European countries' research has reported a similar pattern, where larger construction companies operate at decreasing returns to Scale. (Pierce & Aguinis, 2013)

These cross-country comparisons further highlight the significance of the observed trend and suggest that it may be a common characteristic of the construction industry across different regions. The underlying reasons for this phenomenon could be attributed to factors such as increased organizational complexity, coordination challenges, and potential diseconomies of Scale that arise as companies expand their operations . Table 5 shows selective companies and their return to Scale.

Table 5: Increasing and decreasing return to Scale

Num	Firm	Cash-flow	CRSTE	VRSTE	SCALE	Return	Diversifiée O/N
1	Safi Energy Company	4283,6	0,926	1,000	0,926	drs	Diversified
3	SGTM	2883,1	0,188	0,402	0,467	drs	Diversified
6	S.T.A.M.	1453,0	0,230	0,289	0,796	drs	Diversified
39	Elhallaoui entreprise	323,0	0,134	0,148	0,904	irs	Undiversified
47	Emene Prefa	184,6	1,000	1,000	1,000	-	Diversified
52	Rahal entreprise	159,3	0,577	0,813	0,709	irs	Diversified
53	Fadil84 (sté immobilière)	137,1	0,306	0,426	0,719	irs	Undiversified
58	Fandi prefa	127,1	0,608	1,000	0,608	irs	Diversified
59	Sefiani entreprise	112,7	0,062	0,104	0,597	irs	Undiversified

The results show that the slack is not very present in this sector, which matches most companies' increasing return to Scale. The results illustrate an analysis of the sector's input targets (projections) and peer benchmarking. Table 6 shows a case study of Vias company (random choice).

Table 6: Vias projections and peer benchmark

Results for firm: 28 (Vias)
Technical efficiency = 0,217
Scale efficiency = 0,904 (drs)
PROJECTION SUMMARY :

Variable	Original value	Radial movement	Slack movement	Projected value
Output	422,54	0,00	0,00	422,54
Input 1	54,19	-42,43	0,00	11,76
Input 2	69,45	-54,38	0,00	15,07

Listing of peers:

peer	Lambda weigh
1	0,044
10	0,082
47	0,874

This firm is operating at decreasing return to Scale. In this situation of diseconomies of Scale, a variation of 1% in output implies a variation in input consumption of more than 1%. The analysis of the projection shows that input 1 must be reduced from 54 (Million Dhs) to only 12, and input 2 from 70 (Million) to 15 (Million), which results in a total slack movement of 97 million. The benchmark is a fictive company composed of 4% of Company 1 (Safi Energy), 8% of Company 10 (Construction Management), and 87% of Company 47 (Emena Prefa). As this comparison is very difficult, Vias company can take as peer benchmark company 47 (Emena prefa) as it has the highest weight.

5. Conclusion et perspective

This paper contributes to the existing body of research on the relationship between diversification and performance by specifically measuring economic efficiency through the lens of technical and Scale efficiency using linear programming and mathematical optimization techniques: The D.E.A. approach. The results demonstrate a positive link between diversification and economic performance. Diversified firms outperform their undiversified counterparts.

Furthermore, the study provides valuable insights for the assessed firms by offering projections and recommendations to enhance their efficiency in terms of input consumption. The presence of slack resources in the construction sector suggests opportunities for companies to benchmark themselves against peers and use available resources better.

Moreover, given that many companies in the construction sector are family-owned businesses, it is crucial to pay particular attention to the role of family entrepreneurship and its impact on diversification strategies and performance. Exploring family-owned firms' dynamics and unique challenges could provide valuable insights for academia and practitioners.

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