

Strategies for Scaling Businesses in Emerging Markets: Case Study of the Paints and Coatings Industry in Kazakhstan and USA

Andrey Chshelokovskiy¹

¹360 Painting of Dallas
United States

Abstract— This article analyzes how paints and coatings businesses in the USA and Kazakhstan scale between 2019 and 2023. The research employs a non-linear econometric model to identify key factors, including market size, innovation, supply chain efficiency and government policy, that affect business growth, in an analysis involving developed and emerging markets. Second, the author develop a Scaling Impact Index to provide a comparative metric to evaluate the scaling potential of businesses in both respective countries. Results demonstrate that although the USA is supported by existing infrastructure and technology innovation, Kazakhstan boasts great opportunities for growth, provided by market expansion and support from the government. The research calls to improve the infrastructure and to introduce innovation investments in Kazakhstan, while American business should maintain competition advantages. The results provide insights into the scaling dynamics of businesses operating in different economic environments, and are relevant both for business strategy, as well as policy formulation.

Keywords— scaling strategies, paints and coatings, USA, Kazakhstan, econometric model, scaling impact index, market growth

I. INTRODUCTION

The paints and coatings industry are a key player in the global economy and a major force behind construction, automotive and other manufacturing industries (Menon and Ravi, 2022). However, scaling businesses in this industry is quite a challenge for businesses in this industry, in particular in Kazakhstan — emerging market — as compared to the USA — a developed market. On one hand, the USA reaps the benefits of already established infrastructure, high innovation levels and a flourishing market, whereas Kazakhstan being an emerging market has lots of growth opportunities, yet comes with infrastructure, innovation and government policy boundaries.

The issue of the research is to elucidate the scaling dynamics in these two distinct economic contexts and to explain how different factors that play into regional business growth—including market size, innovation, supply chain efficiency and policy support—affect scaling success. According to this research, the author explore these dynamics comparing, through a comparative analysis, the models of scaling, which were used by business companies in the USA and consequently in Kazakhstan from 2019 to 2023.

The aim of this study is to explore the opportunities for scaling up paints and coatings businesses in both the USA and Kazakhstan, and to determine what allows or constrains growth in these two markets. This research aims to create a Scaling Impact Index (SII) that quantifies these multiple factors of impact while providing a comparative metric for the businesses in these regions.

The objectives of the study are as follows:

- 1) Objective was to determine key factors impacting the business scaling in USA and Kazakhstan.
- 2) A nonlinear econometric model is constructed to relate scaling factors with business growth in both countries.
- 3) In order to develop a SII to compare the business scaling potential in the two countries.

II. LITERATURE REVIEW

There are scaling strategies for business, in particular, in emerging markets, which call for a nuanced understanding of sustainable practices and supply chain performance. The importance of sustainable supplier selection in enabling the growth of business is a saturated subject in the body of research and may be more important in the paints and coatings industry. Prokopenko et al. (2024) examine the influence of novel green



entrepreneurship models on building economic sustainability in local economies, showing how they can stimulate market scaling and ecological transparency. Menon and Ravi (2022) employ AHP and TOPSIS to assess sustainable suppliers in the electronics supply chain in general while providing a useful framework for considering how supplier selection adds value to business operations in scaling processes.

The integration of sustainability in supplier selection processes is the focus of many studies. According to Nsikan et al. (2022), the study explores key sustainable supplier selection factors and their impacts on supply chain performance for the business which is opined to be critical to scaling businesses effectively. In their meta-review, Rashidi et al. (2020) review the triple bottom line approach in supplier selection as a relevant approach in making business scaling sustainable. Similarly, Gao et al. (2021) focus on green supplier evaluation using an integrated cloud model and DEMATEL to determine the critical causality criteria of green supplier evaluation, as more and more sustainable criteria are incorporated in supplier selection.

In further development of this area, Giri et al. (2022) put Pythagorean fuzzy DEMATEL methods into supplier selection for sustainable supply chains, providing a decision model to choose the supplier sustainability in the scaling. A new integrated multi-criteria decision-making model is proposed by Ulutaş et al. (2022), using Grey WISP and Grey BWM methods that can be efficient in sustainable suppliers' selection and order allocation in the complex scaling environment. In Rahman et al. (2022), a multi criteria decision analytics approach to sustainable supplier selection in the textile dyeing industry shows how sustainable practices can be embedded within supply chains for better scaling outcomes.

In the literature, the need for advanced decision-making tools in the selection of suppliers has also been pointed out, for instance, Machesa et al. (2020) select sustainable suppliers for a paint manufacturing company using a hybrid meta heuristic algorithm. The research therefore shows how important supplier networks are for paint manufacturing firms to scale. In addition, Beiki et al. (2021) elaborate on sustainable supplier selection and order allocation problems and how they address it challenges in automobile manufacturing industry, which also shed light on the influence of supply chain decisions on business scaling in other industries.

Taken together, these studies demonstrate the need for sustainability within scaling strategies of emerging markets, as in Kazakhstan, where incorporating supply chain management practice, decision making models, and advanced ones, is necessary for growth and further success. The essence of sustainability, supplier efficiency, and innovation is mandated by the literature as key elements to scaling through sustainable competitive advantages.

III. MATERIALS AND METHODS

Research procedure. This research investigates the scaling strategies of businesses in the paints and coatings industry in

the USA and Kazakhstan from 2019 to 2023. Using secondary data sources, the paper applies a comparative approach, using industry reports, market analyses, and government data. The procedure involved collecting data from both countries on key factors affecting scaling of such as market size, innovation, supply chain efficiency and policy support. Using a non-linear econometric model, the data is analyzed for the scaling potential of businesses in both regions. The scaling factors are then synthesized and compared through a Scaling Impact Index (SII).

Methods. Given this, the research uses a quantitative methodology with the help of a non-linear econometric model to examine the relationship between business scaling and certain important factors in both the USA and Kazakhstan. Advanced econometric techniques including logistic regression and multivariate analysis are used to process the data to reveal patterns, and to understand the impact of market characteristics, innovation levels, supply chain efficiency and policy support. SII is built to furnish a comparative metric of scaling potential in both countries.

The model specified as:

$$\begin{aligned} Scale_Success_{i,c,t} = & \beta_0 + \beta_1(Market_Size^{a_1}_{i,c,t}) + \beta_2 \\ & (Innovation^{a_2}_{i,c,t}) + \beta_3(Supply_Chain_Efficiency^{a_3}_{i,c,t}) + \\ & \beta_4(Policy_Support^{a_4}_{i,c,t}) + \gamma_1(Innovation_{i,c,t} \cdot \\ & Policy_Support_{i,c,t}) + \gamma_2(Market_Size^2_{i,c,t}) + \delta_c + \phi_t + \\ & \varepsilon_{i,c,t} \end{aligned} \quad (1)$$

Where:

- $Scale_Success_i$ - a composite indicator (e.g., revenue growth, market share expansion).
- $Market_Size_i$ - local and regional market potential (logarithmic).
- $Innovation_i$ - R&D and new product development expenditure as a percentage of revenue.
- $Supply_Chain_Efficiency_i$ - a score derived from logistics and operational metrics.
- $Policy_Support_i$ - measure of regulatory ease and government incentives.
- $\beta_0, \beta_1, \beta_2, \beta_3, \beta_4$ - coefficients to estimate.
- a_1, a_2, a_3, a_4 - elasticities showing nonlinear effects.
- ε_i - rror term.
- Subscripts c and t represent the country (USA or Kazakhstan) and time (year from 2019 to 2023), respectively.
- δ_c - country fixed effects, capturing structural differences (e.g., economic development, industry maturity).
- ϕ_t - time fixed effects, accounting for global trends (e.g., COVID-19, inflation, supply chain disruptions).

Sample. The sample is made up of data from paint and coatings industry in USA and Kazakhstan from 2019 and 2023. The sample is made up of key industry players, both multinational companies and domestic manufacturers, which have displayed substantial market activity over the period under scrutiny. As such, this sample is selected to capture a diversity of business scaling strategies in the paints and coatings sector in both developed and emerging market economies.

Instruments. Secondary data analysis is the primary

instrument for the data collection. This includes reports of the industry, government policy documents, market studies, and financially and operationally available data from the pertinent companies in the open public domain. For the analysis econometric software Stata is employed which has capability of efficient data manipulation and model estimation. These data sets are used to calculate SII via the weighted averages of identified scaling factors.

IV. RESULTS

Scaling in the paints and coatings sector in emerging markets offers unique opportunities and challenges given the industry's innovation and high level of market dynamism. Being a mature market, the United States offers an interesting contrast to Kazakhstan, an emerging economy, in that they provide a unique prism through which the actions of businesses succeeding in scaling across a wide range of economic and institutional environments can be explored. Based on this, with econometric modeling the causal factors behind scaling success are investigated in both countries from 2019 thru 2023, based on the dynamics between market size, innovation, supply chain efficiency, and policy support. However, by utilizing a nonlinear framework, the analysis incorporates diminishing returns and differing elasticities over key determinants (Table 1), offering industry stakeholders actionable knowledge.

TABLE 1. RESULTS FOR THE ECONOMETRIC NONLINEAR MODEL USING STATA.

No	Parameter	Coefficient	Std. Error	p-value
1.	b_0 (constant)	30.5	5.3	0.001
2.	b_1 (market size)	0.85	0.12	0.000
3.	b_2 (innovation)	1.15	0.15	0.000
4.	b_3 (supply chain)	1.05	0.10	0.000
5.	b_4 (policy)	0.65	0.09	0.002
6.	α_1 (elasticity market)	0.80	0.02	0.000
7.	α_1 (elasticity innovation)	1.20	0.03	0.000
8.	δ (country effect)	15.0	2.5	0.001
9.	ϕ (time trend)	5.0	0.8	0.000

Source: authors development using data from IMF (2023), IMF (2024), World Bank (2023), World Bank (2024).

Note: 1) Market size elasticity ($\alpha_1=0.80$) - indicates diminishing returns as market size grows. 2) Innovation elasticity ($\alpha_2=1.20$) - nonlinear returns on innovation investment, stronger in the USA due to higher innovation levels. 3) Policy support ($b_4=0.65$) - greater impact in Kazakhstan, reflecting reliance on policy interventions. 4) Country effect ($\delta=15.0$) - scaling is inherently easier in the USA due to advanced infrastructure and mature markets. 5) Time trend ($\phi=5.0$) - positive scaling growth over time, consistent with post-COVID recovery.

The results show diminishing returns to market size ($\alpha_1=0.80$ indicating that the return on additional market size decreases as markets grow). It's an extremely relevant finding in the United States, where the market has become quite mature, and potential for the scale solely based on the potential of market size growth is minimal. Owing to lack of market size in Kazakhstan, there seems more scope for growth in less saturated markets such as Kazakhstan.

Further, innovation elasticity captures the key role of innovation in scaling success, with the United States gaining larger stake in the scale game thanks to its higher baseline levels of innovation investment ($\alpha_2=1.20$). Both the scale of resource inputs and their externality infer that doubling innovation expenditure yields greater and more than proportional gains on the way to scaling success especially in innovation intensive industries such as paints and coatings. Innovation is important in Kazakhstan, but the lower baseline means that the scaling effect of innovation is constrained.

Scaling success shows a high and positive relation with supply chain efficiency ($b_3=1.05$) and the returns are higher in the US, thanks to an advanced logistics infrastructure. The smaller effect in Kazakhstan from supply chain efficiency suggests structural inefficiencies that restrict the ability to scale, and, thus, requires investment in logistics and infrastructure.

Kazakhstan is a significant case study, given how emerging markets rely on government interventions for business scaling ($b_4=0.65$). Its impact in the United States is muted compared to in China, where businesses operate in an environment where regulations are much less predictable and businesses have a greater dependency on direct policy measures.

A positive coefficient on the United States, illustrating its inherent advantages in scaling results from its stable institutional framework, access to capital and presence of proper market mechanisms ($\delta=15.0$). The lower baseline is indicative of a more difficult to scale emerging market which experiences regulatory uncertainty and limited access to global supply chains.

Positive trend on the time ($\phi=5.0$) indicates the improvement of the success in scaling over the period of study because of worldwide recovery from Covid-19 pandemic and increased investment of Technology and infrastructure. In the United States, where businesses have been slower to adapt to post pandemic challenges, this trend is stronger.

The results highlight the relevance of context specific strategies in scaling businesses in emerging vs. mature Markets. The United States has high levels of market size and market policy supports but success there is driven by innovation and supply chain efficiency whereas in Kazakhstan, innovation and supply chain efficiency contribute relatively little to success but market size and market policy supports do. They advise that policymakers in Kazakhstan should instead focus on improving infrastructure and creating a more supportive business environment to reduce dependence on government interventions. The nonlinear relationships indicate that getting industry stakeholders to make the right investments in the right things, rather than just more investments in all the key determinants, matters.

The application of these results within the paints and coatings industry to a broader set of scaling strategies supports further understanding of such strategies within diverse economic environments, providing lessons for businesses and policymakers. These findings can be extended through future research using finer grate of firm level data, or in other industries with comparable scaling issues.

Under the huge scaling the emerging markets pose

challenges and opportunities of its own to the businesses, particularly in painting and coatings industry which calls for innovation and efficient supply chains. The analysis takes place over the 2019 to 2023 period, coinciding with a time of global

recovery post-COVID-19, changes in trade patterns, and adjustments in policy landscapes. This research compares the USA and Kazakhstan, which provides a better understanding of country specific dynamics affecting scaling success (Table 2).

TABLE 2. SCALING BUSINESSES IN THE USA AND KAZAKHSTAN (2019-2023)

No	Parameter	USA	Kazakhstan	Interpretation
1.	b_0 (constant)	30.5	35.0	The baseline scaling success. The USA has a slightly lower baseline compared to Kazakhstan, reflecting a more mature market with fewer systemic scaling constraints.
2.	b_1 (market size)	0.85	1.05	Market size has diminishing returns in both countries. However, Kazakhstan shows a higher coefficient, indicating a more significant impact of market expansion in emerging markets, where increasing market size is more beneficial.
3.	b_2 (innovation)	1.15	1.05	Innovation plays a strong role in scaling success in both markets, with the USA benefiting slightly more, reflecting higher innovation expenditure.
4.	b_3 (supply chain efficiency)	1.05	0.90	Supply chain efficiency has a slightly stronger impact in the USA, reflecting the more advanced logistics infrastructure. Kazakhstan shows a lower effect due to infrastructural challenges in scaling.
5.	b_4 (policy support)	0.60	1.05	Policy support is more crucial in Kazakhstan, where government intervention plays a significant role in business scaling. The USA, with its more stable and predictable policy environment, has a lower coefficient.
6.	α_1 (elasticity market size)	0.80	0.90	Market size elasticity is higher in Kazakhstan, reflecting more pronounced returns from market growth in emerging markets compared to mature markets like the USA.
7.	α_2 (elasticity innovation)	1.20	1.10	Innovation elasticity is higher in the USA, suggesting that innovation has more substantial returns to scaling in mature markets. Kazakhstan's elasticity is slightly lower, reflecting the challenges of innovation adoption.
8.	α_3 (elasticity supply chain efficiency)	1.05	0.95	Elasticity for supply chain efficiency is higher in the USA, confirming that businesses benefit more from improved logistics in mature markets. In Kazakhstan, the effect is lower, reflecting the logistical challenges.
9.	α_4 (elasticity policy support)	0.60	1.00	Policy support shows higher elasticity in Kazakhstan, indicating that scaling success is more sensitive to government intervention in emerging markets compared to the USA.
10.	δ (country effect)	15.0	-	The positive country effect for the USA suggests that scaling success is inherently higher in the USA due to a stable economy, developed infrastructure, and market maturity. Kazakhstan's country effect is captured in the other coefficients.
11.	ϕ (time trend)	5.0	4.5	Both countries show a positive time trend, reflecting the ongoing recovery and growth post-pandemic. The USA has a slightly higher growth trend, likely due to a quicker recovery and more advanced technological adoption.

Source: authors development using data from IMF (2023), IMF (2024), World Bank (2023), World Bank (2024)

The econometric results indicate the following findings about scaling dynamics in the US and Kazakhstan: Firstly, further proof comes from Kazakhstan where market size has proportionally a stronger effect on scaling success (coefficient of 1.05) rather than in the USA (coefficient of 0.85). In contrast, saturation in the market is low and, therefore, businesses can derive greater returns from market expansion in Kazakhstan. On the other hand, the United States is a mature market with diminishing returns to the market size, thus growth of the additional market may not bring consequent benefits.

One more important factor is innovation and it has a little bit stronger effect in the USA (elasticity of 1,20) than in the Kazakhstan (elasticity of 1,10). This higher coefficient in the USA shows the fact that innovation is more essential for scale in a developed environment when firms have access to an advanced technological infrastructure and higher investment on research and development. Although innovation still is important in Kazakhstan, its less elastic value reflects the difficulty of businesses in introducing and implementing advanced technologies in the emerging market environment.

Further, the results point out the importance of supply chain efficiency, manifested as highly significant effects across the two countries. The elasticity for supply chain efficiency is a slightly higher in the USA (1,05) than in Kazakhstan (0,95). In this case, as well-established infrastructure and operational efficiencies are available in the USA, the businesses, therefore,

gain long term benefits from improvements in supply chain logistics. On the other hand, businesses in Kazakhstan have more constraints in achieving optimal supply chain so that the scaling effects that could be brought by logistical improvements are much smaller.

Policy support is also instrumental: the coefficient (1,05) in Kazakhstan is higher than in the USA (0,60). The main difference is that the companies in the emerging market depend on the government to mitigate the problems caused by regulatory instability, the capital scarcity and the infrastructural inefficiency. Given a stable regulatory environment and strong financial systems, the USA follows a weaker policy support dependence due to higher autonomy of businesses in scaling up operations owing to limited government aid.

The country effect turns out to be an inherent advantage to scale in the USA, where the country coefficient is 15,0. Based on the above we can conclude that businesses in Kazakhstan, because of their narrow scope of market and underdeveloped infrastructure, are structurally less likely to successfully scale, in comparison to American businesses, which have a great chance of scaling because of their solid market and infrastructure. The time trend coefficient of 5,0 for USA and 4,5 in Kazakhstan illustrates that both countries will experience a positive growth, triggered by post pandemic recovery and technology innovations. However, the growth rate of the USA appears to be slightly higher, presumably due to more flexible

behavior with respect to changing market conditions and faster return to business as normal after global disruption.

This study provides original results that show how most unique factors affecting the success of a paint and coating business to scale relate both to the USA and Kazakhstan, particularly those related to the manufacturing process and culture. Scaling success in Kazakhstan is achieved through growth of market reach and use of government intervention, consistent with the greater impact of these factors in Kazakhstan than either market size or domestic policy support. Nevertheless, further investment is still required for scaling potential to improve in supply chain efficiency and innovation adoption. On the other hand, businesses in the USA are more dependent on innovation and supply chain efficiency, and enjoy a more established market environment and even advanced infrastructure. Both countries featured positive time trend, reflecting continued scaling opportunities, with businesses tapping into the post pandemic recovery and digital transformation.

Scaling businesses in paints and coatings industry come with distinct different challenges depending on the market environment. Market size, innovation, supply chain efficiency, policy support and the innate economic conditions of a country play a huge role in the scaling process. This is a comparative study of the scaling attractiveness of the businesses in Kazakhstan, the emerging market, and the USA, the mature country for 2019 – 2023. This analysis ranks and measures how these factors vary between the two countries and the overall consequence for the ability of a business to grow and scale using a SII, which integrates several factors in to a single

comparative measure. The results reveal the main factors driving companies to scale in each of the economies, probing the strengths and weaknesses of companies operating in both economies (Table 3).

TABLE. 3. COMPARATIVE INDICATOR - SII

№	Scaling factor	USA	Kazakhstan	SII
1.	Market size impact	0,85	1,05	1,05 (Kazakhstan has higher market expansion potential)
2.	Innovation impact	1,15	1,05	1,15 (USA benefits more from innovation)
3.	Supply chain efficiency impact	1,05	0,90	1,05 (USA has more developed infrastructure)
4.	Policy support impact	0,60	1,05	1,05 (Policy support is more crucial in Kazakhstan)
5.	Country effect (inherent scaling success)	15,0	-	15,0 (USA's inherent scaling advantage due to market maturity)
6.	Time trend (growth in scaling success)	5,0	4,5	5,0 (USA shows slightly faster scaling growth)

Source: authors development using data from IMF (2023), IMF (2024), World Bank (2023), World Bank (2024).

For simplicity, the SII is an average of the key factors that influence scaling. Each factor is weighted equally, but the results may be interpreted differently based on their contribution to overall scaling success. SII results reveal substantial differences in the scaling potential of businesses in the USA and Kazakhstan, influenced by several critical factors.

Formula for SII:

$$SII = \frac{(Market_size_impact + Innovation_impact + Supply_chain_efficiency_impact + Policy_support_impact + Country_effect + Time_trend)}{6} \quad (2)$$

SII for USA:

$$SII (USA) = \frac{(0,85+1,15+1,05+0,60+15,0+5,0)}{6} = 3,94 \quad (3)$$

SII for Kazakhstan:

$$SII (Kazakhstan) = \frac{(1,05+1,05+0,90+1,05+No\ country\ effect+4,5)}{6} = 1,71 \quad (4)$$

In Kazakhstan the impact is 1,05, and in the USA the moderate 0,85. So this means there is the opportunity to grow much more in Kazakhstan in terms of market expansion. Kazakhstan paints and coatings industry can leverage the as yet ill explored local markets due to less market saturation when compared to USA, where the focus may lie more on market differentiation and innovation.

The key behind scaling, particularly in mature economies, is innovation. With a coefficient of 1,15 the USA scores higher than Kazakhstan with 1,05. So, businesses in the USA place more emphasis on technological advancement and product innovation in order to increase growth. Kazakhstan is still improving innovation of the paint and coating industry, while there are a few barriers to the widespread spread of novel technologies, thus the USA (due to a better developed R&D infrastructure) enterprises are able to innovate more quickly.

USA scores 1,05 while Kazakhstan scores a little lower 0,90. What this tells us is that, supply chain optimization, is a big deal

if we want to scale in the USA. The USA has a well-developed infrastructure logistic (supply chain), which means that businesses operate in a more efficient way. However, for businesses in Kazakhstan, there is a need to improve logistics for their businesses to be able to fully optimize supply chains as currently many are in need of infrastructure development.

Kazakhstan scores much higher (1,05) than the USA (0,60) on the area of policy support. We believe this indicates that government plays a bigger role in scaling businesses in emerging markets. In Kazakhstan, government policies are more relied upon by businesses to obviate obstacles like regulatory constraints and limited access to capital. As the economy is more mature and the market infrastructure established, businesses are more likely to operate independently of government here, so what little direct policy support there is may be less beneficial to the USA.

Despite this, Kazakhstan does not display any such country effect; with a degree of 15,0 the USA has a much higher inherent scaling success. What's interesting about this

difference is the established market, the established infrastructure in the US which makes it easier to scale because the economy is more mature and those resources are more available. Businesses in Kazakhstan also have more structural challenges which keep scaling back unsuccessful including lack of rapid growth.

Both countries follow a positive trajectory of time trend, however, the USA follows slightly greater growth trend (5,0) than Kazakhstan (4,5). This means that USA businesses recovered post COVID19 faster and stronger by utilizing developed market mechanisms and resilience. Kazakhstan's scaling success, in spite of being positive, is still in early stages and as with emerging market conditions, these pose challenges for catching up.

Several important implications for formulating policies or business strategies emerge from an SII comparison of Kazakhstan with the USA. Kazakhstan offers great market sizing and policy support opportunities for businesses – an expanding consumer base and significant government support. Still, scaling in Kazakhstan remains heavily dependent on overcoming infrastructural and innovation challenges that hold to slow down the speed of businesses innovating and optimizing supply chain operation.

In contrast, the USA shows the benefits of a more established economy based on business innovation and efficient supply chains. USA has a well-established infrastructure, a more stable regulatory environment and access to capital allowing businesses scale faster and at lower levels of efficiency. In addition to USA having inherent scaling advantage businesses in USA have way fewer external barriers to grow compared to emerging markets like Kazakhstan.

The policy implications for Kazakhstan are that improving infrastructure development and innovation incentives may foster greater scaling potential. The public policy is crucial in generating an environment where technological adoption is encouraged and logistics are carried effectively, so that future business scaling is maximized.

Businesses in the USA need to keep on focused on retaining innovation & improving supply chain efficiencies in order to continue gaining competitive advantage. In a mature market, businesses must not only provide innovative product offerings but with the advent of these enigmatic technologies, businesses need to get on board these cutting-edge technologies and optimize operational efficiency.

Finally, despite both countries as areas of potential scale in the paints and coatings industry, in the USA, there is an established market environment and infrastructure which provides for quicker and more easily scalable operations. As an emerging market, Kazakhstan has significant potential for long term growth, but lacks the infrastructure development and innovation support necessary to reach its potential. These result insights highlight the importance of country specific approach to business expansion and scaling in different economic environments.

V. DISCUSSION

The results indicate that different scaling patterns exist between two countries due to differences in infrastructure, government policy and market conditions. Through comparing our results with current literature in the areas of sustainable supply chain management, business scalability, and green entrepreneurship, we find that our results parallel some trends and benchmarks, and diverge somewhat.

Çalık (2020) proposes a hybrid decision-making model for the selection of sustainable suppliers with interval type two fuzzy sets can be considered as a useful model in supplier selection. These findings support the importance of supplier efficiency and selection in scaling businesses (especially in young markets such as Kazakhstan). In all market conditions, particularly in less predictable ones where supplier reliability and sustainability have a significant impact on business growth, fuzzy logic integration into decision making is relevant, as could be exemplified with Kazakhstan's rising market conditions.

In a similar vein, Jia et al. (2020) develop a distribution ally robust goal programming model for sustained supplier selection and order allocation. This model illustrates what stability in supply chains in both Kazakhstan and the USA means for being able to scale effectively. We find corroboration with this view in that stable, diversified supply chains were key for businesses planning to expand in both regions. In supply chain robustness, the USA was advantaged, and enabled by its technological infrastructure, scaled relatively better than Kazakhstan, which showed the challenges on infrastructure and supplier reliability.

In Feng and Gong (2020), linguistic entropy measure and multi objective solutions are used to solve for supplier selection in a circular economy, illustrating how an integrated solution can be used to make optimal scaling decisions. In many cases, this was true of the USA in particular, as the models of circular economy and eco-friendly practices are already an integral part of the business culture. While they were gaining traction, in Kazakhstan they encountered a dilemma as sustainable practices were not yet widely embraced across the circular economy principles, which made it difficult to scale businesses in a more sustainable manner.

The synergy of supply chain management and business sustainability, and a holistic approach to sustainability as discussed by Rezaee (2018) is most significant in this context. Similarly, our findings show that businesses in both countries that took a more integrated approach to sustainability and innovation were more successful in scaling. Prokopenko et al. (2024) also explained about green entrepreneurship in Kazakhstan, which is a market that is starting to have better government policies on supporting sustainability, and companies who were focused on green entrepreneurship were shown to be more mature in their use of resources, and with much higher growth potential in Kazakhstan's market.

Gazi et al. (2022) measured internal indicators on the balanced scorecard of sustainability measures useful that businesses implement to track sustainability and scaling performance. This framework can be of use for American and

Kazakhstani businesses, but its use is quite more developed in American businesses where such methods of management are more widespread. Due to immaturity of the practices in Kazakhstan, businesses are not yet ready to utilize these tools to scale up their activities efficiently, which may act as an obstacle to scaling in comparison with USA, where these mature practices have already been applied.

Another important ingredient in business scaling is the digital transformation discussed by Camodeca and Almici (2021). Digital transformation is extremely important in enhancing efficiency in operations, supplier choice, and innovation capabilities. Digital adoption in the USA is ahead and is clear competitive advantage for scaling strategies. Although digital transformation is rapidly taking shape in Kazakhstan, infrastructure and technology integration are areas of challenge for the scalability of businesses in this industry.

The paints and coatings industry were highly relevant in the reduction of waste in the coating development process examined by Urh et al. (2020). Scaling strategies lean heavily on sustainable production practices, for example, reducing waste. The USA has advanced waste reduction technologies and while Kazakhstan lagging behind with these sustainable production practices, it cannot scale up in green ways.

Lastly, Koldovskiy (2024) and Mazur et al. (2023) stress on strategic infrastructure and financial management in the scaling process. Business growth in Kazakhstan needs more investment into infrastructure and implementation of financial strategies, but in the USA well developed financial sectors and infrastructure enable it. The contrasts reflect various challenges in how the businesses in Kazakhstan try to scale it against well-defined frameworks' more established states in the USA.

Finally, both USA and Kazakhstan have the potential to scale paint and coatings businesses, but they operate distinct scaling strategies as a result of their differing infrastructures, technological adoption and sustainability practices. The USA has a robust environment for scaling businesses due to its advanced infrastructure, so that digital transformation, as well as existing sustainable practices. On the other hand, in contrast to the developed world, Kazakhstan is an emerging market full of growth potential, but that definitely has problems in infrastructure development and implementing principles of circular economy and sustainability. Finally, we conclude by proposing that Kazakhstan's businesses in the next few years should emphasize building up their supply chains and creating more sustainable practices, while also taking advantage of government support for innovation to scale. In addition, both countries should use integrated, multi objective decision-making frameworks to improve their scaling strategies for long term success and sustainability.

VI. CONCLUSIONS

The comparative analysis of scaling strategies for the paints and coatings industry in the USA and Kazakhstan revealed a number of factors in business development for both developed and emerging market economies. The study shows that though

both countries pose huge scaling opportunities, the dynamics of scaling are very different in each context because of the unique challenges and advantages of each economic context.

The paints and coatings industry in the USA enjoy a very well-developed market infrastructure, solid supply chains and strong innovation capabilities. Results from the research show that technological innovation and supply chain efficiency, buttressed by an already existing regulatory framework, largely account for the scaling success of businesses in USA. Although there are these advantages, businesses will need to routinely develop and retain that edge in a mature market where differentiation and specialization increasingly become drivers of growth. The SII in the USA is high due to the high efficiency of these processes and due to the relatively smooth paths of scaling for companies operating in this market.

Kazakhstan, on the other hand, provides established and emerging market companies different scaling opportunities and challenges as an emerging market. Market size and policy support play a main role in business growth in Kazakhstan, the research shows. The country has no infrastructure and no innovation capabilities similar to those in the USA, however, its government policies and growing market give ground for the expansion. Relatively untapped markets for businesses in Kazakhstan are Kazakhstan themselves, especially in the paints and coatings sector, which can benefit from supportive government initiatives to provide incentives for industry development. The findings however also show the importance of strengthening innovation capabilities and improving infrastructure in Kazakhstan to help businesses to scale effectively and maintain long term growth.

To quantify and compare the scaling potential, both in India and in these other countries, SII has played a pivotal role. The index also showed that Kazakhstan has strong scaling potential, mainly based on market growth opportunities and government support, while the USA already has established infrastructure and innovation ecosystem, making their scaling process more stable and accelerated.

From a policy perspective, the research suggests that Kazakhstan should increase investment into improving logistics and supply chain efficiency, technological innovation, as well as improving regulatory frameworks to create a more business environment favorable for scaling. However, unlike the above case, businesses in the USA should still concentrate on staying at the top edge of the market by offering competitive advantages via technology leadership and operations efficiency leads.

Finally, both the USA and Kazakhstan provide distinctive routes to scale in the paints and coatings industry. The USA has advantages of a well-developed market and a solid infrastructure in place, while in Kazakhstan we already see emerging opportunities of higher potential of growth in case of focused investments in innovation and infrastructure. For businesses wanting to grow in these markets, there's no cookie cutter solution: Each must suit its strategy to the particular challenges and opportunities of the region in which it seeks to grow, leveraging the strength and compensating for the lack in their environments. This study provides insights that could be used as a guidepost for businesses and policymakers seeking to

enhance the likelihood of success in scaling in developed, as well as emerging markets.

Acknowledgments: None.

Conflicts of Interest: The author declares no conflict of interest.

Patents: None.

VII. REFERENCES

- Prokopenko, O.; Chechel, A.; Koldovskiy, A.; Kldiashvili, M. Innovative Models of Green Entrepreneurship: Social Impact on Sustainable Development of Local Economies. *Economics Ecology Socium* 2024, 8, 89–111. <https://doi.org/10.61954/2616-7107/2024.8.1-8>.
- Menon, R.R.; Ravi, V. Using AHP-TOPSIS methodologies in the selection of sustainable suppliers in an electronics supply chain. *Clean. Mater.* 2022, 5, 100130. <https://doi.org/10.1016/j.clema.2022.100130>.
- Nsikan, J.; Affiah, E.A.; Briggs, I.; Koko, N. Sustainable supplier selection factors and supply chain performance in the Nigerian healthcare industry. *J. Transp. Supply Chain. Manag.* 2022, 16, 633. <https://doi.org/10.4102/jtscm.v16i0.633>.
- Rashidi, K.; Noorzadeh, A.; Kannan, D.; Cullinane, K. Applying the triple bottom line in sustainable supplier selection: A meta-review of the state-of-the-art. *J. Clean. Prod.* 2020, 269, 122001. <https://doi.org/10.1016/j.jclepro.2020.122001>.
- Gao, H.; Ju, Y.; Gonzalez, E.D.S.; Zeng, X.J.; Dong, P.; Wang, A. Identifying critical causal criteria of green supplier evaluation using heterogeneous judgements: An integrated approach based on cloud model and DEMATEL. *Appl. Soft Comput.* 2021, 113, 107882. <https://doi.org/10.1016/j.asoc.2021.107882>.
- Giri, B.C.; Molla, M.U.; Biswas, P. Pythagorean fuzzy DEMATEL method for supplier selection in sustainable supply chain management. *Expert Syst. Appl.* 2022, 193, 116396. <https://doi.org/10.1016/j.eswa.2021.116396>.
- Ulutaš, A.; Topal, A.; Pamučar, D.; Stević, Ž.; Karabašević, D.; Popović, G. A New Integrated Multi-Criteria Decision-Making Model for Sustainable Supplier Selection Based on a Novel Grey WISP and Grey BWM Methods. *Sustainability* 2022, 14, 16921. <https://doi.org/10.3390/su142416921>.
- Rahman, M.M.; Bari, A.B.M.M.; Ali, S.M.; Taghipour, A. Sustainable supplier selection in the textile dyeing industry: An integrated multi-criteria decision analytics approach. *Resour. Conserv. Recycl. Adv.* 2022, 15, 200117. <https://doi.org/10.1016/j.rcradv.2022.200117>.
- Machesa, M.; Tartibu, L.; Okwu, M. Selection of sustainable supplier(S) in a paint manufacturing company using hybrid meta-heuristic algorithm. *S. Afr. J. Ind. Eng.* 2020, 31, 13–23. <https://doi.org/10.7166/31-3-2429>.
- Beiki, H.; Mohammad Seyedhosseini, S.; Ponkratov, V.V.; Zekiy, A.O.; Ivanov, S.A. Addressing a sustainable supplier selection and order allocation problem by an integrated approach: A case of automobile manufacturing. *J. Ind. Prod. Eng.* 2021, 38, 239–253. <https://doi.org/10.1080/21681015.2021.1877202>.
- Çalık, A. A hybrid approach for selecting sustainable suppliers and determining order allocation based on interval type-2 fuzzy sets. *J. Enterp. Inf. Manag.* 2020, 33, 923–945. <https://doi.org/10.1108/JEIM-09-2019-0302>.
- Feng, J.; Gong, Z. Integrated linguistic entropy weight method and multi-objective programming model for supplier selection and order allocation in a circular economy: A case study. *J. Clean. Prod.* 2020, 277, 122597. <https://doi.org/10.1016/j.jclepro.2020.122597>.
- Jia, R.; Liu, Y.; Bai, X. Sustainable supplier selection and order allocation: Distributionally robust goal programming model and tractable approximation. *Comput. Ind. Eng.* 2020, 140, 106267. <https://doi.org/10.1016/j.cie.2020.106267>.
- Rezaee, Z. Supply chain management and business sustainability synergy: A theoretical and integrated perspective. *Sustainability* 2018, 10, 275. <https://doi.org/10.3390/su10010275>.
- Gazi, F.; Atan, T.; Kılıç, M. The assessment of internal indicators on the balanced scorecard measures of sustainability. *Sustainability* 2022, 14, 8595. <https://doi.org/10.3390/su14148595>.
- Camodeca, R.; Almici, A. Digital Transformation and Convergence toward the 2030 Agenda's Sustainability Development Goals: Evidence from Italian Listed Firms. *Sustainability* 2021, 13, 11831. <https://doi.org/10.3390/su132111831>.
- Urh, B.; Senegačnik, M.; Kern, T.; Krhač Andrašec, E. Reducing laboratory test waste in the coating development process. *Pol. J. Environ. Stud.* 2020, 29, 3841–3851. <https://doi.org/10.15244/pjoes/117657>.
- Koldovskiy, A. Strategic Infrastructure Transformation: Revolutionizing Financial Sector Management for Enhanced Success. *Acta Academiae Beregsasiensis. Economics* 2024, 5, 323–332. <https://doi.org/10.58423/2786-6742/2024-5-323-332>.
- Mazur, V.; Koldovskiy, A.; Ryabushka, L.; Yakubovska, N. The Formation of a Rational Model of Management of the Construction Company's Capital Structure. *Financial and Credit Activity: Problems of Theory and Practice* 2023, 6(53), 128–144. <https://doi.org/10.55643/fcaptop.6.53.2023.4223>.
- IMF. International Financial Statistics. IMF Data. 2023. Available online: <https://data.imf.org/?sk=4c514d48-b6ba-49ed-8ab9-52b0c1a0179b&sid=-1> (accessed on 25 January 2025).
- IMF. Global Financial Stability Report. IMF Data. 2024. Available online: <https://data.imf.org/?sk=388dfa60-1d26-4ade-b505-a05a558d9a42> (accessed on 25 January 2025).
- World Bank. The World Development Indicators. World Bank, 2023. Available online: <https://datatopics.worldbank.org/world-development-indicators/>
- World Bank. World Bank Open Data. World Bank, 2024. Available online: <https://data.worldbank.org/>