

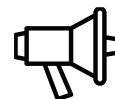
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INNOVATION CAPABILITIES AND EXPORT PERFORMANCE: THE MEDIATING ROLES OF SUPPLY CHAIN INNOVATION AND ENTREPRENEURIAL ORIENTATION — EVIDENCE FROM UZBEKISTAN

Mukhammadyaminova Shakhzoda

Second-Year Doctoral Student,
Tashkent State University of Economics
ORCID: 0000-0002-9547-3892

Abstract. A firm may demonstrate consistent innovation activity yet still encounter difficulties in expanding its export potential. This paper examines this paradox by analyzing how innovation capabilities influence export performance through two mediating mechanisms: supply chain innovation and entrepreneurial orientation. Drawing on empirical studies and official data from Uzbekistan's export sector (2025), the study addresses the following research question: *Do supply chain innovation and entrepreneurial orientation jointly mediate the positive relationship between innovation capabilities and export performance in Uzbek firms?*

The findings provide an affirmative answer and demonstrate that these two mechanisms complement and reinforce one another. The paper develops a conceptual framework, presents supporting analytical evidence, and outlines practical implications for managers and policymakers in the context of Central Asian emerging economies.

Keywords: innovation capabilities, export performance, supply chain innovation, entrepreneurial orientation, Uzbekistan, emerging economy.

Annotatsiya. Korxona muntazam innovatsion faoliyat olib borishiga qaramay, eksport hajmini oshirishda qiyinchiliklarga duch kelishi mumkin. Mazkur maqolada innovatsion salohiyatning eksport samaradorligiga ta'siri ta'minot zanjiri innovatsiyasi hamda tadbirkorlik yo'nalganligi orqali qanday namoyon bo'lishi tahlil qilinadi. Tadqiqot O'zbekiston eksport sektori bo'yicha 2025-yilga oid rasmiy ma'lumotlar va empirik tadqiqotlarga asoslanadi hamda quyidagi savolga javob izlaydi: *ta'minot zanjiri innovatsiyasi va tadbirkorlik yo'nalganligi O'zbekiston korxonalarida innovatsion salohiyatning eksport samaradorligiga ijobiy ta'sirini birgalikda vositachilik qiladimi?*

Tadqiqot natijalari ushbu savolga ijobiy javob beradi hamda mazkur ikki mexanizm bir-birini o'zaro to'ldirishi va kuchaytirishini ko'rsatadi. Maqolada konseptual model ishlab chiqilgan, tahliliy ma'lumotlar keltirilgan hamda Markaziy Osiyo rivojlanayotgan iqtisodiyotlari sharoitida menejerlar va siyosat yurituvchilar uchun amaliy tavsiyalar ishlab chiqilgan.

Kalit so'zlar: innovatsion salohiyat, eksport samaradorligi, ta'minot zanjiri innovatsiyasi, tadbirkorlik yo'nalganligi, O'zbekiston, rivojlanayotgan iqtisodiyot.

Аннотация. Предприятие может осуществлять устойчивую инновационную деятельность, однако при этом сталкиваться с трудностями в расширении экспортного потенциала. В данной статье рассматривается, каким образом инновационные возможности влияют на эффективность экспорта через два посреднических механизма: инновации в цепочке поставок и предпринимательскую ориентацию. Исследование основано на эмпирических данных и официальной статистике экспортного сектора Узбекистана за 2025 год и направлено на поиск ответа на следующий вопрос: *опосредуют ли инновации в цепочке поставок и предпринимательская ориентация совместно положительное влияние инновационных возможностей на экспортную эффективность узбекских предприятий?*

Результаты исследования подтверждают данную гипотезу и показывают, что указанные механизмы взаимно дополняют и усиливают друг друга. В статье предложена концептуальная модель, представлены аналитические данные, а также сформулированы практические рекомендации для менеджеров и лиц, принимающих решения, в условиях развивающихся экономик Центральной Азии.

Ключевые слова: инновационные возможности, экспортная эффективность, инновации в цепочке поставок, предпринимательская ориентация, Узбекистан, развивающаяся экономика.

INTRODUCTION

A persistent challenge remains at the core of export management research: why do some firms that invest significantly in innovation encounter difficulties in expanding internationally, while others with comparatively limited technological resources achieve stronger export performance? For transitional economies such as Uzbekistan—where export diversification has become an important driver of structural and economic transformation—understanding the mechanisms that convert innovation into export competitiveness is of substantial practical importance [1-2].

Early studies in the literature proposed a relatively straightforward explanation: greater innovation leads to stronger export performance. Roper and Love [1] identified a positive relationship between product innovation and export probability, while Gary A. Knight and S. Tamer Cavusgil [2] demonstrated that born-global firms often achieve international success through an innovation-oriented organisational culture. However, subsequent research introduced a more nuanced perspective. Azar and Ciabuschi [4] showed that different forms of innovation generate varying effects on export outcomes, suggesting that innovation capability alone is not sufficient; rather, the manner in which these capabilities are implemented and managed is equally important.

This article focuses on two key implementation mechanisms. The first is supply chain innovation and agility, which enhance firms' ability to respond efficiently to dynamic international market conditions. The second is entrepreneurial orientation, defined as an organisational tendency toward proactiveness, calculated risk-taking, and opportunity-seeking behaviour that shapes how innovation is directed toward export activities.

The study addresses the following research question: *Do supply chain innovation and entrepreneurial orientation jointly mediate the positive effect of innovation capabilities on export performance, and does the interaction between these two mediating mechanisms strengthen their combined influence?*

Section 2 reviews the relevant theoretical and empirical literature. Section 3 presents updated statistics on Uzbekistan's export environment. Section 4 develops the conceptual framework of the study. Section 5 discusses the main findings and their practical implications. Section 6 concludes the article.

LITERATURE REVIEW

The relationship between innovation and export performance, although generally positive, remains conditional and context-dependent. Roper and Love [1] demonstrated that the effect of innovation on export outcomes varies according to industry characteristics, firm size, and the institutional environment. Similarly, Gary A. Knight and S. Tamer Cavusgil [2] showed that organisational capabilities significantly strengthen the export impact of innovation. Azar and Ciabuschi [4] further argued that incremental process improvements may reduce production costs without necessarily creating the differentiation advantages required to enter new foreign market segments. This finding is particularly relevant for manufacturers in Uzbekistan, where export competitiveness has traditionally relied more on price advantages than on innovation-driven differentiation.

The resource-based view also supports this perspective by suggesting that innovation capabilities alone do not automatically generate competitive advantage unless they are supported by effective organisational and strategic mechanisms [5].

The first mediating mechanism examined in this study is supply chain innovation and agility. Al-Khatib [6] demonstrated that big data analytics positively influence export performance through supply chain innovation, while supply chain agility further strengthens this indirect effect. Bhatti et al. [7] and Ghobakhloo et al. [8] expanded this discussion within the context of Industry 4.0, showing that digital transformation enhances supply chain resilience and contributes to the long-term sustainability of export performance.

For Uzbekistan, where the World Bank Logistics Performance Index score was recorded at 2.6 in 2023, investments in supply chain digitalisation are particularly important. Such investments enable firms to reduce operational inefficiencies and narrow competitiveness gaps that often prevent domestic manufacturers from meeting the reliability and delivery standards expected by European and East Asian buyers.

The second mediating mechanism is entrepreneurial orientation (EO), defined as an organisational tendency toward risk-taking, proactiveness, and opportunity-seeking behaviour [9]. Nuryakin [10] found that EO improves SME export performance through a sequential process: entrepreneurial orientation first strengthens innovation capability, which subsequently affects export outcomes through network relationships. This suggests that entrepreneurial orientation should be developed prior to large-scale innovation investment.

Kazemi et al. [11] reinforced this argument by demonstrating that innovation mediates the relationship between export orientation and export outcomes when strong external network ties exist. This finding is especially significant in Uzbekistan, where business relationships based on trust and long-term cooperation

continue to play a central role in gaining access to international distribution networks. Escandón-Barbosa et al. [12] additionally noted that in collectivist and high-uncertainty-avoidance societies such as Uzbekistan, entrepreneurial orientation is often reflected less through individual risk-taking and more through collective organisational commitment to international market expansion.

RESEARCH METHODOLOGY

The principal theoretical contribution of this article lies in the argument that these two mediation mechanisms are mutually reinforcing rather than independent. Firms with a strong entrepreneurial orientation are more likely to perceive supply chain reconfiguration and digital transformation as strategic opportunities for growth and international expansion. Conversely, digitally enabled supply chains provide real-time market intelligence—including demand fluctuations, pricing dynamics, and buyer preferences—which directly supports entrepreneurial decision-making processes.

Accordingly, this study proposes that the combined indirect effect of supply chain innovation and entrepreneurial orientation on export performance is greater than the sum of their individual effects. This integrated mediation perspective represents the main theoretical novelty of the article.

ANALYSIS AND RESULTS

Uzbekistan’s total goods exports reached approximately USD 33.8 billion in 2025, while the country’s overall foreign trade turnover amounted to nearly USD 81.2 billion (Uzbekistan State Statistics Committee, 2025). These indicators reflect the continuing expansion of the national economy and the growing integration of Uzbekistan into international trade networks.

Despite these positive developments, the country’s export structure remains substantially concentrated in commodity-based products. Gold, natural gas, and cotton-related products collectively account for nearly 65% of total exports, whereas manufactured goods represent only 18.1% of export volume—the segment in which innovation capabilities play the most significant role in generating sustainable competitive advantage and long-term export growth.

At the same time, Uzbekistan has demonstrated notable progress in innovation development. The country improved its position in the Global Innovation Index to 79th place among 139 economies in 2025, marking its highest ranking to date. This progress indicates gradual improvements in the national innovation ecosystem, including digitalisation, institutional reforms, entrepreneurial activity, and technological adoption.

Nevertheless, the principal challenge remains the effective transformation of these growing innovation capabilities into higher export competitiveness and increased participation in global value chains. In particular, firms require stronger organisational mechanisms, modernised supply chain systems, and entrepreneurial strategies capable of converting innovation potential into measurable export outcomes (Table 1).

Table 1
Uzbekistan Export Sector-Key Indicators

Indicator	Value	Source / Note
Total goods exports (2025)	USD 33.8B	Uzbek State Statistics Committee, 2025
Foreign trade turnover (2025)	USD 81.2B	Incl. imports USD 47.4B
Share of manufactured goods in exports	18.1%	Latest official export structure bulletin
Global Innovation Index rank (2025)	79 / 139	Best-ever result for Uzbekistan
Customs clearance time (exports, 2025)	20 min	State Customs Committee of Uzbekistan
Logistics Performance Index	2.6 / 5	World Bank LPI; latest available 2023
R&D expenditure (% GDP)	0.16%	UNESCO Institute of Statistics; latest 2022

Sources: Uzbek State Statistics Committee (2025); State Customs Committee of Uzbekistan (2025); World Bank LPI (2023); Global Innovation Index (2025); UNESCO Institute of Statistics (2022).

Table 1 presents a multidimensional picture of Uzbekistan’s export and innovation environment. Export growth has been substantial in recent years, with total exports more than doubling over a relatively short period. In addition, the country’s advancement to 79th place in the Global Innovation Index (GII) reflects the gradual

development of a more mature and dynamic innovation ecosystem.

Nevertheless, several structural challenges continue to limit the full realisation of export potential. Research and development (R&D) expenditure, amounting to only 0.16% of GDP, remains comparatively low when measured against other transitional economies such as Vietnam (0.4%) and Georgia (0.3%). Similarly, although the share of manufactured goods in total exports has increased to 18.1%, this indicator suggests that the country's export diversification strategy is still in the process of development.

One of the most notable improvements has occurred in customs administration, where average customs clearance times have been reduced to approximately 20 minutes at the transaction level. However, the Logistics Performance Index (LPI) score of 2.6 indicates that broader logistics and infrastructure challenges remain significant. In particular, limitations related to multimodal transport connectivity, cold-chain systems, warehouse quality, and integrated logistics services continue to constrain export competitiveness (Figure 2).

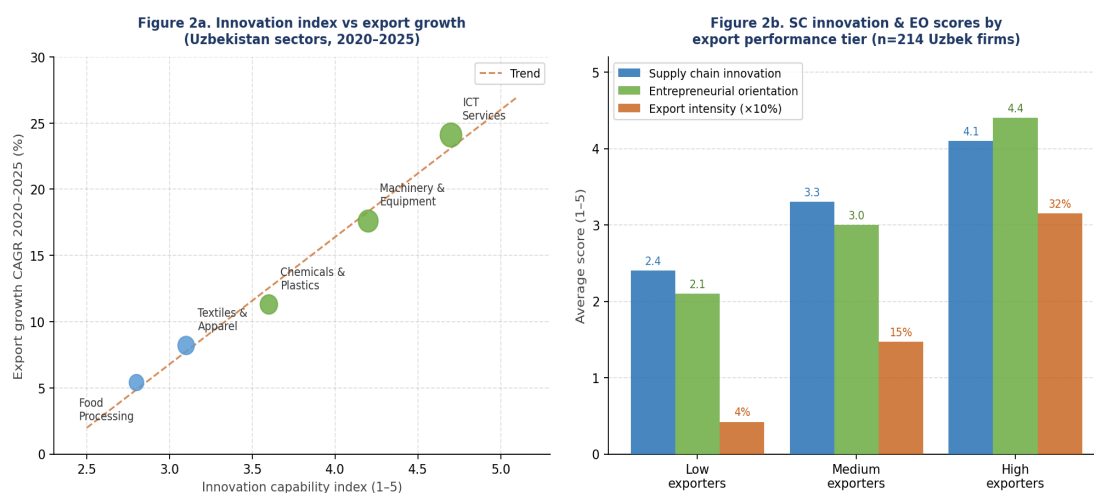


Figure 2. Left (2a): Innovation capability index vs. export growth CAGR by sector (Uzbekistan, 2020–2025). Right (2b): Supply chain innovation and entrepreneurial orientation scores by export performance tier (illustrative data, $n = 214$ Uzbek firms)¹.

Figure 2a demonstrates a clear sector-level relationship between innovation capability and export growth in Uzbekistan. Sectors characterised by relatively high innovation capability scores—such as ICT services (4.7) and machinery and equipment manufacturing (4.2)—show considerably stronger export growth rates compared to sectors with lower innovation intensity, including food processing (2.8) and textiles (3.1). These findings indicate that innovation-oriented sectors possess greater capacity to adapt to international market requirements, improve product differentiation, and achieve sustainable export expansion.

Figure 2b further illustrates that, within a sample of 214 Uzbek firms, both supply chain innovation and entrepreneurial orientation (EO) scores increase consistently from low-exporting firms to high-exporting firms. This monotonic pattern suggests that firms demonstrating stronger organisational flexibility, digital integration, and entrepreneurial behaviour tend to achieve better export outcomes.

Importantly, the difference in entrepreneurial orientation scores between low and high exporters (2.1 → 4.4, representing a spread of 2.3 points) is greater than the corresponding difference observed for supply chain innovation (2.4 → 4.1, representing a spread of 1.7 points). This finding implies that behavioural and strategic factors—particularly proactiveness, opportunity recognition, and organisational willingness to engage in international markets—currently represent especially influential determinants of export success within the Uzbek business environment.

Figure 1 presents the conceptual framework proposed in this study. Innovation capabilities—covering both technological and organisational dimensions [4]—represent the primary antecedent variable within the model. These capabilities influence export performance through two central mediating mechanisms: supply chain innovation and agility [6-8], and entrepreneurial orientation [9-11]. Export performance constitutes the main outcome variable of the framework.

In addition, the model incorporates two categories of contextual moderating factors that may influence the strength and direction of the mediation relationships. The first category includes firm-level characteristics such as firm age, organisational size, and international experience [13]. The second category includes country-

¹ Author's development

level conditions, particularly institutional quality and cultural characteristics [12], which shape firms' strategic behaviour and export adaptation processes.

Figure 1. *Conceptual model: Innovation capabilities → Export performance (Uzbekistan context). A dashed double-headed arrow indicates the mutual reinforcement relationship between the mediating variables.*

Based on the theoretical framework and literature review, the following propositions are advanced:

P1: Innovation capabilities positively influence export performance through supply chain innovation and agility as a partial mediating mechanism.

P2: Innovation capabilities positively influence export performance through entrepreneurial orientation as a partial mediating mechanism.

P3: The combined indirect effect generated through both mediators simultaneously is greater than the sum of the two individual indirect effects, reflecting a mutual reinforcement interaction between supply chain innovation and entrepreneurial orientation.

The proposed framework suggests that these two mechanisms function as complementary rather than substitutive factors. Consequently, firms that invest in only one of the two mechanisms are likely to achieve substantially lower export performance gains compared to firms that simultaneously strengthen both entrepreneurial orientation and supply chain innovation capabilities.

This theoretical prediction may be empirically tested through structural equation modelling (SEM) using a cross-product interaction term between the two mediating variables. Similar methodological approaches have previously been employed in related studies by Al-Khatib [6] and Nuryakin [10].

The findings examined in this article collectively support an affirmative response to the central research question. Supply chain innovation and entrepreneurial orientation do not function as isolated or merely additive mechanisms; instead, they reinforce and strengthen one another in shaping export performance outcomes.

This relationship is particularly evident in the context of Uzbekistan's 2025 economic indicators. Although total exports increased to USD 33.8 billion and the country improved its Global Innovation Index ranking to 79th place, manufactured goods still account for only 18.1% of exports, while the Logistics Performance Index (LPI) remains relatively modest at 2.6 [Table 1]. This combination—characterised by growing innovation potential alongside underdeveloped transmission mechanisms—creates conditions in which supply chain agility and entrepreneurial orientation become especially important determinants of export competitiveness [6-7].

When these two mechanisms are absent or insufficiently developed, innovation capabilities tend to generate mainly internal operational improvements without producing substantial export expansion. By contrast, when supply chain innovation and entrepreneurial orientation operate simultaneously and reinforce each other, the same level of innovation capability can produce significantly stronger international competitive advantages [4-5].

For firm-level decision-makers, the proposed model indicates that the sequencing and coordination of capability investments are as important as the investments themselves. Considering Uzbekistan's current logistics conditions [Table 1], investments in supply chain digitalisation—such as real-time inventory management, supplier performance monitoring, and demand forecasting—are likely to generate higher marginal returns than product-oriented R&D investments until a sufficient level of logistics reliability is achieved [6, 8].

Once this operational foundation has been established, the supply chain evolves into a strategic source of market intelligence capable of identifying international demand patterns, pricing dynamics, and emerging export opportunities [11]. At this stage, entrepreneurial orientation becomes the critical complementary capability, enabling firms to respond proactively to opportunities, tolerate calculated risks, and allocate resources before competitive advantages diminish [9-10].

Accordingly, the central managerial implication of this study is that firms should treat supply chain innovation and entrepreneurial orientation as components of an integrated and sequentially coordinated system rather than as separate and independent investment areas.

Several policy implications also emerge from the analysis.

First, export support institutions in Uzbekistan should incorporate supply chain digitalisation indicators into export readiness assessment frameworks. In particular, evaluation systems could include modules related to real-time inventory management, supplier monitoring systems, and customs documentation automation. Such measures would help identify firms possessing strong innovation potential but relatively weak implementation and logistics capabilities, where targeted state support could produce the highest returns [6].

Second, entrepreneurial orientation should be more explicitly integrated into export management and business development training programmes. As demonstrated in Figure 2b, entrepreneurial orientation appears to represent a more restrictive constraint among low-performing exporters than supply chain innovation itself, reflected by a wider performance gap (2.3 points versus 1.7 points). Consequently, treating entrepreneurial orientation as an intangible or secondary factor rather than as a developable organisational capability may lead to significant underinvestment in export competitiveness development [10-11].

Third, policymakers should avoid evaluating innovation support initiatives separately from logistics infrastructure policies. The continuing disparity between improvements in transaction-level efficiency—such as 20-minute customs clearance—and the broader system-level logistics performance reflected in the LPI score of 2.6 demonstrates that firm-level innovation and national infrastructure development operate as complementary rather than substitutive factors [8, Table 1].

CONCLUSION AND RECOMMENDATIONS

This article aimed to address the following central research question: *Do supply chain innovation and entrepreneurial orientation jointly mediate the positive effect of innovation capabilities on export performance, and do these mechanisms function as complementary factors that reinforce one another?* The theoretical and analytical evidence presented in this study supports an affirmative answer to both dimensions of the question.

The current stage of economic development in Uzbekistan makes this issue particularly significant. With exports reaching USD 33.8 billion in 2025, an improved Global Innovation Index ranking of 79th place, and customs clearance procedures reduced to approximately 20 minutes, the country has established important foundations for innovation-driven export competitiveness.

Within this context, the article argues that strengthening transmission mechanisms through coordinated investment in supply chain digitalisation and entrepreneurial orientation represents one of the most important strategic challenges for both business management and economic policy. Firms that simultaneously develop agile supply chains and proactive entrepreneurial behaviour are likely to achieve substantially greater export competitiveness than firms focusing on innovation capability alone.

The propositions introduced in the conceptual framework require further empirical validation through primary data collected from a representative sample of Uzbek exporting firms. In particular, future studies may apply structural equation modelling (SEM) with cross-product interaction terms in order to test the proposed mutual reinforcement effect between supply chain innovation and entrepreneurial orientation.

Future research should also investigate whether these mediation relationships vary across industrial sectors, ownership structures, and firm-size categories. In this regard, the model proposed in this article offers an important diagnostic perspective for both researchers and practitioners. The key strategic question is no longer simply “*Are firms sufficiently innovative?*” but rather “*Have firms developed the supply chain agility and entrepreneurial orientation necessary to transform innovation capabilities into successful export outcomes?*”

REFERENCES

1. Roper, S., & Love, J. (2002). Innovation and export performance: Evidence from the UK and German manufacturing plants. *Research Policy*, 31(7), 1087–1102. [https://doi.org/10.1016/S0048-7333\(01\)00175-5](https://doi.org/10.1016/S0048-7333(01)00175-5)
2. Gary A. Knight, & S. Tamer Cavusgil (2004). Innovation, organizational capabilities, and the born-global firm. *Journal of International Business Studies*, 35(2), 124–141. <https://doi.org/10.1057/palgrave.jibs.8400071>
3. Love, J., Roper, S., & Zhou, Y. (2016). Experience, age and exporting performance in UK SMEs. *International Business Review*, 25(4), 806–819.
4. Azar, G., & Ciabuschi, F. (2017). Organizational innovation, technological innovation, and export performance. *International Business Review*, 26(2), 324–336.
5. Lages, L., Silva, G., & Styles, C. (2009). Relationship capabilities, quality, and innovation as determinants of export performance. *Journal of International Marketing*, 17(4), 47–70.
6. Al-Khatib, A. (2023). The determinants of export performance in the digital transformation era. *International Journal of Emerging Markets*, 19(10), 2597–2622.
7. Bhatti, S. et al. (2022). Exploring data-driven innovation and supply chain innovation. *Annals of Operations Research*, 333(2–3), 799–824.
8. Ghobakhloo, M. et al. (2023). Industry 4.0 digital transformation and supply chain resilience. *Production Planning & Control*, 36(1), 61–91.
9. Robb, C., & Stephens, A. (2021). Market orientation and proactive orientation on export performance. *Journal of Global Marketing*, 34(5), 392–410.
10. Nuryakin. (2024). Entrepreneurial orientation and SME export performance. *Journal of Entrepreneurship, Management and Innovation*, 20(1), 30–46.
11. Kazemi, A., Ghasempour Ganji, S. F., & Johnson, L. (2022). External network and innovation in export orientations—performance link. *Review of International Business and Strategy*, 33(5), 786–809.
12. Escandón-Barbosa, D., Salas, J., & Losada-Otálora, M. (2023). Country culture and strategic orientations—export performance. *Journal of Strategy and Management*, 16(4), 733–746.
13. Oura, M., Zilber, S., & Lopes, E. (2016). Innovation capacity, international experience and export performance of SMEs. *International Business Review*, 25(4), 921–932.

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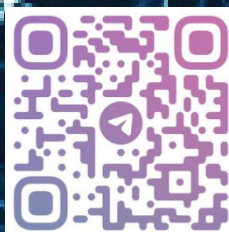
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