

## Strengthening Grape Export Competitiveness in Karnataka through an Integrated Conceptual Framework

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### ABSTRACT

**Purpose** - The aim of this study is to explore the literature pertaining to grape cultivation, export performance, infrastructure, standardisation, farmer group, market access, competitiveness, sustainable development and integrate all these into an overall conceptual framework for promoting sustainable development of the grape export in Karnataka. The study takes into account the incoherence of the literature available and explores the interactions between production, institutional, organisation and market factors and their effect on the export readiness and performance.

**Methods** - The 38 studies published from 2005-2026 were the subject of a systematic literature review. The literature chosen included peer reviewed journal articles, books, theses, working papers and empirical studies on value-chain development, Good Agricultural Practices, cooperatives, Farmer Producer Organisations (FPOs) and agricultural trade in general and in particular on grape exports. Research were organized in groups according to the year of study and region, methodological approach and thematic area. The convergent findings were identified using the method of thematic synthesis, which was used to identify conceptual relationships and gaps in research. Eight themes were detected that were included in a conceptual framework that was based on the literature.

**Results** - The review shows that export performance of the grape crop is influenced by various factors such as export agriculture practices, infrastructure, awareness of the growers, standards implementation, MSME-cooperative viability and collective export capacity and market access. The amount of literature available is skewed towards the performance of Maharashtra and the national level, and specific and focused in terms of the performance of Karnataka is limited. The farm's readiness to export was identified as the key link between farm level capabilities, infrastructural capabilities, and organisational capabilities and sustainable export performance. There is a positive relationship between institutional support, value chain upgrading and public-private collaboration, and causes a negative impact on export capability.

**Implications**- The study highlights the need for coordinated investments, in packhouses/cold chains, testing facilities, farmer training, forming farmer groups, providing certification, and in international market linkage. It also sets a guideline to conduct more empirical testing with the grape growers, FPOs, MSMEs and exporters of Karnataka in the future.

**Novelty**- The study brings together previously disjointed literature into a holistic framework of sustainability and separates awareness of sustainability from the organization and collective export potential from export readiness. The study brings together the scattered literature to present a

*comprehensive perspective on sustainability and separates the awareness of sustainability from the awareness of the collective export potential from the export readiness, thus establishing a link between these two.*

**Keywords:** *Grape Exports, Export Readiness, Sustainable Export Performance, Grape Cultivation, Export Infrastructure, MSME Cooperatives.*

## Introduction

The fresh grapes industry is an important sector of the high value horticulture industry in India, as it is labour intensive, has a high commercial value, export oriented and can provide farmers with a link to the international market. The varietal adaptation, improvement of production technology and establishment of specialised cultivation clusters has contributed to the development of cultivation of Grape in India (Chadha, 2024; Mani et al., 2014; Naik, 2006). With the passage of years, Indian grapes have entered into various foreign markets, leading to an increasing number of studies focusing on export performance, trade direction, competitiveness and market stability (Babar & Satpute, 2025; Chandran et al., 2026; Murthy et al., 2014; Pradhan et al., 2024; Yarazari et al., 2022). However, potential production is not a guarantee of continued successful exports. The fresh grape market is a key requirement of high-quality, residue compliance, traceability, reliable post harvest handling and timely logistics to satisfy the evolving requirements of international fresh grape buyers and regulators.

The literature indicates that there are a number of inter-related factors which influence the export of grapes. The quality of the grapes that comply with the export specifications (appearance, maturity, safety and uniformity) will be dependent on the farm production practices. The finding of the research on Good Agriculture Practice (GAP), farmer attitude and institutional support showed that the knowledge and attitude of the farmers regarding implementation of the recommended practices is critical in participating in export (Som et al., 2016; Som et al., 2017; Ramesh et al., 2015). However, growers need to be aware of a good product if they do not have the technical assistance, testing centres, certification assistance, and access to low-cost financing. It is especially noteworthy to observe that this knowledge is not sufficient to be translated into practice, when analysing the export readiness of SMEs in the Grape sector.

Export infrastructure is yet another important aspect. Fresh grapes are very susceptible, require a packhouse, pre-cooling, grading, cold storage, and must be transported with refrigeration; additionally, there is a need for residue testing and efficient logistics. Some of the previous studies indicate that production/marketing constraints and supply chain constraints are the primary factors affecting the participation in export (Babar & Satpute, 2025; Chandran et al., 2026; Pradhan et al., 2024; Singh, 2013; Yarazari et al., 2022). However, infrastructure is typically dealt with in terms of a general constraint, instead of an overall constraint of availability, accessibility, affordability and operational reliability. Any step in the post-harvest value chain that is weak can lead to a decrease in quality, rejection risk and ultimately less competitiveness for growers.

A possible means for doing this is with the use of collective institutional arrangements. From the experience of Mahagrapes, farmer collectives are emerging as a very effective means of aggregation, certification of produce together and controlling quality and access to higher value export markets (Roy & Thorat, 2008; Ramesh, 2013). The governance, professional management and institutional strengthening of the FPOs is also emphasized in research (Lalitha et al., 2024). The viability of these export systems (co-operative, FPO and MSME) is not thoroughly researched in various scenarios in different regions. Collective organisations can be formalised and do not have export coordination, negotiation, risk management and supply consistency functions.

These are more pertinent in the context of Karnataka where grapes have significant export potential but in the absence of literature on the export preparedness, it is of great importance. The evidences available are mainly in Maharashtra (Babar & Satpute, 2025; Chandran et al., 2026; Murthy et al., 2014; Pradhan et al., 2024) particularly at Nashik, Sangli & Marathwada. It is therefore important to gather the fragments of information and learn the circumstances that would allow for sustainable export performance in the grape producing areas, once the production is converted.

For this purpose, a Systematic Literature Review (SLR) is used in the study to explore export-oriented cultivation practices, infrastructure availability, viability of MSMEs and cooperatives, grower awareness, conforming to standards, market entry barriers, value chain upgrading and institutional support. The findings of the themes are followed by a development of an integrated conceptual framework for sustainable development of export of the grapes in Karnataka. Export readiness as outlined in the framework is the mechanism through which the farm level, export capacity of the organisations and institutions, are linked to the export economic, market, social and environmental outcomes.

### **Background and Contextual Overview**

Indian Grape has been developed from being a horticultural activity of limited area in India to being more and more, a commercial and export oriented industry. Thanks to the work done by the grape improvement, adaptation of grape cultivation technologies, special crop-management practices and organized clusters of grape cultivation (Chadha, 2024; Mani et al., 2014; Naik, 2006), cultivation of grapes has benefited. Grapes have a special place in horticultural export due to its very perishable nature and requirement of extreme cooperation and coordination between production, post harvest handling, quality control and international logistics. So, the quality of the product is as important as being able to be consistent, to be able to provide food safety, traceability and timely delivery: all of this is very crucial for export competitiveness.

Due to the growth in the export sector, the research on growth, instability, direction and competitiveness of grape-export has been drawn in India. However, the research indicates that the export potential of Indian grapes is not the same across all markets and throughout the year as prices fluctuate across markets and years, geographic concentration of markets, market demand and product quality vary across years (Bhagat & Jadhav, 2021; Chetia et al., 2022; Kiran & Sivakumar, 2016; Nithin, 2016). The compliance with Good Agricultural Practices (GAP), pesticide residue limits, phytosanitary requirements and traceability systems have consequently come to play a pivotal role for export participation (Som et al., 2016; Som et al., 2017).

The institutional arrangements of the grape export are represented by the various stakeholders such as growers, cooperatives, FPOs, MSMEs, packhouse operators, labs, exporters, logistics service providers and public agencies. Collective action, such as Mahagrapes model (Roy & Thorat, 2008; Ramesh, 2013) is a way to achieve the above goals. But this is dependent on effective governance, good professional management and on-going market linkages.

In this National scenario Karnataka is one of the prominent grape growing areas, however there is no proper study conducted in Karnataka export cluster as compared to the established grape clusters in Maharashtra. The current research works carried out in Karnataka have been concentrated on the production and marketing aspect particularly in the case of dry-grapes (Yarazari et al., 2022). The limited evidence indicates the necessity of studying the export oriented cultivation capacity, infrastructure, grower compliance, collective institutions and market-access conditions in an integrated framework with the help of literature.

### **Research questions**

The literature review has been done systematically based on the six research questions that have been formulated based on the various issues associated with grapes exports, literature, which is related to production, infrastructural, institutional and market related issues. These questions aim at examining the concept learnt from the available studies on transition from grapes have towards a more sustainable engagement in international markets in the case of Karnataka.

- RQ1: What does the existing literature show about the different practices involved in grape cultivation that will allow it to be exported as per the specifications? Which of these are relevant in the grape producing areas of Karnataka?
- RQ2: What sort of export infrastructure (packhouses, pre cooling, cold storage, testing laboratories and logistics) is required for the export of fresh grapes?

Financial, operational and governance issues affecting the viability of the MSME and Cooperative / Farmer producer organisation models of grape exports in groups.

- RQ4: How do the literatures reveal the knowledge and compliance of grape growers with the international quality standards, traceability, food-safety and phytosanitary standards?
- RQ5 – What are some of the barriers to grape growers being able to export their crops to markets outside of Karnataka? Production, economic, infrastructure, institutional, regulatory and market barriers.
- RQ6 – How can the export-development framework incorporate the following MSME support, Value chain upgrading and Public – Private collaboration to improve the export-readiness and performance of Karnataka grape?

Themes are synthesized from these questions, and the questions can be used to formulate the proposed concept.

### **Research Methodology**

The literature review is systematic and will be used to synthesize the literature done on the Grape cultivation, export performance, infrastructure, standards compliance, collective institutions and market access. Academic databases were used for searching relevant studies using various combinations of keywords of grapes, agricultural exports, cooperatives, MSMEs, value chain and sustainability. The inclusion criteria included peer-reviewed articles, books, theses and credible reports (from reputable sources) which were relevant to India and other similar settings. After the duplication, the title and abstract of all the studies were checked and then the full text of those that met the inclusion criteria were read. A review matrix was developed to compile key information, and was thematically analysed. The data obtained were then analyzed to draw themes which were then integrated to identify the gaps in the research and to suggest the conceptual framework.

### **Descriptive Profile of the Literature**

Only 38 publications from 2005 until it will reach 2026 form the review corpus. The temporal distribution suggests that the research around the cultivation of grapes and the exportation of the agricultural products was not continuous, but rather grew step-wise. First articles have focused on the changing agricultural trade system, the use of technologies, and the competitive system of agriculture and collective export management. The literature grew in the direction of export performance and direction between 2013 and 2019: export performance, export direction, farmer attitude, Good Agricultural Practices and value-chain governance and international competitiveness. A significant increase in research activities was observed after 2021 in export constraints, Farmer Producer Organisations, climate risk, market diversification, sustainability and dynamic determinants of agricultural exports.

2024 was the most prolific year for publication (six studies) as was always the case with all annual publications, with 2016 following with four studies. The rising number of publications in the last few years reflects the growing academic attention to the institutional, environmental and sustainability issues related to agricultural exports. However, the absence of a series of annual publications also indicates that research in the field of grape export is a relatively narrow and fragmented field.

The thematic classification indicates that eight studies (21.1% of the total sample) related to agricultural export and the second largest group was macroeconomic performance, which had seven studies (21.9% of the total sample). For each of the following categories five studies were included: Export performance, direction of export, compliance with technology and standards, production constraint, export constraint. Four studies focused on farmer characteristics and collective institutions/value-chain governance, export competitiveness and cultivation. There were only three studies that were specifically about diversification, climate risk and sustainability. The literature seems to have concentrated on the economic performance and environmental resilience and integrated sustainability are less developed topics.

Geographically, 24 studies (63.2% of corpus) were studied at national or general level that is India. This was of interest as Maharashtra or the Mahagrapes is the one which has very few studies, but has a strong hold in the Indian grape export system. Only one study focused on Karnataka and this study dealt with production and marketing problems faced by dry-grape growers [38]. Of the two studies one was from other states in India and three studies were of international/comparative studies in nature. This geographical imbalance has a good justification that a framework is Karnataka oriented.

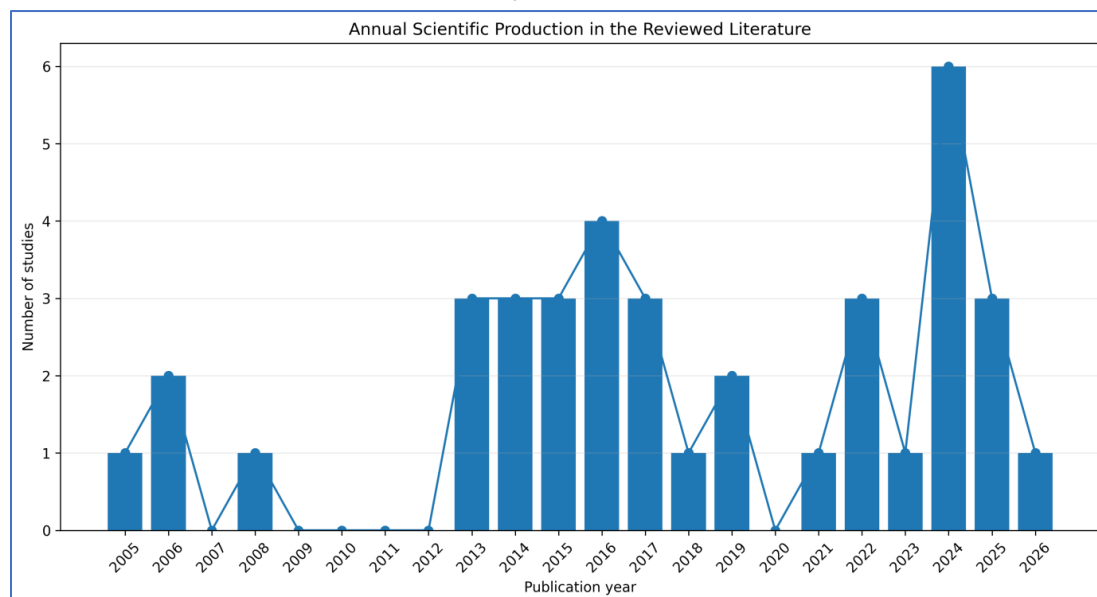
In terms of method, the most common category – representing 17 studies or 44.7% of all the studies – was Methodologically, Econometric, Trade and Statistical analyses. The case-study, institutional and value-chain approaches accounted for 15.8% of the farmer and producer surveys, whereas the remaining 21.1% were farmer and producer surveys. A small number of conceptual, historical, technical and policy oriented publications (18.4%) were also there. The methodological profile is variable and there is some disconnection between the macro level trade analysis and the evidence collected at the institutional level from the farmers.

**Table 1: Literature Review was Conducted to get an Overview of the Literature**

| Dimension            | Distribution                                                                                                                                               |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Publication coverage | 38 studies published during 2005–2026; peak publication year: 2024 with six studies                                                                        |
| Dominant themes      | Agricultural exports and macroeconomic performance: 8 (21.1%); export performance: 5 (13.2%); technology and compliance: 5 (13.2%); constraints: 5 (13.2%) |
| Geographic focus     | India—national/general: 24 (63.2%); Maharashtra/Mahagrapes: 8 (21.1%); Karnataka: 1 (2.6%); other Indian states: 2 (5.3%); international: 3 (7.9%)         |
| Study types          | Econometric/trade/statistical: 17 (44.7%); farmer surveys: 8 (21.1%); case-study/institutional: 6 (15.8%); conceptual/policy: 7 (18.4%)                    |

Overall, the descriptive evidence confirms a literature base that is economically oriented, methodologically diverse and geographically concentrated outside Karnataka. This pattern supports the need for a systematic, cross-thematic synthesis and an integrated conceptual framework addressing Karnataka's grape-export ecosystem.

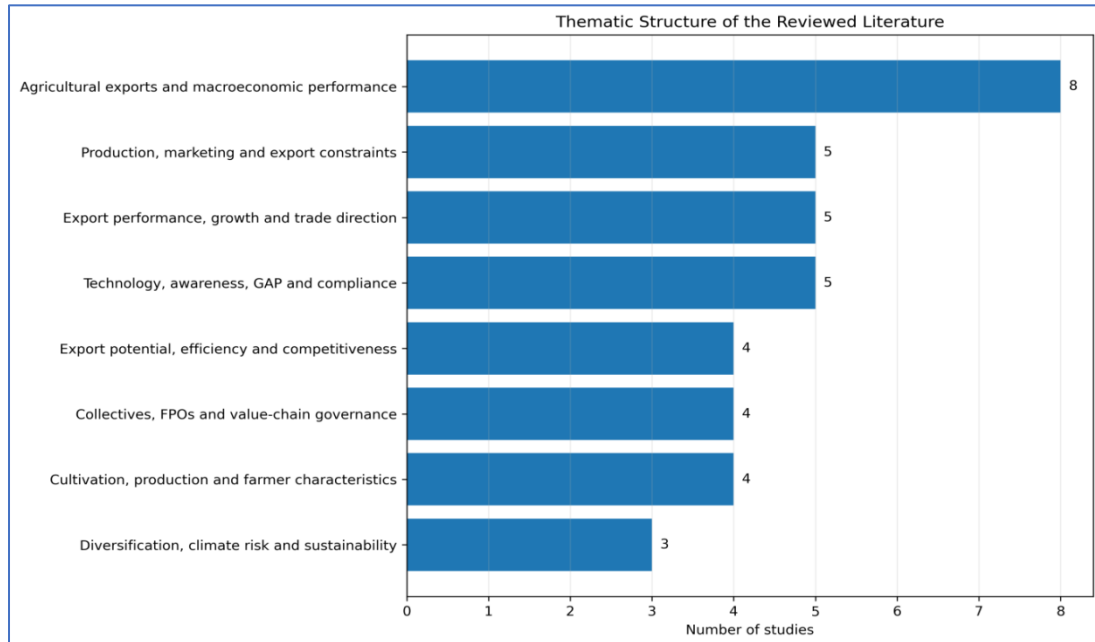
The evidence presented in the descriptions agrees with the literature base being mainly economically oriented with a diverse method and a geographical focus on the industry outside of Karnataka. This pattern is in response to the need for a cross-thematic synthesis and a conceptual framework for the Karnataka Grape Export Ecosystem in a holistic manner.



**Figure 1: Annual Scientific Production**

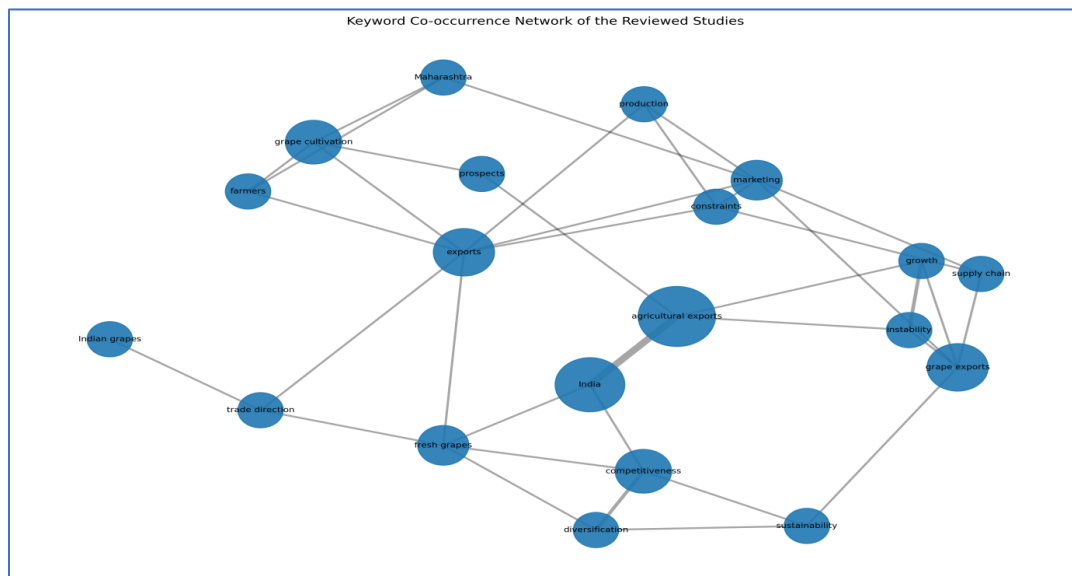
The distribution of time of the 38 studies reviewed is given in figure 1. The trend depicts an overall rise in research interest with some fluctuations, particularly after 2021, when the research interest has significantly increased, and reaching its peak in 2024. It is a recent trend that shows growing interest

in academia of the constraints of grape export, sustainability, farmer organisations, competitiveness and development of value chains.



**Figure 2: Themed distribution of the reviewed literature**

The distribution of studies in the 8 themes identified are shown in figure 2. Most often the focus was on agricultural exports and macro-economic performance, then on export performance, and lastly, on compliance with standards and export constraints. In contrast, this aspect of market diversification and climate risk and sustainability was comparatively less, marking a research gap in the literature.



**Figure 3: Keyword Co-occurrence Network**

The relationships between the main keywords derived from the literature reviewed showed in Figure 3. Certainly, the literature is multidisciplinary as evidenced by the number of terms that frequently appear in the literature, such as agricultural exports, grape exports, competitiveness, production, marketing, standards and sustainability. The network also confirms that the support of institutions, FPOs and value chain governance and issues are still fairly secondary and require a more holistic conceptual approach.

### **Thematic findings**

- **Grape Cultivation, Production Context and Farmer Characteristics**

Based on the literature reviewed, the production and export of grapes can be represented in 8 interrelated themes such as grape cultivation and producer characteristics, export performance and export direction, export competitiveness, technology adoption and standards compliance, agricultural exports and macroeconomic performance, collective institutions and value-chain governance, production, marketing and export constraints, sustainability, diversification and climate resilience. In total, these themes show that grape-export performance is dependent upon and more complex than just production volume or international demand. It is more likely, however, to be a result of farm capability, institutional processes, post harvest facilities, quality assurance and market coordination and the trade environment.

The vineyards, the production environment and the farmer's attributes were examined. The context in which grapes are cultivated, the production context and the characteristics of the farmer were studied.

The first stream of literature lays the groundwork for the production and socio-economic base of Indian grape industry. The present export industry of grapes is put in perspective by Chadha [5] who has traced the history of introduction, spread and establishment of cultivation of grapes in India. The technicality of grape growing is evidenced in the work of Mani et al. [17] that discussed the importance of pest management and crop protection in maintaining grape quality and productivity.

Empirical research in actual wine producing areas has shown that production decisions are strongly linked to socio-economic aspects of farmers. Ghosh et al. [11] studied the production environment of one of the established grape growing clusters of India in Sangli. Likewise, Babar and Satpute [2] have analysed socio-economic profile of export oriented grape growers in Marathwada. The results of these studies indicate that growers' capacity to implement their specialised export oriented practices are affected by their education level, farming experience, size of land holdings, access to information, and participation in institutions.

But, literature is largely limited to known grape producing areas such as Maharashtra. The condition of grape farmers in Karnataka regarding their cultivation conditions, grower attributes and export preparedness has been given little attention when compared with other states. This gives rise to the question whether the lessons learnt from production clusters in Maharashtra can be readily replicated in Karnataka or if there is a need for a region-specific approach to production clusters to take account of the differences in climate, infrastructure, institutional support and market connectivity.

- **Export Performance, Growth, Instability and Trade Direction**

There is an extensive literature that assesses the performance of Indian grape exports in the past. A growth analysis is done by Bhagat and Jadhav [4] and an econometric evaluation of the performance of grape production and export by Nithin [21]. Similarly, Thulasiram & Alagumani [37] have studied the economic performance of fresh-grape exports. These studies make it clear that export growth needs to be measured in the context of instability, as export volume and/or value can grow while at the same time experiencing fluctuations from one year to the next, market uncertainty and price realisation uncertainty.

Trade-direction studies add to this analysis by looking at the geographical distribution and stability of markets to which the trade is directed. The direction of export of Indian grapes is studied by Kiran and Sivakumar [13] while Chetia et al. [8] use the Markov-chain method to assess the retention and transition of export markets. These contributions suggest that export success is not only a function of overall growth, but also of the ability to have stable markets and to minimize overconcentration on a limited number of markets.

The literature thus calls for a multidimensional picture of the performance of grape export, which includes export growth, market stability, market retention, price realisation and diversification. Still, the national level approach is still the prevailing method. This analysis might mask variations in production systems and the ability to access infrastructure and institutions at the state level. The growth in exports at the national level does not necessarily imply that the state is also ready to export. To comprehend the potentialities of Karnataka in production and their linkage with the international markets a more contextual interpretation is needed.

- **Export Potential, Efficiency and Global Competitiveness**

The third theme is on efficiency, exportability and competitiveness of Indian grapes and agriculture products. Barma [3] explores the efficiency of Indian agriculture export in a broader sense in the context of stochastic panel, thus providing a broad-based understanding of Indian agriculture's performance as exporting efficiency. Deshmukh et al. [9] have worked more specifically on the export potential of Indian grapes and Seccia et al. [30] have assessed the competitiveness of table-grape from a global viewpoint. Indian agribusiness competitiveness is viewed in the context of the overall trade environment of Asia and 21st century in Singh [32].

These studies all indicate that export potential is not necessarily export competitiveness. Even when agro-climates are good and production capacity was high, a country or region can still under-perform on the international markets due to quality, logistical, market intelligence, certification, branding or institutional capacity gaps. Competitiveness is, thus, a relative and dynamic concept that is dependent on the competitive performance of the exporters, the importing country's demand, product differentiation and the ability to produce consistent product quality.

It also suggests that India needs to go beyond production expansion in its grape export policy from the competitiveness literature. To achieve sustainable international positioning, it is necessary to improve the unit value, market reputation, supply reliability and to diversify the destinations. The issue that Karnataka must address is not just one of production but also whether the state has the whole package – from production to export – of grapes to rival existing domestic and international grape clusters.

- **Technology Adoption, Farmer Awareness and Standards Compliance**

A key theme in the literature related to technology, knowledge and standards. Chandra [6] has discussed the importance of technology and adaptation, as means to succeed in export markets in developing countries. Among the various domains of knowledge, Naik [20] refers to knowledge as a key area in competitive agriculture with particular reference to Indian grapes. The contributions here indicate that not only physical resources but the ability to acquire, adapt and apply specialised technical knowledge are needed for export development.

This is corroborated by farmer level studies. Ramesh et al. [25] studied the attitude of the farmers towards the cultivation of grapes and export, and concluded that the involvement in export market depends on the perception, expectation and willingness to adopt export oriented practices. Som et al. [34] evaluate stakeholders' knowledge and attitude on Good Agriculture Use Practices and Som et al. [35] analyze the role of institutions in development of these practices and grape exports. The results of these studies all indicated that institutional extension, training and technical guidance are a prerequisite to the application of quality and safety standards.

There is a big difference between awareness and compliance. Awareness relates to the grower's knowledge of Good Agricultural Practices, pesticide restrictions, residues limits, traceability, certification and importing country requirements. Compliance on the other hand is related to the actual application of these standards: Record maintenance, approved input use, testing, certification, controlled post-harvest processing. Even if knowledge is there, growers' compliance is not always guaranteed because of their financial constraints, technical and infrastructural constraints.

Therefore, conceptualization of awareness and compliance are to be considered as related but different constructs in a conceptual model. Collective awareness raising through institutional support and infrastructure, finance and collective coordination could decide if the awareness is transformed into compliance. This distinction is particularly important for small and medium size growers who might know about export requirements but do not have access to laboratories or certification services, recognised packhouses or access to low-cost technical assistance.

- **Agricultural Exports, Economic Growth and Macroeconomic Determinants**

In the fifth theme, the export of grapes is integrated in the context of the relationship between agricultural trade and economic performance. Kaur and Sidhu [12] study the causal relationship between exports and agricultural gross domestic product in India and Ramphul [26] studies the agricultural exports and agricultural growth. Kumari and Kakar [14] further the discussion by comparing the agricultural export and economic growth of India with China using econometrics.

Thakur [23] discusses the policy and institutional aspects of agricultural trade and its impact on the trade of agricultural products from India. Suresh and Mathur [36] discuss the overall performance and prospects of agricultural commodity exports from India while Roy [28] examines the growth and instability of the exports. Recent research adds the firm-level and dynamic aspects. Solanki et al. [33] explore the firm performance-agricultural exports link through system-GMM methods and Ravi Kumar et al. [27] investigate the factors influencing agricultural exports in India with a dynamic panel approach.

All these texts reveal the influences of macroeconomic factors, trade policies, exchange-rate changes, global demand, the capacity of companies and institutional quality on agricultural exports. But not all producers and regions benefit from this growth in exports equally. In reality, the availability of export opportunities is related to farmers' capacity to link to organised value chains and satisfy the requirements of markets. The general macroeconomic literature, therefore, gives support to export promotion, but not much explanation on how the producer systems at the state level can export. This gap reinforces the need to integrate the national vision on the trade with the local vision on the value chain and institutional analysis.

- **Farmer Collectives, FPOs and Value-Chain Governance**

One of the most significant themes for the study would be institutional arrangements for collective action that would focus on Karnataka. In particular, the Mahagrapes model is given special consideration in the literature. Ramesh [24] explores how farmers can be connected to export markets via Mahagrapes, whilst Roy and Thorat [29] investigate how small farmers can become involved in high value horticultural exports via Mahagrapes. These studies are just a few examples of how collective organisations are addressing some of the challenges posed by fragmented production, limited bargaining power, high certification costs and lack of access to foreign buyers.

Singh [31] takes a different way of dealing with the problem by introducing the notions of governance and upgrading in global production networks. This lens focuses on the conditions of farmers' participation rather than just the extent of their participation. Value-chain governance influences the individuals or parties that set quality standards, the individuals or parties that have the responsibility for compliance, the sharing of information, and the sharing of value along the value chain among growers, exporters and buyers.

This institutional debate is furthered by Lalitha et al. [15] who look at enhancing the Farmers Producer Organisations (FPOs) and empowering small farmers. Their research indicates that collective organisations cannot be just formally registered. They are effective when they are professionally managed, when they have an effective internal governance structure, when members are engaged in actively participating, when they have the financial resources, and when they have market linkages and access to technical services.

There is literature that backs up the possibility of the cooperative, FPO and MSME model of export but not all the collective models are feasible. Collective Organisations can effectively perform export functions if they are financially sustainable, operationally coordinated, have good leadership, are transparent and market-oriented. This is important for the evaluation of future export potential of MSMEs—cooperatives in Karnataka in the case of grapes.

- **Production, Marketing, Supply-Chain and Export-Market Constraints**

Studies about constraints have been carried out and identified several constraints along the grape export value chain. Babar and Satpute [1] discussed about the constraints of production, marketing and export by the farmers in Marathwada who export grape and Pradhan et al. [22] have analyzed marketing and export constraints of grape export farmers in Nashik. Chandran et al. [7] narrow their scope to Theni and focus on four constraints to cultivation and supply chain, demonstrating that constraints are not confined to Maharashtra.

Murthy et al. [19] discuss fruit and vegetable marketing in the context of export performance of the grapes of Andhra Pradesh and how it relates to logistics, marketing channels and organisation of supply chain. Yarazari et al. [38] while concentrating on dry-grape producers of Karnataka, shed light on the production and marketing issues of the grape economy of the state.

The literature on constraints shows that grape growers have a multi-dimensional constraint situation. Pest incidence and climate changes may impact the production level, while high input costs and quality control challenges can present a challenge to growers. In the marketing chain, they can find problems of relying on market intermediaries, price volatility, lack of market information and poor negotiation position. Export specific factors are certification costs, risk of residues, complicated documentation, restricted access to buyers and consignment rejection. Some of the constraints faced in the supply chain are the lack of packhouses, lack of pre-cooling and cold storage, high transportation cost, limited access to testing facilities etc.

A key takeaway is that the constraints are interdependent. Lack of infrastructure drives up compliance costs; farmer organisation is weak which in turn lowers farmers' bargaining power, financial resources are limited and so is their ability to adopt new technologies, as well as market information is poor, which makes farmers more reliant on intermediaries. Hence single policies are not likely to yield lasting impacts unless they are complemented by measures in production, infrastructure, finance and institutions and markets.

#### **Market Diversification, Climate Risk and Export Sustainability**

The last theme combines the elements of market diversification, competitiveness and environmental sensitivity. Montes Ninaquispe et al. [18] analyze the diversification and competitiveness of the Peruvian fresh-grape exports, and García Juárez et al. [10] explicitly relate competitiveness and diversification to sustainability in the world market for grapes. These studies are done away from India but provide comparative viewpoints on the significance of destination concentration reduction and destination response to demand changes and on holding competitive export position.

Madrewar et al. [16] considers the environmental dimension by analysing the socio-economic impacts of climate change on export oriented Indian grape industry. Grape production is very temperature dependent and rain and humidity, as well as pest attacks and unusual weather patterns, have an impact. Climate induced disruptions can impact yield, fruit quality, pesticide use, harvest timing, and conform to the requirements of export specifications. Thus, Climate Risk is not just a production issue, but also plays a role in the exportability and consistency of production as well as supply chain planning and market reliability.

The sustainability literature extends the concept of export performance. The short-term growth in quantity or in value should not be the only measure of sustainable export of grapes. They should also embody diversification, climate smart, efficient use, minimisation, and stabilisation, of farmer returns, and involve inclusion of small farmers. This is especially pertinent in Karnataka where export development has to be scaled up without compromising the environment and social sustainability.

#### **Cross-Thematic Synthesis and Research Gaps**

The literature analyzed shows that there is ample knowledge on the individual parts of the grape export system. They have each investigated aspects of production, farmer attributes, export expansion, export orientation, competitiveness, Good Agricultural Practices, farmer associations and problems of sustainability. But these are still not to a great extent connected.

The first point is that most of the empirical studies are focussed on Maharashtra and mainly Nashik, Sangli and Marathwada of Maharashtra. Though significant in the production of grapes, Karnataka does not receive a significant amount of attention. Second, export infrastructure is often cited as a limitation without a systematic assessment of the adequacy of the various components of the infrastructure, such as packhouses, pre-cooling facilities, cold storage, laboratories and logistics. Thirdly, while the Mahagrapes literature shows the potential of collective exports, the financial and operational sustainability of the implementation of such models in Karnataka is not extensively explored.

Fourthly, awareness and compliance go hand-in-hand, but they are at different stages of export preparedness. Fifth, export barriers are studied singly, and not as a system of barriers. Finally, limited

studies combine the MSME support and value chain upgrading with collective action and public–private partnerships within a holistic sustainable export-development framework.

Thus, literature was used to develop a conceptual model that in turn guided the export readiness and sustainable export performance of the grapes, which were mediated by export-oriented cultivation practices, infrastructure availability and capability, MSME–cooperative viability, and grower awareness and standards compliance. The barriers to export and support from the MSMEs, including value-chain upgrading, partnerships and institutions, can have a negative impact on these relationships. Such a model needs to be evolved through a systematic process of literature review and not assumed in advance, and can then be the basis for empirical research to develop sustainable grape-export in Karnataka.

### **Conceptual Framework Development**

Conceptual framework was created in an integrative synthesis of the eight themes that were identified in the systematic literature review. Instead, the framework builds on a series of concepts, relationships, and gaps, from the literature, and provides a coherent narrative of how sustainable grape-export development is achieved. The thematic findings suggest that there is a complex of production capabilities, infrastructure, farmer knowledge and standards compliance, collective organisation, institutional support and access to international markets that affects the performance of the grape-export sector.

The focus is on processing in the framework, thus a process-oriented perspective is used. It differentiates between export potential, mechanisms that translate export potential into export capability, export barriers that limit export participation and export outcomes that indicate export sustainability. This distinction is important as literature indicates that just producing won't turn export success. Even successful production, quality assurance, post harvest management and collective coordination and market linkages are inadequate to produce export outcomes.

From the results of this synthesis the framework can be summarized in four general areas:

- Foundational antecedents - Export-oriented cultivation practices, export-infrastructure adequacy, grower awareness and MSMEcooperative viability
- Capability mechanisms, which involve international standards compliance, collective export capability and export readiness.
- Contextual influences including access to export markets and export market barriers, institutional support, value chain upgrading and public-private collaboration.
- Outcome construct - represented by sustainable export performance of grapes.

The proposed relationships between these constructs are based on frequently observed patterns in literature reviewed.

### **Theoretical Orientation of the Framework**

The capability perspective helps to understand why it is not enough to have access to resources in order to be successful in exporting. Producers and collective organisations need to be able to integrate technical knowledge and infrastructure, finance, certification systems and market information into successful export operations. Chandra (2006) and Naik (2006) have stressed on the technology adaptation and knowledge development which is essential for competitive agricultural exports as it upholds the notion that the market-oriented and productive capabilities are necessary to be developed from the resources.

Formal regulations, quality standards, certification systems, extension services and government agencies can be used to explain how they affect grower behaviour and are understood by the use of institutional theory. The promotion of Good Agricultural Practices and dissemination of knowledge, as shown by studies by Som et al. (2016) and Som et al. (2017) are important factors in the adoption of Good Agricultural Practices. The institutional aspects thus shape the awareness of growers on export standards and the support they need to meet export standards.

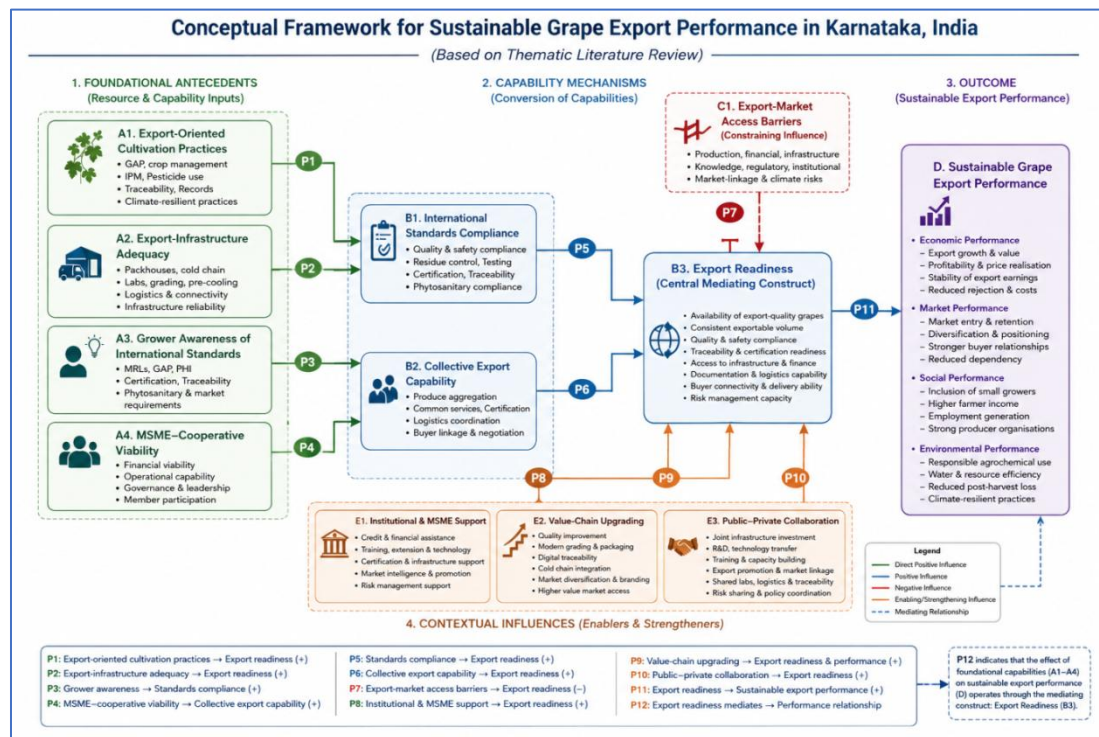
The relevance of collective-action theory lies in the fragmentation of the production of grapes, and the high transaction costs. Small growers may not have the volume they require for export, to get certified, access to pack houses, or be able to negotiate with international buyers on their own. The study

on Mahagrapes demonstrates the possibility of aggregation, provision of collective services and access to markets for small farmers through collective arrangements (Roy & Thorat, 2008; Ramesh, 2013). But collective action can only take place if there is good governance, financial sustainability and coordination of operations in the organisations.

The final and last theoretical underpinning is the value-chain governance. There is a need for coordination within the grape industry among growers, producer organisations, packhouses, laboratories, logistics providers, exporters, regulators and international buyers when exporting grapes. Singh (2013) shows that governance and upgrading have an impact on producers' involvement in export grape production network. The framework thus reflects a value-chain approach to export performance, rather than a bottom-up approach based on the performance of individual farms.

These stand-alone views collectively illustrate the interaction of the production resources, institutions and collective arrangements, as well as value-chain relationships, that shape export readiness and performance.

### Proposed Conceptual Framework



**Figure 4: Keyword Co-occurrence Network**

The figure outlines a conceptual framework that draws on the literature to highlight the interdependent roles of various resources, capabilities, institutional supports and conditions in the value chain on sustainable grape-export performance in Karnataka. The framework is structured into four interrelated parts: foundations (antecedents), capabilities (mechanisms), context (influences), and export performance (sustainability). These constructs are expected to be related to each other through 12 research propositions.

The first is made up of four antecedents that are basic or fundamental. Good Agricultural Practices, crop management, integrated pest management, traceability, record keeping and climate-resilient farming are some of the export-oriented cultivation practices. Proposition 1 is that these practices have a positive impact on export readiness, in terms of increasing the availability of export quality grapes and the consistency of such product. The export-infrastructure includes cold-chain, laboratories, grading systems, pre-cooling, logistics and connectivity, and packhouses. Inadequate and

unreliable infrastructure negatively affects export readiness by hurting product quality and slowing export movement in the export chain, thus Proposition 2 proposes that adequate and reliable infrastructure has a positive impact on export readiness.

The awareness of growers with regard to international standards includes an awareness of maximum residue limits, Good Agricultural Practices, pre-harvest intervals, certification, traceability and phytosanitary requirements. One of the suggestions in Proposition 3 is that increased awareness positively correlates with compliance to international standards. The financial strength, operational capability, governance quality, leadership and member participation of cooperatives, FPOs and export-oriented MSME is MSME's cooperative viability. According to Proposition 4, viability of an organisation has a positive effect on the collective export capability.

The second is the capability mechanisms. International standards compliance is an indicator of the actual implementation of the residue control, testing, certification, traceability, quality assurance and phytosanitary procedures. The reduction of the risk of rejection and increase of market eligibility is a positive effect on export readiness that can be attributed to compliance with Proposition 5. Collective export capability encompasses aggregation, common certification, logistics co-ordination, quality control and buyer negotiation. Proposition 6 suggests that this capability will have a positive impact on export readiness by being able to collectively link small growers into international markets.

The mediating construct in the centre is the export readiness. It's the ability to provide exportable volumes, quality and safety standards, access to infrastructure and finance, documentation and logistics, relationship with buyers and timeliness. According to Proposition 11, export readiness is a positive determinant of sustainable performance of grapes exported. Proposition 12 also suggests that the foundational capabilities will affect the export readiness, which, in turn, will affect the final outcome of performance.

The third is about capturing contextual influences. Financial, infrastructural, regulatory, institutional, knowledge-related and marketing and climate-related constraints are considered as export-market access barriers. The barriers are predicted to have a negative effect on export readiness in Proposition 7. Readiness is bolstered by institutional and MSME support, such as finance, training, certification assistance, infrastructure support, and market intelligence, in a positive manner under Proposition 8. Under Proposition 9, value chain upgrading (including upgrading of grading, packaging, digital traceability, integration of cold-chain, and branding and market diversification) are recommended to improve export readiness and performance. Proposition 10 focuses on public and private partnership to promote export readiness via infrastructure investments, technology transfer, training, common services and market linkage.

Sustainable performance of grape exports is the final construct, which covers economic, market, social and environmental outcomes. These include export expansion, profitability, diversifying markets, keeping customers, bringing in smaller farmers, jobs, proper use of agrochemicals, working with limited resources and minimizing post harvest losses. In summary, the framework includes a concept of sustainable export performance, which is not only about production but also involves coordinated capabilities.

### **Contribution of the Framework**

The 'conceptual framework' proposed adds to the literature regarding exporting of grapes in a number of ways. Firstly, it brings together the production, infrastructure, compliance and collective organisation and market access aspects which have been considered individually. Secondly, it differs from grower awareness to standards compliance. Thirdly it sets apart the formality of a cooperative or FPO from their ability to export collectively. Fourth, it takes an export ready-up equipping approach as a mechanism for transforming export resources and institutional arrangements into the actual export outcomes. Fifth, it adopts an export ready up equipping approach as a mechanism to transform export resources and institutional arrangements into actual export outcomes. Last but not least, it brings the definition of export performance to a broader perspective and adds the economic, market, social and environmental sustainability.

It is not assumed that all the proposed relationships are already empirically proved in the state of Karnataka. Rather, it brings together the relationships that can be found in the wider grape-export literature, and offers a framework for future empirical testing. For its applicability in Karnataka, primary

evidence from farmer, cooperatives, FPOs, MSMEs, exporters and pack house operators and supporting institutions are required.

### **Discussion**

The thematic synthesis shows that sustainable performance in grape export is a systemic result of interaction between the capabilities, infrastructure and institutional support at the farm level and the demands of international markets and that collective organisation plays a key role in these interactions. The past studies indicate that India has enormous potential in production and export, but the growth of production doesn't always translate to a steady and competitive export performance (Chandra, 2006; Naik, 2006; Singh, 2013; Som et al., 2017). The standardisation, traceability and residue compliant grapes were made possible by this work and the efficient post harvest handling and logistics ensured the quality of the grapes for export success (Murthy et al., 2014; Pradhan et al., 2024; Babar & Satpute, 2025).

The suggested framework complements the existing literature by introducing the export readiness as the main connection between cultivation practices, infrastructure/adequacy, standards and collective export capability and sustainable export performance. It also differentiates awareness from compliance as growers may have an awareness without actually putting it into practice due to financial, technical or infrastructure barriers (Ramesh et al., 2015; Som et al., 2016; Som et al., 2017).

The findings also support the relevance of joint, FPO and MSME spurred openings in combating disrupted creation and low bargaining power of FPOs and in addition high export exchange costs (Roy & Thorat, 2008; Ramesh, 2013; Lalitha et al., 2024). But they can only work if there is good governance, good financial management and financial sustainability. The contextually relevant lens provided by the framework is an opportunity to discuss the potential of production being exportable for Karnataka. It also highlights the need for value-chain upgrading, investment in infrastructure, institutional measures and public-private partnership, among others, instead of export promotion measures being implemented on a standalone basis (Singh, 2013; Chandran et al., 2026).

### **Theoretical, Policy and Managerial Implications**

In theory, this study brings together capability and institutional approaches, collective-action and value chain theories to gain a deeper understanding of the sustainable performance of grape exports in terms of export readiness. It draws from previous research, in which the notions of awareness and compliance and organisational and collective export capability have been dissociated. Policy-wise it highlights the importance of coordinating investments in packhouse, cold chains, testing facility, support for certification and credit provision and farmer training. Public agencies can assist in cross-sectoral partnership formation between the sectoral partners in the region (growers, FPOs, MSMEs and exporters). The producer organisations must enhance its management, in terms of governance, professional management, quality control, traceability, linkages with buyers and risk management. Exporters should offer technical and advice and level market relations to growers and transparent their procurement.

### **Future Research Agenda**

The proposed framework needs to be validated empirically with the data from the grape growers, FPOs, cooperatives, MSMEs and exporters, support institutions of Karnataka. A comparative study between Karnataka and Maharashtra, to look into possibility of transferability of successful models of collective exports, could be an interesting analysis. There is a need to further assess district level infrastructure access, standards awareness, standards compliance, financial viability and value chain coordination. To study the export readiness over time, considering the effects of climate variability and policy support and market diversification, longitudinal studies can be conducted. Additionally, PLS and SEM (covariance-based) can be used to analyze the mediating and moderating relationships. Mixed method studies could give more information about export sustainability, the inclusion of farmers and governance of the institutions.

### **Limitations**

This study has some limitations as literature available on the exports of grapes is limited in volume, geographically restricted and there is a significant amount of literature available on Maharashtra and a limited direct literature on Karnataka. Some other factors such as different research design,

different study population, different definition and analysis technique also reduce comparability of studies. Some of the studies are not specific enough to be only on grapes but are more general. The conceptual framework is based on a secondary literature and not yet empirically tested. Furthermore, infrastructure availability, viability of MSMEs, standards and public-private partnerships could be different in each district. Based on the limitations, the relationships in the proposed study have to be regarded as a collection of theoretical suggestions or propositions which should be tested in future empirical studies.

### Conclusion

A systematic literature review was conducted to collect all the relevant information related to the cultivation, export performance of grapes, infrastructure, standards compliance, collective institution, market barriers, competitiveness and sustainability development of grape export in Karnataka which was later utilized in developing an integrated framework for the development of grape export in Karnataka. The results of this review show that production potential is not adequate to sustain the participation in the international markets. To achieve export success, all the cultivation practices should be coordinated, post harvesting infrastructure should be available, awareness in growers should be maintained, the practices followed by the growers should be in line with international practices and should have market linkages and MSME-cooperative integration.

The proposed model in this study proposes that the most crucial of these factors to sustainable grape-export performance is export readiness. It also recognizes that the process can be hindered by market access restrictions and institutional support can increase farmer and/or organization capacities, value chain strengthening and/or public-private partnerships can improve capacities. The study helps to resolve the confusion over the difference between knowledge of exportation and organisation, and the ability to evolve into a sustained exporting group of grape producers.

It provides a policy-making framework, institutional coordination and empirical studies for Karnataka. However, the connections are still in the conceptual stage and primary data of the growers, FPOs, MSMEs, exporters and support agencies are required to substantiate these connections. Overall, the study has been helpful in providing a sustainability-based holistic approach towards enhancing the export of grapes in the various grape growing belts of Karnataka by providing a holistic and inclusive perspective.

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