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Quinoa: Market Trend Insights in Gaining Competitive Advantage in New Product Development toward Future Food and Nutritional Security

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Abstract

Preamble: This section provides an introduction to the quinoa chain, the problem statement, research objective, research questions, and definition of concepts.

Literature review: A systematic literature review was undertaken to analyze the post-harvest technology innovations in recent years. Academic databases and search engines (e.g., Scopus and Google Scholar) were utilized to find articles in English focusing on post-harvest technology, biological, and nutritional properties of quinoa, traditional uses of quinoa, product development of quinoa based products.

Methodology: This study bestows the features of the global quinoa trade, discovering the marketing insights into supply and demand, market access prevailing conditions and the key elements of value chain and pertinent public policy challenges to strengthen the productive sector and achieve a more efficient value chain. The present paper is based on the historical data analyzing the new market trend insights in gaining competitive advantage in new product development-wonder grain-Quinoa.

Results and Discussions: This study is about Quinoa, a nutritious grain which has minimal penetration in the Indian food industry. The case analyzes Quinoa in terms of its utility, market potential, and also feasibility to the Indian market. It deals with the value chain of Quinoa from the perspective of all the stakeholders involved. The case also has found out the loopholes in the value chain and provides ideas to be formulated to overcome the same. It has a study about cost cutting methods which could improve the price competitiveness of Quinoa. This review sheds light on how traditional quinoa processing and products evolved and are being adopted into novel food processing and modern food products, as well as noting the potential of side stream processing of quinoa by-products in various industrial sectors.

Recommendations: This research paper sheds light on how traditional quinoa processing and products evolved and are being adopted into novel food processing and modern food products, as well as noting the potential of side stream processing of quinoa by-products in various industrial sectors. Furthermore, this study moves beyond the technological aspects of quinoa production by addressing the socio-economic and environmental challenges of its production, consumption, and marketizations to reflect a holistic view of promoting the production and consumption of quinoa.

Keywords: Quinoa, Market Trend Insights, Competitive Advantage, New Product Development, Future Food, Nutritional Security

Preamble

With the world's second-largest population, India is also home to the second-largest digital market — and it's booming in both urban and rural areas. India now has more than 500 million internet users and over 450 million smartphone users, with one in every three people consuming video content online. The growth of regional language usage, access to technology through voice, and a wonderful mix of early and new internet users make this market ripe for opportunity. Chenopodium quinoa, a new crop for the Controlled Ecological Life Support System (CELSS) with high protein values (12-18%) and unique proportions of important amino acids, may provide greater versatility in meeting the needs of humans on long term space missions. It is thought to have originated in the Altiplano region of Peru and Bolivia in the South American Andes.

Quinoa grows three to seven feet high and produces a small, flat, circular shaped seed. It has been considered "One of the World's most perfect foods." Compared to other cereal grains, it is higher in protein context (14-18%) and has a nutritionally attractive amino acid balance. The seed is high in lysine, methionine and cystine, making it complementary to both other grains and to legumes, which are deficient in these nutrients. It also has higher levels of energy, calcium, phosphorus, iron, fiber and B vitamins than barley, oats, rice, corn & wheat. On average, quinoa yields 5.8% oil by weight.

The FAO (Food & Agricultural Organization of the United Nations) has officially declared that the year 2013 be recognized as "The International Year of the Quinoa". Proposed by the Government of Bolivia and receiving strong support from many Central and South American Countries, quinoa has now been singled out by the F&O as a food with high nutrient value, impressive biodiversity and an important role to play in the achievement of food security worldwide. It highlights the scope of Quinoa to be included in the food bowl of India. Quinoa (*Chenopodium quinoa* Willd.) is native to the Andean region and has attracted a global growing interest (Ahamed, et. al 1996) due its unique nutritional value. The protein content of quinoa grains is higher than other cereals while it has better distribution of essential amino acids. It can be used as an alternative to milk proteins. Additionally, quinoa contains a high amount of essential fatty acids, minerals, vitamins, dietary fibers, and carbohydrates with beneficial hypoglycemic effects while being gluten-free. Furthermore, the quinoa plant is resistant to cold, salt, and drought, which leaves no doubt as to why it has been called the "golden grain". On that account, production of quinoa and its products followed an increasing trend that gained attraction in 2013, as it was proclaimed to be the international year of quinoa. In this respect, this review provides an overview of the published results regarding the nutritional and biological properties of quinoa that have been cultivated in different parts of the world during the last two decades.

Quinoa farming, marketing and consumption in India is at a nascent stage, but groups promoting India varieties of millets, the small-seeded grasses that are the staple food of indigenous communities of the semi-aid topics of Asia and Africa, are concerned over the possibility of quinoa eventually taking over locally grown millets. Among other factors, they point to a recent initiative

by the Indian Council of Agricultural Research (ICAR) to research quinoa's agronomical and nutritional values, even as research to Indian millets, which are of equally high quality, languishes. According to the latest report by IMARC Group, titled "India Quinoa Market: Industry Trends, Share, Size, Growth, Opportunity and Forecast 2022-2027, the India quinoa market reached a volume of 49,026.2 Tons in 2021. Quinoa is a food item that is generally obtained from the seed of the Chenopodium quinoa plant. It is a gluten-free food product that is widely used in the preparation of fried rice, salads and protein shake to replace grains. It is a rich source of a higher amount of protein, carbohydrates, fiber, vitamins and minerals,

and antioxidants. Additionally, it also contains plant compounds that enhance its flavor and health effects, such as saponin, quercetin, kaempferol, oxalates, phytic acid and squalene. In India, there has been a considerable rise in the consumption of quinoa due to the increasing popularity of western food trends.

"Quinoa Grain Market" 2023 report exhibits (Figure 1) the degree and Overview of the different business prospects throughout the next few years and the positive income figures in the years to come. Significant industry patterns, Market size, and Market share gauges are dissected and referenced in the business examination report. It likewise concentrates on the vital Markets and notices the various areas for example the geographical spread of the business. The enormous scope Quinoa Grain Market report assists businesses in knowing its Market by sharing throughout different time spans, transportation, stockpiling, and supply prerequisites of its items.

It also discusses the market size of different segments and their growth aspects along with Competitive benchmarking, Historical data and forecasts, **Company Revenue Shares, Regional opportunities, Latest trends and Dynamics,** growth trends, various stakeholders like investors, CEOs, traders, suppliers, Research and Media, Global Manager, Director, President, **SWOT analysis i.e. Strength, Weakness, Opportunities, and Threat** to the organization and others. Revenue forecast, company share, competitive landscape, growth factors, and trends. The report can help to know the market and strategize for business expansion accordingly. The strategy analysis gives insights from market positioning and marketing channels to potential growth strategies, providing in-depth analysis for brand fresh entrants or existing competitors within the Quinoa Grain industry. Global Quinoa Grain Market Report 2023 provides exclusive statistics, data, information, trends, and competitive landscape details during this niche sector.

Global Quinoa Market Segmentation: By Nature

Organic quinoa is produced using natural and sustainable agricultural practices without the use of synthetic fertilizers, pesticides, genetically modified organisms (GMOs), or chemical additives. Inorganic, also known as conventional, quinoa is produced using conventional agricultural methods that may involve the use of synthetic fertilizers, pesticides, and other chemical inputs. These practices are typically aimed at maximizing yields and managing pests and diseases. Inorganic quinoa may be more readily available and potentially more affordable compared to organic quinoa. Consumers' growing interest in healthy and sustainable foods has led to an increased demand for organic quinoa and is supposed to increase further in the coming years.

Global Quinoa Market Segmentation: By End User

The food industry is the primary and most significant market for quinoa. Quinoa is consumed as a nutritious whole grain or processed into various food products. Quinoa's popularity in the food industry is driven by its exceptional nutritional value, gluten-free nature, and versatility in a wide range of recipes and cuisines. Quinoa extracts, oils, and proteins are used in cosmetics due to their potential benefits for skin and hair. Quinoa's nutritional properties and bioactive compounds may contribute to its potential use in the development of functional foods, dietary supplements, and nutraceutical products that promote health and well-being. The food industry remains the dominant market for quinoa, accounting for the majority of its consumption and commercialization.

The Quinoa Quandary

Agronomical and nutritional features aside, quinoa's worldwide growth hinges on keeping it inexpensive. Consumers will not buy something they cannot afford, and farmers will not raise vast amounts of a commodity that is not financially feasible. The so-called quinoa problem is that as quinoa demand has increased in recent years, so has its price. Less than $70 per tonne a decade ago, quinoa now sells for more than $2,000, according to FAO estimates. Quinoa growers in Bolivia near Lake Titicaca, the world's highest body of water, harvest waist-high stalks covered with purple,
yellow, green, and orange blooms. This is the birthplace of the Tiahuanaco and Inca civilizations, as well as the origin of quinoa.

"Now people everywhere are buying quinoa. It is sold at marketplaces in La Paz. It's everywhere. As a result, we may also sell in small amounts. "With that money, we feed our family," farmer Elias Vargas told the United Nations. Mr. Vargas and his neighbours sell their harvests to Alexander Coffee, a Bolivian coffee brand that incorporates quinoa in its salads, sandwiches, and desserts. Every day, the business bakery produces around 1,000 quinoa chocolate chip cookies.

"It was difficult at first to alter the attitude," said Pamy Quezada Velez, CEO of Alexander Coffee. Quinoa was once considered "poor man's meal," with Bolivians preferring wheat and rice. "More people are becoming interested in the concept, and we're doing well with quinoa."

The relationship between small farmers and small companies is part of an initiative financed by the UN's International Fund for Agricultural Development (IFAD). While farmers like Mr. Vargas may not produce enough to sell in overseas markets, growing local demand opens up new prospects for them. Almost all of the estimated 250,000 acres of quinoa agriculture worldwide is in the hands of small farmers and groups. FAO estimates that at least 130,000 small quinoa growers from South America alone will benefit this year from increased sales, higher prices for their crops and a return to indigenous practices in a sustainable manner.

"It's still very affordable to poor people in local markets, but it's rather pricey in supermarkets," Mr. Bojanic explained. The fast spread of quinoa cultivation in the previous years has been a double-edged sword. Farmers are more likely to sell the quinoa harvests they would have consumed when prices increase, raising worries about malnutrition. About one-third of children under the age of five in the Andean nations are already chronically malnourished, according to estimates from the World Health Organization (WHO).

Potential contribution of Quinoa to Food security and sovereignty

High rates of child malnutrition remain across India, with Jharkhand in eastern India having some of the worst figures. Half of the children in Jharkhand are stunted or underweight. Anemia is very widespread, affecting more than 70% of children and 67% of reproductive-age women. Quinoa is a highly nutritious, climate-resilient crop with significant potential to enhance nutrition, food security, and income, particularly among the rural poor.

The relationship between nutrition, poverty, food security and agriculture has been highlighted and is incorporated in the UN's Sustainable Development Goals (SDGs). The paper focuses on three interconnected SDGs: eliminating extreme poverty, achieving zero hunger, and improving health and well-being. The Global Indicators Framework for SDGs is used in the study to guarantee that the ultimate objective of eradicating all types of malnutrition and nutritional security by 2030 is met. Globally, India has the largest proportion of stunted (31%) and wasted children (51%), as well

as under-five mortality (16%). (FAO, IFAD, UNICEF, WFP and WHO, 2019; UNICEF, 2019). India also has the highest proportion of undernourished people in the world (24 percent of the worldwide population) (FAO, IFAD, UNICEF, WFP and WHO, 2019). As a result, the report's central concern is how India can attain nutritional security by 2030. In this context, the paper evaluates the status, factors, implications of malnutrition as well as existing policies and interventions to solve the multifaceted problem of nutritional insecurity in India. Furthermore, the paper focuses on the interdependence of agriculture, food, and nutritional security in order to establish a solid policy framework to attain nutritional security by 2030.
The global food production and distribution scenario poses significant difficulties to the four pillars of food security: availability, access, consumption, and biological usage. In this sense quinoa forms a strategic crop with potential to contribute to food security and sovereignty owing to: nutritional quality, genetic variety, resilience to unfavourable climatic and soil conditions, and cheap production cost.Quinoa planting offers an option for countries with poor food production, forcing them to buy or accept food help. The nutritional benefits and agricultural versatility of quinoa are discussed, demonstrating that quinoa is a crop with a high potential to contribute to food security in various regions around the world, particularly in countries where the population lacks access to protein sources or where production conditions are limited by low humidity, limited input availability, and aridity.

India Quinoa Market Trends

The market in India is primarily driven by the growing health consciousness among the masses. This is supported by the changing dietary patterns and the increasing preferences for leading a healthy lifestyle among individuals. Along with this, the rising prevalence of celiac diseases and the widespread popularity of vegan, low-calorie and gluten-free diets among the masses are creating a positive market outlook. Moreover, the shifting preferences toward convenient food items due to the hectic schedules of working professionals are providing a boost to the demand for quinoa across the country. Apart from this, several leading players are heavily investing in launching quinoa-based bread, noodles, pasta and cookies and introducing ready-to-eat food variants, which are gaining prominence among individuals. Additionally, easy product availability via online and offline organized retail channels and the advent of home delivery models are further providing an impetus to the market growth. Other factors, including rapid urbanization and the penetration of social media platforms, are also positively influencing the market across India. On account of the aforementioned factors, the market is anticipated to reach a volume of 189,196.2 Tons by 2027, exhibiting a CAGR of 25.3% during 2022-2027.

Review of literature

Quinoa was feted by food lovers as a novel addition to the familiar ranks of couscous and rice (Downes 2000). Dieticians clucked over quinoa approvingly because it ticked the low fat box and fitted in with the government healthy eating advice to" base your meals on starchy foods". Adventurous eaters liked its slightly bitter taste and the little white curls that formed around the
grains. Vegans embraced quinoa as a credibly nutritious substitute for meat. Unusual among grains, quinoa has high protein content and it contains all those pesky, yet essential amino acids needed for good health that can prove so elusive to vegetarians who prefer not to pop food supplements (Palanisami et.al 2015). Although Bolivia and Peru have historically been responsible for 85% of global complete quinoa production (Romero and Shahriari 2011). The average size of farms in the Southern Altiplano is unknown; for a large quinoa farm it is estimated to be 50 hectares. Quinoa production is rapidly expanding to new

regions. During 2010-15, varieties were rested in Central & Southern Asia (Kyrgyzstan, Tajikistan, Sri Lanka and Bhutan), Western Asia and North Africa (Algeria, Egypt, Iraq, Iran, Lebanon, Mauritania, Sudan and Yemen); and in African countries (Djibouti, Kenya, Somalia, South Sudan, between 2006 and early 2013, Quinoa prices tripled as the demand for the .elsewhere. With a high protein content of 14-18% and a rich presence of essential amino acids, quinoa has caught the attention of the health-conscious, especially vegan and vegetarians. The United Nations celebrated 2013 as the 'Year of Quinoa' to highlight the values of the niche crop, especially its ability to grow on dry soil.

Quinoa is grown mainly in cool mountainous regions, because air temperature above 90 to 95 degrees causes sterility of the Pollen. Quinoa has been cultivated since the early 1980s in the US and commercially produced since the mid 1980s in the Colorado Rockies, especially in the San Luis Valley (Hellin and Higman 2003). Production research has been conducted in Washington and New York States, Colorado, Utah, Minnesota, North Dakota, Virginia, Maine, and Arizona. Commercial products have also been attempted in California, New Mexico, Oregon & Washington. The bigger barrier to US production is climate.

Research Methodology

This study bestows the features of the global quinoa trade, discovering the marketing insights into supply and demand, market access prevailing conditions and the key elements of value chain and pertinent public policy challenges to strengthen the productive sector and achieve a more efficient value chain. The present paper is based on the historical data analyzing the new market trend insights in gaining competitive advantage in new product development-wonder grain-Quinoa. A critical analysis of the quinoa market was conducted to develop a qualitative outlook and to provide projections regarding this market. The database selected consisted of Scopus, Google Scholar, and ScienceDirect, where recent articles published in English were perused to understand recent market trends on quinoa.

Marketing Insight into Supply and Demand

Global quinoa imports continue to grow, although not as fast as previous years. The latest trade data show that quinoa imports in the world reached a total of 75,208 tons in the year ending September 2016, which is 13% more than in the previous year (Fig 1). According to unofficial estimates published in various communication media in Peru and Bolivia, in 2013, the cultivated area for quinoa reached 50,000 hectares in Peru and 80,000 hectares in Bolivia. The Bolivian Foreign Trade

Institute reports that in 2013 the cultivated area in Bolivia exceeded 95,000 hectares, i.e. production of 755000 tonnes and exports of around USD 100 million. The authorities in charge of the farming sector in Andean countries have, therefore, been strongly supporting the increase in cultivated area, production and exports. In calendar year 2015 the increase was 15% compared to the year before; in 2014, 24% and in 2013, 37%. So the growth in global trade is largely flattering (Fig 2 & 3).

The global quinoa market is expected to expand at a healthy rate from 2021 to 2031 (forecast period). Quinoa is in high demand due to its health advantages and nutrient content. Quinoa is a gluten-free, high-fiber product that is popular among health-conscious customers. Quinoa is increasingly being used in food products such as pasta, noodles, and bread, which is projected to help the worldwide quinoa market grow. Moreover, the growing interest in natural and organic goods in the cosmetic industry is projected to propel the worldwide quinoa market. Furthermore, increasing usage of quinoa in breakfast foods is likely to spur the growth of the global quinoa market during the forecast period.

Quinoa Market - Competitive Landscape

Leading players in the quinoa market are Keen One Quinoa, Quinoa Foods Company, The British Quinoa Company, Northern Quinoa Production Corporation, Quinoa Corporation, Hain Celestial Group, Andean Valley S.A., Andean Naturals Inc., Inca Organics, and European Quinoa Group. The global quinoa market is extremely fragmented due to the presence of various small- and large-scale vendors. These companies compete in distribution, product innovation, quality, and price. A majority of big corporations have invested in R&D to build production facilities around the world and meet expanding product demand. Furthermore, these competitors are actively pursuing new joint ventures, mergers, acquisitions, and product development to achieve a competitive advantage in the market. Additionally, manufacturers expect to open new retail outlets to expand their distribution network, resulting in a larger market by 2032.

Quinoa Market - Trends and Opportunities

Increasing consumer health worries about the greater incidence of multiple lifestyle diseases, such as obesity, diabetes, gastrointestinal disorders, cardiovascular ailments, and so on, are primary aspects projected to boost the sales of quinoa market. Moreover, rising consumer knowledge of quinoa's multiple health advantages in regulating blood cholesterol, encouraging healthy gut microbes, increasing immunity, and treating hypertension is expected to fuel the growth of the global quinoa market. Furthermore, the growing popularity of healthy eating habits is raising the use of gluten-free, low-calorie foods like quinoa. Aside from that, the growing popularity of western cuisine trends in India has resulted in the widespread availability of quinoa-based pasta, bread, cookies, noodles, and other baked goods.

Furthermore, consumers' strenuous work schedules and sedentary lifestyles are fueling the demand for ready-to-eat and convenient food options such as quinoa-based flakes and muesli. Additionally, India's growing cosmetic and personal grooming sector is increasing the use of quinoa for dark spot removal, acne treatment, skin renewal, and other purposes. Moreover, the Indian government has launched a number of initiatives to promote the cultivation of sustainable and drought-tolerant crops, such as quinoa, which is anticipated to strengthen market growth in the coming years.

Quinoa Multifunctionality

The inclusion of quinoa in tourism development programs that include agriculture as a component (agro-tourism, agro-ecotourism) are attractive alternatives for small growing areas and the promotion and conservation of less commercial ecotypes. The promotion of Andean tourism corridors, Inca routes or other attractive circuits in the Region, would allow quinoa and its diversity within the various production systems of the Andean zone to be displayed. Including quinoa in the menus that accompany these trips allows visitors to discover the traditional flavours and preparations and to appreciate identities, cultures, knowledge and traditions. In several countries of the Andean Region the conservation of biodiversity is being promoted as a local development strategy.

Quinoa Market - Regional Landscape

The quinoa market in North America is projected to expand during the forecast period, owing to increased consumer awareness of the advantages of adopting nutritious gluten-free food products. Furthermore, the increasing spending power of consumers in the region has raised the demand for quinoa. Moreover, the United States is likely to present growth prospects in the quinoa market in North America. Europe is expected to contribute significantly to the global quinoa market during the projected period. A large

increase in quinoa seed production in Europe has resulted in decreased prices and improved consumption habits.

The quinoa market in Asia Pacific is likely to develop during the forecast period. The regional demand for quinoa is expected to expand as the popularity of healthy food ingredients grows. Moreover, emerging economies such as India and China are anticipated to assist the growth of the regional market.

Demand has grown rapidly in recent years, especially from high-income countries such as the United States of America, Canada, France and Germany. Moreover, in some of the traditional quinoa-producing and consuming countries, such as Bolivia, Peru, Ecuador and to a lesser extent Chile, Argentina and Colombia, there is also renewed interest in the production and consumption of quinoa and quinoa-derived products.

Characteristics of the Value Chain

International demand has resulted in higher standards in terms of product quality and homogenization. This in turn reduces transaction costs and makes it easier to guarantee product quality and safety. There are no detailed studies available for quantifying how resources are distributed between the different linkages in the value chain. However, as with other value chains, the bulk of the income is most likely retained by food industry traders and processors. For example, in a comparison of retail prices in the United States Super Market July 2013 prices were USD 14-25/kg.

This can be done through dissemination and demonstrations of best farming methods. Indians farmers will then be in a position to learn more about how to improve the production of this crop. Basic research conducted in Indian universities in collaboration with other research institutes should be encouraged in order to contribute towards breeding improved varieties better adapted to national agro-environmental conditions for pearl quinoa, while the export price FOB is USD 3/kg.

Key Elements of the Value Chain

The commodity value chain study of the worldwide Quinoa seed Industry analyses the product flour along the several phases, from production to end-level supply, by which a producer/company adds value to the product. The value chain spans from agricultural production through final consumption via processing, trade, and marketing. Value adding that takes place in Bolivia is mainly in the form of packed quinoa grain, flour, flakes and insufflated quinoa. These serve as ingredients for other more elaborated products. Gluten free pastas, breakfast cereals, burgers, pudding and flans are some of the products being elaborated in Bolivia; but, they represent only a small fraction of the volumes being exported. These value added products receive much higher prices in the end markets, the higher costs associated with producing these products is a factor that should be evaluated.

Producers (growers and contract farmers), collectors, processors, dealers, wholesale/retail merchants, and consumers are all involved in the value chain. They are researched using the firms engaged, the volume of production, the market price of the commodity, and the expected profit margin. An examination of these factors can assist the various stakeholders in gaining a full understanding of the product's progress along the value chain.

The yield stagnation is caused by a number of variables, the most important of which are mentioned below:

1. Small producer constraints (which impact the majority of quinoa growers) prohibit them from obtaining essential agricultural inputs like loans, technical help, and water resources. 2. The use of seeds with high genetic diversity and low quality, which affects yields and product quality. Seed

development is crucial for increasing production, and agricultural research institutions and non-profit private organisations' research is currently insufficient to bring about major technical progress. Furthermore, no institutional mechanisms exist for disseminating pre-existing technical advancements.

2. Significant post-harvest losses are also connected with small farmers' limited resources (e.g. storage and processing facilities).
3. Due to a lack of adequate processing infrastructure, crude procedures are used, resulting in considerable post-harvest losses.
4. Quinoa cultivation on degraded or marginal soils (despite its great agro-ecological adaptability, the crop still requires basic fertile conditions to develop).

To summarise, there is still enormous scope for increasing production in traditional quinoa-producing countries: by increasing cultivated area (a process that has been underway in recent years); and by optimising the potential for increased yield by overcoming the difficulties and limitations that affect small scale farming. However, it is unclear that the Andean nations' increased
output will be adequate to meet global demand. Other countries may take advantage of this circumstance and enhance their quinoa output; however, it should be highlighted that the impact on Andean growers would vary depending on which nations enter the quinoa production race. They may be at a disadvantage in terms of cash, technology, and productive resources.

Quinoa is almost entirely produced by peasant producers, which means that supply is very fragmented. In Bolivia alone, it is estimated that there are at least 70000 small producers of quinoa, which means that on average they grow about 1 hectare of quinoa per farmer. This is central to the nature of the market channels established for quinoa flow to local, regional and export markets.

Even if the channels differ slightly depending on the eventual destination of the product, their basic structure is similar and designed to cope with amounts handled in tiny volumes that are very variable in terms of quality and physical attributes.

Furthermore, quinoa is not a product that can be ingested directly, which affects marketing and distribution: middlemen are required to carry out a variety of prior operations, including as drying, defueling, and saponin removal.

International demand has resulted in greater product quality and homogeneity standards. This lowers transaction costs and makes it easier to ensure product quality and safety. There are no extensive studies available to measure how resources are allocated across the value chain's many links. However, like with other value chains, food sector dealers and processors are likely to keep the majority of the profits. For example, in a comparison of retail pricing in US supermarkets in July 2013, pearl quinoa was priced at USD 14-25/kg, whereas the export price FOB was USD3/kg.

Key Professionals in the Value Chain

The value chain is made up of a diverse group of experts with varied amounts of economic influence. They use various types of technology, and the relationships they make with other value chain linkages vary as well. Quinoa marketing circuits are structured similarly to those of other Andean grains and other goods with significant peasant roots: the weakest link is primary production (FAUTAPO Foundation, 2012).

Primary Production

Small individual producers dominate primary production, however they are occasionally grouped in cooperatives and other legal and informal groupings. The fundamental infrastructure for storage, drying, and defueling is lacking, and income levels are low. As a result, they have minimal negotiating power and are at the bottom of the value chain. There are a few outliers, such as producer groups who are members of CABOLQUI (Bolivian Chamber of Exporters of Quinoa and Organic Products), which have earned up to 70% of FOB export pricing.

Storage and Basic Processing

This stage is mostly occupied by tiny (including micro and individual) businesses that have lately banded together as producer cooperatives and organisations, creating modest scale facilities to better the drying, winnowing, and spanning removal procedures. Storage facilities are often placed locally, and production is subsequently distributed to regional and worldwide markets.

Industrialization

This step may contain some of the fundamental primary processing, but it mostly involves the grinding of the grain and its preparation, either for direct consumption as flour or for absorption into further quinoa transformation processes. This stage mostly incorporates small and medium-sized businesses, as well as a small number of cooperatives and legitimate organisations.

The businesses mainly gather, extract, and industrialise organic or conventional quinoa before selling it to its eventual destination, whether national or worldwide.

Marketing for the Domestic Market

Local domestic markets or marketplaces aimed at small rural communities are sometimes supplied by the same small producers that sell their items in weekly farmers' markets held in various locations.

Wholesalers that engage with the processing sector generally provide regional markets and marketplaces in big urban areas. When the processing facilities are likewise situated in a city, direct transactions between grain brokers and the processing sector are possible.

Marketing for the Foreign Market

Quinoa production for export markets must fulfill greater presentation, consistency, and safety criteria. It should be highlighted that the majority of quinoa for export is produced and centrifuged as organic quinoa, and so flows via specialist marketing channels that deal directly with importers at the final destination. Importers are often medium or big businesses having the administrative structure and financial resources required to carry out the procedures and fulfill the requirements of international commerce.

Peasant groups and associations that have had success in overseas markets are usually supported by a public institution or an NGO.

Value chain operational requirements

The structure of marketing channels is shifting due to both a quick growth in external demand and an increase in demand from densely populated metropolitan areas.To ensure that the economic advantages of increased demand and better international prices reach small farmer producers, brokerage and processing channels must be improved. To that end, public assistance programmes must prioritise finding solutions

to current big problems:

Small manufacturers require assistance in forming alliances. Technical, financial, and institutional support are required to provide associations with access to small-scale storage facilities and primary treatment facilities for grain selection and preparation for industrial transformation. As a result, small producers would be a more important link in the value chain.

Programs can be implemented to assist firms in strengthening their position as suppliers to the processing industry. Several countries have already tried and tested such schemes. Government measures to boost domestic quinoa consumption should be linked to systems for direct public purchase from producer cooperatives and groups, therefore shortening the marketing chain. In order to effectively focus public policy objectives and goals and enhance execution, detailed studies on the quinoa value chain and its transformation process should be done.

Policy Challenges

Quinoa production and placement in regional and international markets are expected to remain healthy. Quinoa production thus provides an important opportunity to encourage the growth of small-scale family farming. However, in order for the advantages to reach small producers at the end of the supply chain, special, well-targeted public policy is necessary.

Priorities include:

Increasing productivity, incorporating technological breakthroughs (particularly in seed quality and crop management), and boosting technical assistance and technological transfer programmes are all priorities. Developing research lines that will enable for better levels of standardisation and consistency in production without jeopardising the crop's cheap cost and abundant biodiversity. Promoting the formation of groups in order to expand the size of activities in small-scale peasant production, including basic production and processing, industrialisation, and marketing. Improving storage and drying facilities to reduce post-harvest losses while providing small producer organisations more negotiating leverage with the other links in the value chain. Conducting research on new quinoa applications in order to increase supply and adapt quickly to new forms of market need.

Promoting initiatives to increase product understanding on worldwide markets, particularly those concentrating on nutritional features as well as ethical and cultural values. Monitoring markets, particularly overseas markets, to avoid mismatches between supply and demand that have a detrimental influence on pricing. Maintaining state initiatives to boost domestic consumption, such as adding quinoa into school and college food services and applying additional promotion and distribution methods.

It should be emphasised that the adoption of public policies to boost quinoa production needs the engagement of numerous specialists throughout the value chain, consistency over time to ensure an effective impact, and targeting to ensure that the effect is felt where it is most needed.

Findings

Future climate change will have a detrimental impact on India's agro-ecosystems, lowering water availability, quality, and agricultural output. Quinoa has the potential to play a role in future agricultural system diversification and commercialization in India, particularly in areas prone to biotic stressors such as drought and salt. Quinoa is an excellent crop for organic agriculture because of its resistance to pests and disease.

Quinoa's strong nutritional content makes it an appealing component for traditional Indian foods and

represents an additional value in the high-quality food industry. Quinoa is also a viable option for preparing glitter-free dishes and beverages for Coeliacs.

India is home to one out of every three malnourished children in the globe. India is also second only to China in terms of the number of

etic patients (Gupta et al. 2015). This is mostly due to increased white rice consumption and charging for Global Quinoa production. Quinoa has a high potential for climate adaptation to a variety of biotic and abiotic regions.

Quinoa research programmes and future studies should assist the growth of this important but underused crop, and concerted efforts, such as imposing agricultural practices and mechanisation of quinoa cultivation, should be investigated.

Concluding remarks

The growing demand on international markets will continue to be the main factor driving the development of quinoa cultivation in coming years. There is a high level of interest in the crop due to its health promoting properties; the values and traditions associated with its production; and the wide range of preparation and consumption options offered by the grain and its derivatives.

The projected growth of demand and supply in both developing and developed countries indicates that prices will remain stable, or even increase, at least until the end of this decade. Finally, the cultivation of quinoa will continue to be a valid alternative to improve the income of small producers, especially those in the Andean region. Stimulating the production of quinoa should be considered a powerful public policy tool for fighting rural poverty and improving the food and nutrition of low income populations. However, authorities must ensure that higher prices do not result in vulnerable populations who are not traditional quinoa consumers being denied access to this nutritious food. Government public purchase programs implemented in Bolivia, Peru and Ecuador aim to avoid such an outcome.

The development of quinoa cultivation also requires support policies specifically geared towards overcoming the principal problems affecting productivity, especially considering that developed countries will increasingly enter the market as producers. It is essential to continue research and to disseminate technological packages tailored to the different agro-ecological conditions under which the crop is grown. Similarly, strengthening the value chain, improving bargaining conditions for small producers and equipping organizations with basic storage and primary transformation facilities, should all be areas of priority concern for public authorities. Otherwise, there is the risk that the economic prosperity and benefits of high quinoa prices may never reach small producers.

Lastly, the interest and coordinate efforts of public organizations in producer countries, as well as NGOs and international organizations linked to the agrarian sector, can raise aware has about the qualities of quinoa, thus consolidating its status as a healthy food, associated with traditional values and cultures that are valued on international markets.

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Conflicts of Interest

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Figure 1: Quinoa Market Scope and Segmentation

Forecast Period	**022 to 2029**
Base Year	**021**
Historic Years	**020 (Customizable to 2014 - 2019)**
Quantitative Units Segments Covered	**Revenue in USD Billion, Volumes in Units, Pricing in USD Product (Black Quinoa Seeds, Red Quinoa Seeds), Application (Direct Edible, Reprocessing Products) Certification (Conventional, Organic, Fair Trade and Dual)**
Countries Covered Market Players Covered	**U.S., Canada and Mexico in North America, Germany, Sweden, Poland, Denmark, France, U.K., Netherlands, Switzerland, Belgium, Russia, Italy, Spain, Turkey, Rest of Europe in Europe, China, Japan, India, South Korea, Singapore, Malaysia, Australia, Thailand, Indonesia, Philippines, Rest of Asia-Pacific APAC) in the Asia-Pacific (APAC), Saudi Arabia, U.A.E, South Africa, Egypt, israel, Rest of Middle East and Africa (MEA) as a part of Middle East and Africa (MEA), Brazil, Argentina and Rest of South America as part of South America Blue Lake Milling (Australia), Grain Millers, Inc. (U.S.), Morning Foods Ltd U.K.), General Mills, Inc. (U.S.), Avena Foods Limited (Canada), RICHARDSON INTERNATIONAL LIMITED (Canada), CEREALTO SIRO FOODS (Spain), Premier Nutrition Company, LLC (Germany), Nestlé SA Switzerland), Molino Spadoni spa (Italy), WEETABIX (U.K.), Valsemøllen Denmark), Grillon D'Or (France), Clif Bar & Company (U.S.), Associated**

	British Foods plc (U.K.), DANONE SA (Switzerland)
Opportunities	**● The rising prevalence of lifestyle diseases ● Use of quinoa for disease prevention and health maintenance ● Food and beverage manufacturers are considering the health benefits of quinoa**

Figure 2: Global Quinoa Market

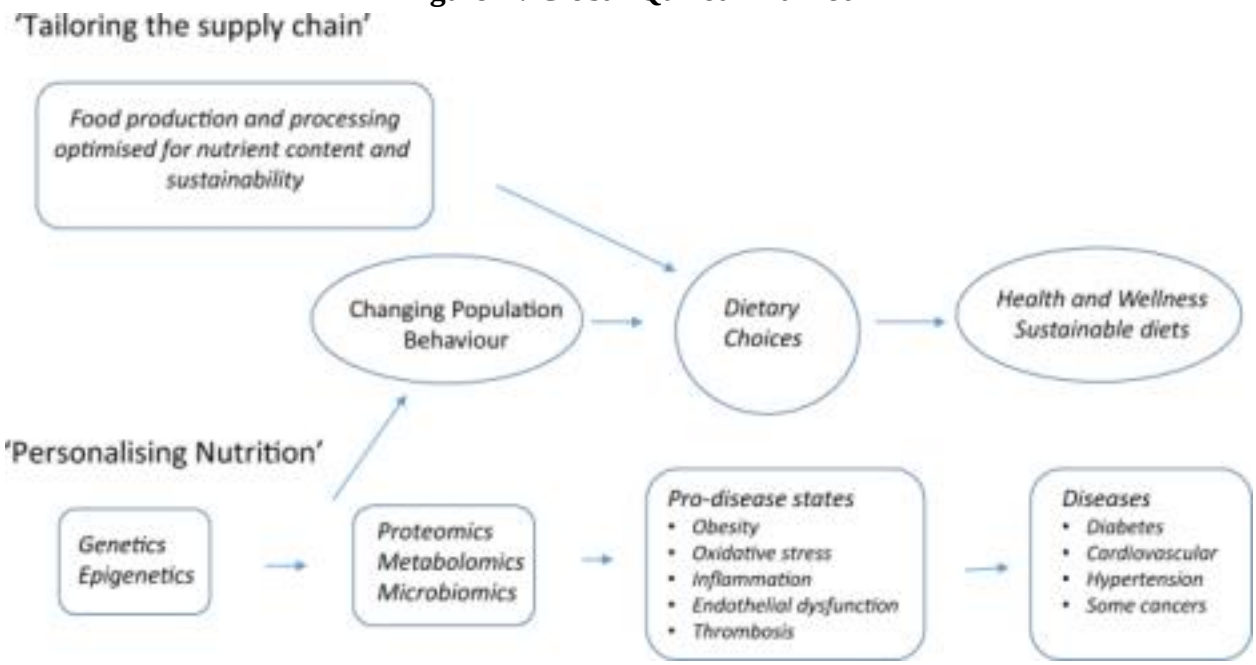
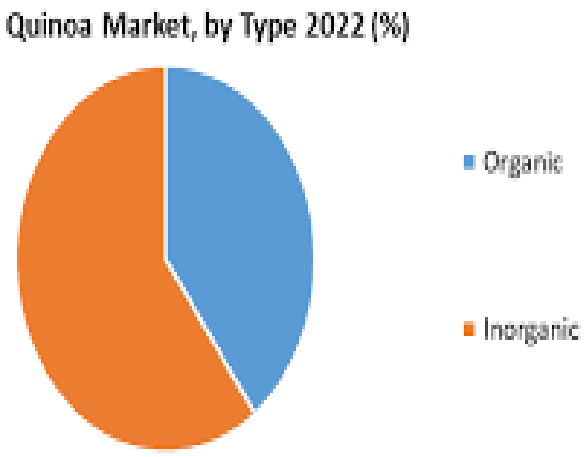


Figure 3: Quinoa Market by Type



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