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Local Fruit Production Management to Enhance Competitiveness and Add Cultural Value and Economic Value to Local Area in Nakhon Ratchasima Province

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Abstract
Purpose. The purpose is to enhance the competitiveness of local fruit production that is distinctive, which brings cultural and economic value to the local area, with cultivating local fruit trees using four types of local fruit trees in Nakhon Ratchasima Province, namely custard apples, durians, pomelos, and Manila tamarind.
Methodology/ approach. The following methods were used: a literature review aimed at integrating knowledge in production management and the cultural identity of local fruits. Data were then collected from three target groups: parties involved in local fruit cultivation, local fruit farmers, and local fruit consumers. The collected data were analyzed to determine the level of production management capability in enhancing the competitiveness of local fruit production, as well as to analyze the relationships using Structural Equation Modeling (SEM), which includes the management of local fruit production with components for measurement, such as management of production factors, enhancing competitiveness, and adding cultural and economic value. The results are presented through eight indices, divided into two categories: harmonization indices, which include GFI, AGFI, NFI, IFI, CFI, and TLI, and estimation error indices, which include RMSEA and RMR.
Results. According to a study on the cultivation of custard apple, durian, pomelo, and tamarind is consistent with the community's cultural practices in the province. The average management ability of farmers was 4.04, indicating a high level. The management of local fruit production was the most effective. Durian was found to have the highest capacity for management among local fruit trees. The testing of hypotheses using structural equation model (SEM) analysis revealed that local fruit production management affects cultural value and economic value in a manner that statistically improves competitiveness. Consumers rated the transmission of cultural practices for cultivating indigenous fruit trees an average of 4.11. The consensus was greatest regarding production and cultural practices,. The Manila tamarind has the strongest cultural transmission among local fruit species.
Originality/ scientific novelty. This research is an integration that emphasizes the cultural identity of local fruits by aligning cultural and economic values with production management. This approach enhances capacity and creates competitive cultural value in both domestic and international markets, focusing on the unique characteristics of the fruits. It leads to the sustainability of the economic, social, and cultural aspects of the local area, making them strong and sustainable. The study constructs a Structural Equation Model (SEM) to examine the relationships among production management, competitiveness, and cultural/economic value, aiming to elevate and enhance the capabilities of farmers from local fruits to a global level.
Practical value/ implications. The study provides insights for optimizing local fruit production while preserving cultural identity, improving competitiveness for grow up in domestic and international markets. Practical implications include enhanced production practices, informed decision-making, and increased economic and cultural value. It also supports policy development for sustainable agriculture and socio-economic growth in rural areas.

Key words: local fruit trees, production management, competitiveness, cultural value and economic value, Thailand.

1. INTRODUCTION

Nakhon Ratchasima Province is renowned for its diverse range of local fruit trees, each possessing distinct characteristics. For instance, Pak Chong District is known for its custard apples, which are notable for their large size and sweet flavor. In Sung Noen District, pomelos are cultivated in soil enriched by the Lam Ta Khong River, with phosphorus minerals contributing to the fruit's unique taste. Nonthai District is recognized for its Manila

tamarind, which thrives in saline soil and benefits from nearby rivers, imparting a distinctive flavor. Additionally, Pak Chong District is famous for its durian variety, which stands out due to its lack of tissue and milder aroma compared to other varieties.

The province is widely regarded as an exemplary model for the implementation of the Geographical Indications (GIs) system. This system, a government policy, aims to stimulate the grassroots economy and protect products with unique characteristics specific to their production regions. Its goal is to enhance the quality and reputation of local products, leading to tangible outcomes. According to the Government of Thailand. [1], generating income and establishing a sustainable economic foundation are closely linked. This connection relies on communities leveraging the unique attributes of their natural geographical resources, such as favorable weather conditions. Utilizing raw materials from a specific geographical region to manufacture local products contributes to the development of goods with distinct characteristics.

Geographical Indications (GIs) serve as powerful governance tools that exert significant influence over local innovation processes [2]. In particular, research in China has demonstrated that GIs help reduce information asymmetry in agricultural transactions by providing consumers with details about the origin and quality of products. This leads to increased agricultural production and significant improvements in farmers' income [3]. However, questions remain regarding the mechanisms through which a GI can act as a counterbalance to the global trend toward standardization in agri-food systems. Under what conditions can a GI promote endogenous innovation and sustain the typicality of terroir products while balancing the economic sustainability of enterprises with the social, cultural, and environmental conservation of the local context [4-5]. Furthermore, consumer perception research has indicated that GIs are perceived as an effective strategy to enhance the competitiveness of agricultural products, increase farmers' income, and revitalize rural environments [6].

The cultivation of local fruit trees is of significant importance within the context of community culture, particularly with respect to occupation and livelihood. This significance is rooted in the cultural traditions associated with cultivation, which have long served as the primary occupation of the Thai people. Each community preserves distinct cultures and traditions passed down through generations, reflecting its way of life. The preservation of local culture and way of life in Nakhon Ratchasima is crucial for bolstering the competitiveness of the region's distinct fruit production. This can be achieved through the development of process innovations that enhance the cultivation of local fruit trees and incorporate local occupational practices, such as improving product effectiveness and increasing productivity.

Furthermore, the enhancement of local fruit production will not only foster a more competitive market but also play a significant role in preserving and promoting local cultural heritage. Research has highlighted that the efficient exploitation of local fruit resources through sustainable production and high-value processing can add economic value while supporting community development [7]. This approach is potentially applicable to all local fruit tree cultivation and offers promising prospects for sustainable development [8]. The subsequent step toward augmenting competitiveness involves generating economic value within the local region of Nakhon Ratchasima Province, with a particular focus on bolstering the grassroots economy. This entails fostering a self-sustaining community economy that thrives through collaborative support and mutual assistance. Moreover, it encourages the equitable sharing of economic benefits among stakeholders, while also promoting the cultural and social values related to these products [9-11]. Ultimately, morality and an effective economic system play integral roles in fostering development across multiple domains including society, individuals, communities, cultures, environments, and natural resources with a focus on strength and sustainability.

2. LITERATURE REVIEW

This research divides the literature review into two parts.

Part One: The first part examines local fruits from an economic perspective, revealing a range of studies focused on production and marketing. For example, one study [12] on the "Production and Marketing Systems of Pomelo in the Upper Northeastern Region of Thailand" concluded that pomelo production in Nakhon Ratchasima Province is economically viable, positioning the province as one of the leading production areas. However, the study also noted that the area's fruit production still lacks advancements in production technology. This observation is supported by further research [13-14] that investigated production models in the durian sector. These studies recommended developing information systems for disaster forecasting and for identifying product characteristics that meet geographical indication standards, as well as employing such systems to enhance production processes. Additionally, another study [15] examining sugar apple and Annona hybrid production

in Pak Chong District, Nakhon Ratchasima Province, suggested that integrating traditional knowledge with modern innovations can significantly improve farmers' production technology. Moreover, research on consumer behavior [16] has highlighted the importance of incorporating marketing strategies to support local fruit production. The findings indicated that consumers were drawn to Lava Durian primarily because of its unique volcanic identity, with price and distribution channels also playing important roles.

Several studies further emphasize the need to build a distinctive product identity to enhance the value of local fruits. For instance, one investigation [17] demonstrated that the pomelo from the region possesses a unique and intense flavor compared to other varieties, making it easily recognizable to consumers. Similarly, another study [18] proposed that creating a unique identity for local fruits could significantly increase their market value a recommendation that aligns with the policy direction of the Department of Agricultural Extension [19] aimed at promoting economically significant fruit identities tailored to local contexts.

In addition, international research [20-22] supports these findings by emphasizing that geographical indications (GIs) can enhance product value and promote rural development. These studies also note that origin-based labels foster both economic growth and community identity, and that balancing product differentiation with local sustainability is essential for success in the global market.

This section examines the social and cultural dimensions of local fruits. The findings indicate that social and cultural aspects particularly community participation in both the economic and societal realms play a significant role in maintaining sustainability. Such participation must align with the community's way of life, beliefs, traditions, and cultural practices. For example, one study [23] explored the integration of historical and social knowledge for restoring and planning traditional fruit landscapes in Piedmont (Italy). Another investigation [24] examined local knowledge and management in the context of bamboo and livelihoods in Thailand. In addition, a study [25] surveyed the status of local wisdom and provided guidelines for promoting cultural tourism in Songkhla Province, focusing on community areas in Khlong Hae Subdistrict, Hat Yai District. Supporting these findings, research [26] discussed how traditional knowledge and local products are interlinked, thereby enhancing cultural preservation and economic resilience. Similarly, another study [27] explored how geographical indications are embedded within local culture and traditions, emphasizing their role in sustaining social cohesion and regional identity.

Taken together, these studies reveal that previous research on local fruits has largely been conducted in isolated segments, lacking a holistic approach to address the economic and social challenges faced by the regions. Therefore, this study integrates economic, social, cultural, and livelihood dimensions to develop and strengthen the national economy in a sustainable manner. As the adage goes, "Economy, society, culture, and livelihood can grow strong together if we understand, accept, and preserve them," which truly fortifies communities within their unique contexts.

3. METHODOLOGY

This research has been approved by the Human Research Ethics Committee, Nakhon Ratchasima Rajabhat University, certificate number HE-173-2020, dated December 28, 2020, with details as follows.

3.1 Sample and Population. The population and samples were divided into 3 groups as follows.

3.1.1 Parties involved in the cultivation of local fruit trees, including government, private and public sectors involved in the cultivation of local fruit trees by purposive sampling, totaling 12 people as follows:

1) 4 representatives from government sectors in Nakhon Ratchasima Province
2) 4 representatives from business sectors in Nakhon Ratchasima province
3) 4 representatives from the public sector

3.1.2 Local fruit growers in Nakhon Ratchasima province whose total population is unknown.

Study sample: The researchers used the method of calculating an unknown sample population to determine the size of the sample using the formula of W.G. Cochran [28] at a confidence level of 95%, which is

$$n = \frac{P(1-P)Z^2}{d^2}$$

Where n is the number of samples required.

P is the proportion of the population that the researcher wants to randomize (the ratio is 50% or 0.50 in general).

Z is a given confidence level or a level of statistical significance.

Z at a significance level of 0.05 equals 1.96 (95% confidence level), so Z = 1.96.
d is the tolerance proportion that is allowed to occur.
At the 95% confidence level, the error ratio was 0.05.

equation $$n = \frac{0.5(1-0.5)(1.96)^2}{0.05^2} = \frac{0.9604}{0.0025} = 384.16$$

Based on the equation above, the sample size was at least equal to 384.16 people In this study, the researchers collected data from 400 people, which was random stratified sampling by dividing the population into groups or classes based on the objectives of the study that have similar internal characteristics or the same rank as possible, but will differ between classes. Then, they were randomly selected from each class for study [29] using the proportion of "types of local fruit trees" in a grouping as shown in Table 1.

Table 1

The sample used in the study

List of local fruit trees	**Number of samples (people)**
Custard apple	100
Durian	100
Pomelo	100
Manila tamarind	100
Total	400

3.1.3 Local fruit consumers in Nakhon Ratchasima province whose total population is unknown.
Study sample: The researchers used the method of calculating an unknown sample population to determine the size of the sample using the formula of W.G. Cochran (Suwimon Tirakanan. 2012: 174) at a confidence level of 95%, which is

Where n is the number of samples required.
$$n = \frac{P(1-P)Z^2}{d^2}$$
P is the proportion of the population that the researcher wants to randomize (the ratio is 50% or 0.50 in general).
Z is a given confidence level or a level of statistical significance.
Z at a significance level of 0.05 equals 1.96 (95% confidence level), so Z = 1.96.
d is the tolerance proportion that is allowed to occur.
At the 95% confidence level, the error ratio was 0.05.

equation $$n = \frac{0.5(1-0.5)(1.96)^2}{0.05^2} = \frac{0.9604}{0.0025} = 384.16$$

From the equation above, the sample size was at least equal to 384.16 people in this study. Researchers collected data from 400 people using non-probability sampling, namely, accidental sampling because the exact time of the local fruit consumption is unknown.

3.2 Research Instruments. There are 3 types of tools used to collect data as follows:

3.2.1 Interview form for the cultivation of local fruit trees on the issues of cultural characteristics, factors of production, production processes, and relationship between local fruit production and community cultural practices.The strengths of local fruit production align with the community's cultural practices and the identity of local fruit trees.

3.2.2 A production management questionnaire for enhancing the competitiveness of local fruit production is divided into 3 parts as follows.

Part 1 Basic Information of Respondents

Part 2 Three key issues were identified regarding the opinions of local fruit growers on production management aimed at enhancing the competitiveness of local fruit production. These issues consisted of local

fruit production management, the enhancement of competitiveness, and the elevation of cultural and economic values. The questionnaire employs a 5-point rating scale.

Part 3 Additional opinions of local fruit growers towards management of local fruit production. Questions in this part are open-ended questions.

3.2.3 Evaluation form for cultural transmission of local fruit cultivation to the public, divided into 3 parts as follows

Part 1 Basic Information of Respondents

Part 2 The study examined consumer attitudes towards cultural practices related to the cultivation of local fruit trees, focusing on three key aspects: adherence to cultural practices during production preparation, adherence to cultural practices during the production process, and adherence to cultural practices during the product output process. The questionnaire employs a five-level rating scale.

Part 3 Additional opinions of consumers towards the cultural transmission of local fruit cultivation in the area of Pak Chong District, Nakhon Ratchasima Province, Sung Noen District, Nakhon Ratchasima Province and Nonthai District, Nakhon Ratchasima Province to the public. Questions in this part are open-ended questions.

3.3 Data Collection. The collection of data to meet the objectives of this research can be divided into 2 types as follows.

3.3.1 Secondary data. Secondary data collection from research papers, research papers, study reports and other relevant documents.

3.3.2 Primary Data. The research tools for collecting data included an interview form designed to gather information on local fruit cultivation practices, a production management questionnaire aimed at improving the competitiveness of local fruit production, and an evaluation form used to assess the cultural transmission of knowledge related to planting local fruit trees among the general public.

3.4 Data Analysis. Data analysis can be divided into 2 types:

3.4.1 The qualitative analysis employed in this study involved content analysis, wherein the data collected from the interviews were examined and categorized into key themes or main issues. The research scope encompasses the division of each main issue into sub-issues, aiming to acquire insights into the characteristics of local fruit tree cultivation that align with the cultural practices of communities residing in the area.

3.4.2 The quantitative analysis involved the examination of primary data obtained from a questionnaire on production management. The purpose of this analysis was to improve the competitiveness of local fruit production and promote the transfer of cultivation practices, specifically through the planting of local fruit trees among the general public. The analysis utilized measures such as mean and standard deviation, following the evaluation criteria outlined by as follows:

- Production Management Questionnaire for Enhancement of Competitiveness of Local Fruit Production
- Evaluation form for cultural transmission of local fruit cultivation to the public

4. RESULTS

The results of building a production management process to enhance the competitiveness of local fruit production that is an identity, which adds cultural and economic value to the local area in Nakhon Ratchasima Province

4.1Custard Apple. The Custard Apple in Pak Chong District, Nakhon Ratchasima Province, there are three varieties of custard apple, including the local variety. The overall impression is that it tastes sweet but is small. Due to the agricultural cotton, fragrant, sweet flavor, smooth texture, easy sticking, fruitful, and medium-sized fruit, Fai Kaset custard apples have distinguishing characteristics distinct from the original native varieties. Consumers appreciate the large quantity of meat. Similar to custard apple skin, the fruit skin of the Phet Pak Chong custard apple variety is quite smooth and features shallow eye slits. After cooking, the meat's skin can be easily peeled away. The texture resembles that of a custard apple. The custard apple variety Phet Pak Chong has large fruit, abundant flesh, few seeds, a rapid yield, and a fruitful distribution throughout the tree. This type of custard apple was developed by the Pak Chong Research Station, Inseechandrastitya Institute for Crops Research and Development, Kasetsart University, which has made the Phet Pak Chong custard apple variety one that farmers pay more attention to and grow more of because it yields high-quality fruit, thereby increasing growers' income.

The study revealed that the impact of production management on the competitiveness of sweet apple production was significantly high, with an average score of 3.81 (=3.81 and S.D.=1.07). The local fruit production management demonstrates the highest level of competence, with an average score of 4.31 (=4.31 and S.D.=0.84). This is followed by efforts to enhance cultural and economic value, which received an average score of 3.89 (=3.89 and S.D.=1.19). The enhancement of competitiveness received a lower average score of 3.31 (=3.31 and S.D.=0.98).

4.2 Durian. The durian in the Pak Chong District is distinguished by its good flavor, dry flesh, which is not mushy, soft and smooth texture, small seeds, lack of a pungent odor, and abundance of durian meat. Pak Chong has a low relative humidity, which makes the fruit delicious and allows even those who dislike durian to consume it. Due to this distinction, Pak Chong durians are distinct from other durian varieties. resulting in a durian flavor that matches the slogan "dry texture, soft, smooth, and odorless." Due to its singular characteristics, Pak Chong durian is distinct from other durians. Due to the increase in durian production and the development of food culture, the food processing industry has shifted from producing coconut milk ice cream to producing durian ice cream.

It was found that the ability to manage production to enhance the competitiveness of the overall durian production was at the highest level. The mean was 4.27 (=4.27 and S.D.=0.80). The management of local fruit production was the most competent with an average of 4.56 (=4.56 and S.D.=0.63), followed by cultural and economic value enhancement with an average of 4.26 (=4.26 and S.D. =0.79) and in terms of enhancing competitiveness, the mean was 3.99 (=3.99 and S.D.=0.86).

4.3 Pomelo. The pomelo in Sung Noen District and Khao Khong Yang have a thick skin, but they are large and sweet. Because sediment flows from the Lam Ta Khong Dam, the soil is rich in minerals, making it fertile and regulating the application of chemical fertilizers mixed with manure. the fruit is juicy and has a honey-like hue. The shrimp are large but tasteless. Annually, there is a Geo Park pomelo juice market in the Ban Khong Yang community. It is a market where everyone is invited to participate and eat pomelos from Geo Park, which will connect Geopark tourist routes.

It was found that the ability to manage production enhances the competitiveness of pomelo production. Overall, it was at a high level with an average of 4.00 (=4.00 and S.D.=0.87). Management of local fruit production and enhancing cultural and economic values were the most competent with an average of 4.17 (=4.17 and S.D.=0.80). The mean was 3.77 (=3.77 and S.D.=0.92).

4.4 Manila tamarind. The Manila tamarind in the Nonthai sub-district or Phet Nonthai tamarind has a distinctive sweetness. The soil is suitable to make Manila tamarind Phet Nonthai taste delicious. If compared to other varieties, other varieties are only congested, so they are not very sweet, but Phet Nonthai is outstanding because of its sweetness. Many Nonthai people will have Manila tamarind planted in their homes, that is, the culture of eating is that Nonthai people like to eat Manila tamarind. It is a seasonal fruit tree, and has thus become a part of the eating culture.

Manila tamarind found that the ability of production management to increase the competitiveness of the overall Manila tamarind production was at a high level with an average of 4.07 (=4.07 and S.D.=0.80). Adding cultural value and economic value has the most proficiency with an average of 4.37 (=4.37 and S.D.=0.68), followed by management of local fruit production with an average of 4.19 (=4.19 and S.D.=0.75). In terms of enhancing competitiveness, the mean was 3.82 (=3.82 and S.D. =0.84).

From the above, local fruit trees (custard apple, durian, pomelo, and tamarind) found that the production management ability to increase the competitiveness of custard apple, durian, pomelo, and tamarind was generally at a high level with an average of 4.04 (=4.04 and S.D.=0.91). Local fruit production management was the most competent with an average of 4.31 (=4.31 and S.D.=0.77), followed by cultural and economic value enhancement. The mean was 4.17 (=4.17 and S.D.=0.90). Competitiveness enhancement had a mean of 3.72 (=3.72 and S.D.=0.93) as presented in Table 2.

Table 2
The level of production management capability to enhance the competitiveness of local fruit production when considered as a whole.

Item	Custard Apple	Durian	Pomelo	Manila Tamarind	Local Fruit Tree
Management of Local Fruit Production	**4.31**	**4.56**	**4.17**	**4.19**	**4.31**
- Management of Production Factors	3.88	4.53	4.10	4.38	4.22
- Production Process Management	4.49	4.54	4.17	4.13	4.33
- Product Management	4.47	4.67	4.27	4.07	4.37
Enhancing Competitiveness	**3.31**	**3.99**	**3.77**	**3.82**	**3.72**
- Production Optimization	3.58	3.90	3.60	3.64	3.68
- Product Value Added	3.40	3.97	3.60	3.97	3.73
- Increasing Productivity in Production	2.85	4.15	4.23	3.83	3.76
Adding Cultural and Economic Value	**3.89**	**4.26**	**4.17**	**4.37**	**4.17**
- Cultural Value Added	3.56	4.12	4.16	4.30	4.04
- Economic Value Added	4.70	4.60	4.20	4.55	4.51
Total	**3.81**	**4.27**	**4.00**	**4.07**	**4.04**

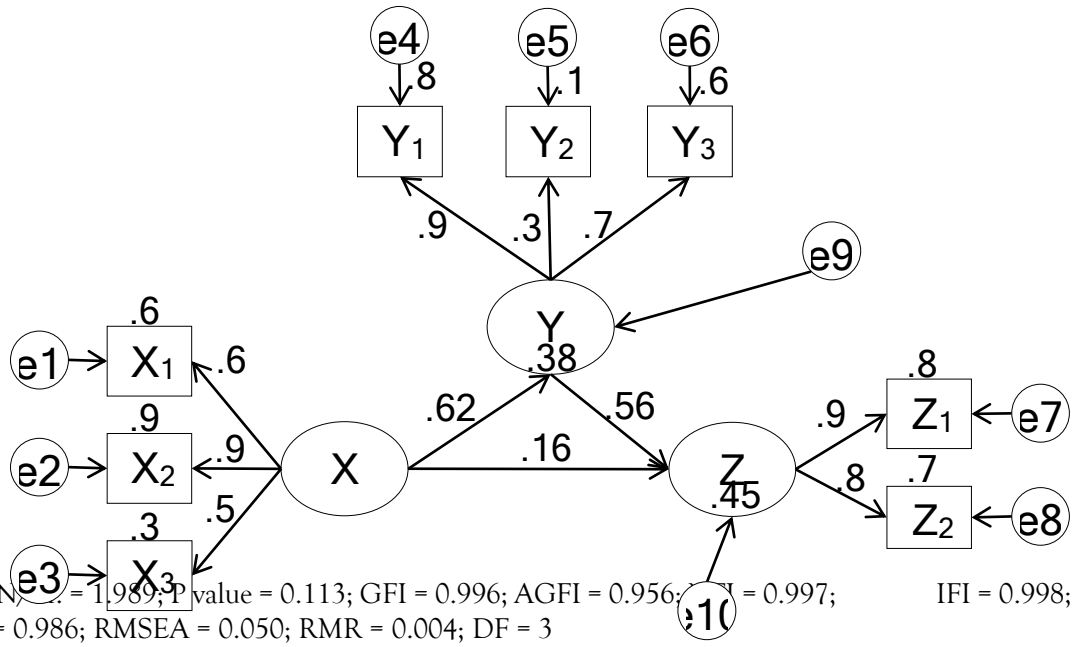
Source: surveys and authors' calculation.

5. The study employed a Structural Equation Model (SEM) to examine the interplay among the management of local fruit production, the enhancement of competitiveness, and the augmentation of cultural and economic values. The SEM comprised various components to assess the management of local fruit production, including input management, production process management, and output management. The variable that enhances competitiveness includes a component for measurement. These factors encompass enhancing operational efficiency, augmenting the value of production, and improving productivity within the production process. The variables about cultural enrichment and economic value encompass distinct components that are utilized for measurement purposes, specifically cultural enrichment and economic value added. The symbols utilized in the context of data analysis are formally defined as follows.

X	represents	local fruit production management variables.
X_1	represents	management of factors of production.
X_2	represents	production process management
X_3	represents	increasing production
Y	represents	competitiveness enhancement variable.
Y_1	represents	productivity improvement
Y_2	represents	productivity value added aspect
Y_3	represents	increasing productivity in production
Z_{total}	represents	cultural enrichment and economic value variables
Z_1	represents	cultural values added aspect
Z_2	represents	economic value added aspect

The findings of the examination of structural equations in production management aimed at enhancing the competitiveness of domestic fruit production can be illustrated using a set of eight indices, categorized into two types. These indices include harmonization measures such as GFI, AGFI, NFI, IFI, CFI, and TLI, as well as estimation errors represented by RMSEA and RMR. Based on the examination of all eight indicators, it was determined that the implementation of a production management structural equation model has the potential

to enhance the competitiveness of local fruit production. The findings align with the empirical evidence across all eight indices, demonstrating strong validity and confirming a satisfactory fit, as depicted in Figure 1.



CMIN/DF = 1.989; P value = 0.113; GFI = 0.996; AGFI = 0.956; NFI = 0.997; IFI = 0.998; CFI = 0.998; TLI = 0.986; RMSEA = 0.050; RMR = 0.004; DF = 3

Figure 1. Results of the analysis of production management structural equations to increase the competitiveness of local fruit trees.

From Figure 1, the results of the analysis of production management structural equations to increase the competitiveness of local fruit production. can be explained as follows:

5.1) Local fruit production management had a positive influence on increasing competitiveness. The regression coefficient of the independent variable in standard score form () was 0.619. Local fruit production management could predict the increase. The competitiveness was 38.3 percent (R2 = 0.383) with a statistical significance at the .01 level.

5.2) Management of local fruit production from the data analysis found that there was no direct influence on increasing cultural and economic values with a statistical significance level of 0.137.

5.3) Increasing competitiveness influences increasing cultural and economic values. Directly, the regression coefficient of the independent variable in the form a of standard score () was 0.563. Increasing competitiveness, could predict cultural enrichment. and the economic value was 45.3 percent (R2 = 0.453) with a statistical significance at the .01 level.

5.4) Determine the management of local fruit production that has a positive indirect influence on increasing cultural value and economic value through increasing competitiveness in a positive direction and having a regression coefficient of the variables. The total standard score is 0.173 (0.383*0.453).

In conclusion, the management of local fruit production has a statistically significant positive effect on increasing competitiveness in a positive direction. In addition, it was discovered that increasing competitiveness influenced the growth of cultural and economic value, whereas the management of local fruit production had no direct impact on this growth. Management of local fruit production was found to have a positive influence on cultural enrichment through a statistically significant increase in competitiveness. This was determined by testing the indirect relationship between the management of local fruit production and increasing cultural and economic value through competitiveness.

Result of transferring the cultural practice of growing local fruit trees to the public by promoting and supporting community-based tourism in Nakhon Ratchasima Province.

1. The custard apple found that the consumers saw that the cultural practice of custard apple cultivation was transmitted as a whole at a high level, the mean was 3.98 (=3.98 and S.D.=0.92). In terms of productivity and cultural practice, there was the highest agreement and the mean was 4.03 (=4.03 and S.D.=0.95). for cultural

practice of production with an average of 3.98 (=3.98 and S.D.=0.84) and production preparation and cultural practices with an average of 3.94 (=3.94 and S.D.=0.97).
2. In durian, it was found that consumers perceived that the overall culture of durian cultivation was conveyed at the highest level with an average of 4.22 (=4.22 and S.D.=0.71) with the highest mean of 4.36 (=4.36 and S.D.=0.70), followed by the aspect of production and cultural practices with an average of 4.21 (=4.21 and S.D.=0.68) and the aspect of preparation for production and cultural practices, which had a mean of 4.09 (=4.09 and S.D.=0.74).
3. It was found that the overall culture of pomelo cultivation was conveyed at a high level by consumers. with an average of 3.98 (=3.98 and S.D.=0.75). In terms of production preparation and cultural practices, the most agreed was with an average of 4.09 (=4.09 and S.D.=0.75), followed by production and cultural practices with an average of 4.03 (=4.03 and S.D.=0.79) and in terms of productivity and cultural practices. The mean was 3.82 (=3.82 and S.D.=0.69).
4. For Manila tamarind consumers perceived that the overall culture of tamarind cultivation was at the highest level with an average of 4.27 (=4.27 and S.D.=0.60). In terms of preparation for production and cultural practices, the most agreed was with an average of 4.31 (=4.31 and S.D.=0.58), followed by the production aspect and cultural practices with an average of 4.29 (=4.29 and S.D.=0.55) and productivity and cultural practices with an average of 4.20 (=4.20 and S.D.=0.67).
5. Local fruit trees (custard apple, durian, pomelo, and Manila tamarind) found that consumers perceived that the cultural practice of growing local fruit trees (custard apple, durian, pomelo, and Manila tamarind) was generally at a high level with an average level equal to 4.11 (=4.11 and S.D.=0.77). The aspect of productivity and cultural practices had the highest agreement with an average of 4.15 (=4.15 and S.D.=0.80). For product preparation and cultural practices, the mean was 4.11 (=4.11 and S.D.=0.78) and the production and cultural practice had an average of 4.08 (=4.08 and S.D.=0.72) as shown in Table 2.

Table 2
The level of consumer opinions towards cultural transmission of local fruit cultivation (custard apple, durian, pomelo and Manila tamarind)
when considered as a whole.

Item	Custard Apple	Durian	Pomelo	Manila Tamarind	Local Fruit Tree
Production preparation and cultural practices	3.94	4.09	4.09	4.31	4.11
Production and cultural practices	3.98	4.21	3.82	4.29	4.08
Productivity and cultural practices	4.03	4.36	4.03	4.20	4.15
Total	**3.98**	**4.22**	**3.98**	**4.27**	**4.11**

Source: surveys and authors' calculation.

5. DISCUSSION

In Nakhon Ratchasima Province, the cultivation of custard apple, durian, pomelo, and Manila tamarind aligns closely with the community's cultural practices. A well-developed production management process has enhanced the competitiveness of these local fruits, adding both cultural and economic value. The overall management skills of farmers were notably high, particularly in grading produce, setting prices, and coordinating logistics for effective nationwide distribution. This observation is consistent with previous findings [18] that managing fruit production can significantly increase the value of products such as mangosteen and durian by meeting agricultural standards. Durian distribution, in particular, stands out for its effective use of both online platforms (e.g., Facebook and fan pages) and traditional offline channels. This strategy supports findings [30] on the development of online fruit logistics, where many fruit traders have shown a strong interest in using digital

tools like Facebook, Instagram, and Line. Hypothesis testing revealed that effective management in local fruit production not only enhances cultural and economic value but also boosts competitiveness and growth. Additionally, preserving local fruit trees within communities provides ongoing income for growers, fostering stability and prosperity among farmers. These results align with previous observations [30] that many younger fruit traders prefer inheriting family orchards and continuing traditional cultivation practices, thereby supporting a stable community income and aiding the revival of the foundational economy. The benefits of preserving cultural heritage extend beyond direct financial gains such as tourism revenue to include non-market benefits like enhanced recreational experiences and cultural appreciation [31]. Although there were initial debates regarding the suitability of different local groups for value addition, such issues can be resolved through collaborative efforts [32]. Recent studies further support these observations, with [31] reiterating that the economic value of cultural heritage includes significant non-market benefits, and [33] emphasizing the role of stakeholder collaboration in preserving traditional agri-food products for sustainable rural development. Moreover, research [34] found that cultural identity has a strong influence on consumer preferences for traditional foods, reinforcing the importance of maintaining local agricultural practices and products.

Consumers have perceived the transfer of local fruit products and cultural practices as highly successful, valuing the unique characteristics of each fruit type—including its history, size, weight, flavor, and aroma. This process not only forges strong local identities but also transmits cultural heritage to future generations. While cultural identity evolves, the demand for these unique products remains robust [35]. Similarly, research [36] found that integrating innovative pomelo research boosted community identity and increased farmer earnings in Nakhon Pathom Province, complementing earlier findings [18] regarding value creation for unique mangosteen varieties in Nakhon Si Thammarat. Furthermore, study [17] highlighted the unique identity of the Thong Dee Ban Thaen pomelo, which aligns with guidelines [19] promoting "fruit identity" as an economically significant asset. Emphasizing production efficiency and quality standards further enhances the potential of these fruits. Among the studied fruits, Manila tamarind demonstrated the highest level of cultural transmission, followed by durian, pomelo, and custard apple.

6. CONCLUSION

The study on local fruit production management to enhance competitiveness and add cultural and economic value in Nakhon Ratchasima Province aimed to examine the relationship between production management, competitiveness, and the cultural and economic values of four types of local fruits: custard apples, durians, pomelos, and Manila tamarinds. These fruits possess unique characteristics that reflect the region's cultural heritage and natural resources, deeply embedded in the local way of life.

The findings revealed that farmers demonstrated a high level of production management capability, with durian cultivation standing out as the most efficient, followed by Manila tamarind, pomelo, and custard apple. Structural Equation Modeling (SEM) analysis indicated that production management had a statistically significant direct positive effect on competitiveness. In turn, competitiveness directly influenced the enhancement of cultural and economic value. However, production management had no direct impact on cultural and economic value but exerted an indirect effect through improved competitiveness.

Regarding the transmission of cultural practices associated with local fruit cultivation, consumers perceived the process to be at a high level. Manila tamarind was most closely associated with cultural heritage and everyday consumption, followed by durian, custard apple, and pomelo. Local fruit cultivation was found to be more than a source of income; it serves as a medium for preserving cultural identity and sustaining the traditional way of life in the community.

The integration of production management with the preservation and enhancement of cultural and economic values is a key strategy for strengthening the competitiveness of local fruit farmers in Nakhon Ratchasima. This approach supports both domestic and international market growth while promoting grassroots economic development and safeguarding local cultural heritage, leading to sustainable and resilient community development.

7. LIMITATIONS AND FUTURE RESEARCH

The limitations of this research primarily stem from the geographical scope being restricted to Nakhon Ratchasima Province and focusing solely on four types of local fruits: custard apple, durian, pomelo, and Manila tamarind. These factors may limit the generalizability of the findings to other regions or fruit types with different production contexts. Additionally, the study mainly relied on quantitative data collected within a specific

time frame, which might not fully capture long-term changes or the depth of cultural practices and adaptation strategies employed by local farmers. The absence of detailed market factors, such as consumer demand, pricing strategies, and international market dynamics, also constrains the study's applicability to broader economic evaluations.

Future research should consider expanding the geographical scope to other provinces with diverse fruit production systems. It should also investigate a wider range of local fruits, such as bananas in Siang Sang District and coffee in Sung Noen District, under the same analytical framework. Incorporating qualitative data will enhance the understanding of cultural practices, farmer adaptation, and consumer perceptions. Moreover, economic models with detailed variables assessing income generation, job creation, and macroeconomic impacts will provide a clearer picture of the potential economic contributions of local fruit production. A supply chain and market analysis should be included to identify market opportunities and optimize the value chain from production to consumer. Lastly, future research should focus on strategies for improving the management and cultural value transmission of fruits with lower performance, such as custard apple and pomelo, to ensure sustainable development and competitiveness in both domestic and international markets.

REFERENCES

1. Government of Thailand. (2022). Pakchong Khaoyai Custard Apple registered a new GI product, sweet, fragrant, sticky texture, small seeds generating income for farmers over 51 million baht per year. (Online). Source: https://www.thaigov.go.th/infographic/contents/details/6327 [Accessed: December 26, 2022].

2. Belmin, R., Casabianca, F., & Meynard, J. M. (2018). Contribution of transition theory to the study of geographical indications. Environmental Innovation and Societal Transitions, 27, 32-47. https://doi.org/10.1016/j.eist.2017.10.002.

3. Yang, J., Li, Z., & Liu, X. (2024). The impact of geographical indications on agricultural production and farmers' income in China. Agriculture, 14(1), 113. https://doi.org/10.3390/agriculture14010113.

4. Chabrol, D., Mariani, M., & Sautier, D. (2017). Establishing geographical indications without state involvement? Learning from case studies in Central and West Africa. World Development, 98, 68-81. https://doi.org/10.1016/j.worlddev.2015.11.023.

5. Vandebroek, I., Reyes-García, V., de Albuquerque, U. P., Bussmann, R., & Pieroni, A. (2011). Local knowledge: Who cares? Journal of Ethnobiology and Ethnomedicine, 7(1), 35. https://doi.org/10.1186/1746-4269-7-35.

6. Galli, F., Carbone, A., Caswell, J. A., & Sorrentino, A. (2022). Perceptions of geographical indication labels as quality indicators inside and outside the label's area of influence: The case of spring fruits. Renewable Agriculture and Food Systems, 37(5), 566–576. https://doi.org/10.1017/S1742170521000319.

7. Pappalardo, G., La Via, G., & Bonanno, A. (2018). Efficient exploitation of local fruit resources through sustainable production and high added value processing. Agricultural Systems, 162, 43–50. https://doi.org/10.1016/j.agsy.2018.01.022.

8. Zocchi, D. M., Piochi, M., Cabrino, G., Fontefrancesco, M. F., & Torri, L. (2020). Linking producers' and consumers' perceptions in the valorisation of non-timber forest products: An analysis of Ogiek forest honey. Food Research International, 137, 109417. https://doi.org/10.1016/j.foodres.2020.109417.

9. Shackleton, S., Delang, C. O., & Angelsen, A. (2011). From subsistence to safety nets and cash income: Exploring the diverse values of non-timber forest products for livelihoods and poverty alleviation. In S. Shackleton, C. Shackleton, & P. Shanley (Eds.), Non-timber forest products in the global context (pp. 55–81). Heidelberg, Germany: Springer.

10. Kar, S. P., & Jacobson, M. G. (2012). NTFP income contribution to household economy and related socio-economic factors: Lessons from Bangladesh. Forest Policy and Economics, 14(1), 136–142. https://doi.org/10.1016/j.forpol.2011.08.003.

11. Coomes, O. T., Takasaki, Y., Abizaid, C., & Arroyo-Mora, J. P. (2016). Environmental and market determinants of economic orientation among rain forest communities: Evidence from a large-scale survey in western Amazonia. Ecological Economics, 129, 260–271. https://doi.org/10.1016/j.ecolecon.2016.06.001.

12. Athipanyakul, T., Nudum, K., Lertgrai, P., & Nillakan, L. (2014). Production and marketing systems of pomelo in the Upper Northeastern Region of Thailand. Khon Kaen University.

13. Nudum, K., Lertgrai, P., & Nillakan, L. (2014). The development of the production model of the durian season of farmers. Nakbutr Parittasan Journal, 6(2), 63-73.

14. Wongla, R. (2018). Innovative production development of Durian Long lablae – Lhin lablae in agroforestry systems on agricultural and food security of Uttaradit Province. Uttaradit Rajabhat University.

15. Komkhuntod, R. (2007). Development of production technology of sugar apple and Annona hybrids in Packchong District, Nakornratchasima Province (Master's thesis, Kasetsart University).

16. Harnsuek, P., Lekjarn, S., Tangthin, S., & Saiyut, P. (2019). Factors related to consumers' purchasing decisions of Lava Durian Sisaket in Northeast Thailand. Khon Kaen University.

17. Techawongsathien, S. (2018). Creation of Phan Thong Dee identity, Ban Thaen. Bangkok: The Research Fund Office.

18. Kaewthai, N., Kittiphum, A., Suwichak, S., Hansriwichit, S., Wanichphan, A., Morasilp, T., Romyen, J., & Samlee, O. (2021). Management to increase the fruit value of a large group of farmers in Nakhon Si Thammarat Province. Bangkok: Area Development Capital Administration and Management Office, National Higher Education Science Research and Innovation Policy Council.

19. Department of Public Relations. (2020). Department of Agricultural Extension promotes fruit identity to add value to farmers in each locality. (Online). Source: https://thainews.prd.go.th/th/news/detail/TCATG200616104806920 [Accessed: December 2, 2021].

20. Belletti, G., Marescotti, A., & Vakoufaris, H. (2017). Geographical indications, public goods, and sustainable development: The roles of actors' strategies and public policies. World Development, 98, 45–57. https://doi.org/10.1016/j.worlddev.2015.05.004.

21. Barham, E., & Sylvander, B. (2011). Labels of origin for food: Local development, global recognition. CABI. https://doi.org/10.1079/9781845933524.0000.

22. Bowen, S., & Zapata, A. V. (2009). Geographical indications, terroir, and socioeconomic and ecological sustainability: The case of tequila. Journal of Rural Studies, 25(1), 108–119. https://doi.org/10.1016/j.jrurstud.2008.07.003.

23. Larcher, F., Gullino, P., Mellano, M.G., Beccaro, G.L. and Devecchi, M. (2017). Integrating historical and social knowledge for restoring and planning traditional fruit landscape in Piedmont (Italy). Acta Hortic. 1189, 339-342, https://doi.org/10.17660/ActaHortic.2017.1189.65.

24. Thaworn, R., & Phetthongma, R. (2014). Bamboo and livelihoods in Thailand: Local knowledge and management. Asia Pacific Community Forestry Training Center, Dumaibase Co., Ltd.

25. Chuangthong, S., & Wunkaew, W. (2015). A survey of knowledge status and guidelines for developing local wisdom to promote cultural tourism in Songkhla Province: A case study of community areas in Khlong Hae Subdistrict, Hat Yai District, Songkhla Province. Office of the Higher Education Commission.

26. Bérard, L., & Marchenay, P. (2006). Local products and geographical indications: Taking account of local knowledge and biodiversity. International Social Science Journal, 58(187), 109–116. https://doi.org/10.1111/j.1468-2451.2006.00591.

27. Tregear, A. (2003). From Stilton to Vimto: Using food histories to understand geographic indications. Environment and Planning A, 35(9), 1495–1510. https://doi.org/10.1068/a35294.

28. Suwimon Tirakanan. (2012). Required Sciences for Research Methodology: A Guide for Practice. Bangkok: Department of Evaluation and Research, Faculty of Education, Ramkhamhaeng University.

29. Boonjai, S. (2007). Research methodologies: Practical approaches leading to success. Bangkok: Chulalongkorn University.

30. Khattiyawong, T., Niyomwong, T., & Satpanich, K. (2022). Guidelines for the development of online fruit logistics system to strengthen the local economy. NRRU Community Research Journal, 16(2), 55-69.

31. Ruijgrok, E. C. (2006). The three economic values of cultural heritage: a case study in the Netherlands. Journal of Cultural Heritage, 7(3), 206-213. https://doi.org/10.1016/j.culher.2006.07.002.

32. Zocchi, D. M., Fontefrancesco, M. F., Corvo, P., & Pieroni, A. (2021). Recognising, safeguarding, and promoting food heritage: challenges and prospects for the future of sustainable food systems. Sustainability, 13(17), 9510. https://doi.org/10.3390/su13179510.

33. Zocchi, D. M., Fontefrancesco, M. F., & Wiskerke, J. S. C. (2021). Heritage food and sustainable development: The role of stakeholders' collaborations in preserving traditional agri-food products. Sustainability, 13(4), 2160. https://doi.org/10.3390/su13042160.

34. Britwum, K., & Demont, M. (2022). The nexus between cultural identity and consumer preferences for traditional foods: The case of indigenous rice in Ghana. Food Quality and Preference, 96, 104383. https://doi.org/10.1016/j.foodqual.2021.104383.

35. Britwum, K., & Demont, M. (2022). Food security and the cultural heritage missing link. Global Food Security, 35, 100660. https://doi.org/10.1016/j.gfs.2022.100660.

36. Nilpan, S., Kaiboriboon, S., Natwaranan, P., & Alai, P. (2015). Pomelo research innovation for society and economy of Nakhon Pathom Province. Bangkok: Office of Thailand Science Research and Innovation.