



รายงานผล

โครงการประชุมวิชาการด้านเกษตรและการจัดการธุรกิจ
ระหว่างวันที่ 29 - 31 พฤษภาคม 2567

โดย

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สาขาวิชาเกษตรศาสตร์และสหกรณ์

โครงการนี้ได้รับการสนับสนุนจากทุนพัฒนานุเคราะห์เพื่อการศึกษาทางไกล
ประจำปี 2567

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ทุนพัฒนาบุคลากรเพื่อการศึกษาทางไกล ประเภทหน่วยงาน

1. ชื่อโครงการ โครงการประชุมวิชาการด้านเกษตรและการจัดการธุรกิจ

2. ประเภทโครงการ โครงการพัฒนาบุคลากรให้ได้รับความรู้และทักษะทางวิชาการ

สอดคล้องกับพันธกิจ และประเด็นยุทธศาสตร์ของแผนพัฒนามหาวิทยาลัยสุโขทัยธรรมาธิราช ระยะ 20 ปี (พ.ศ. 2561 - 2580) ในพันธกิจข้อ 2 วิจัยพัฒนาองค์ความรู้ และนวัตกรรม เพื่อใช้ในการพัฒนาบุคคล ชุมชน สังคม และประเทศ

3. ชื่อและประวัติของผู้ขอรับทุน/ผู้รับผิดชอบโครงการ

ชื่อภาษาไทย ภาวัต เจียมจินฉัตร

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ตำแหน่ง ผู้ช่วยศาสตราจารย์ สังกัด สาขาวิชาเกษตรศาสตร์และสหกรณ์

4. ความสำคัญของโครงการ

โครงการประชุมวิชาการด้านเกษตรและการจัดการธุรกิจเป็นโครงการที่มุ่งพัฒนาทักษะความรู้และวิชาการอาจารย์สาขาวิชาเกษตรศาสตร์และสหกรณ์ ซึ่งอาจารย์ที่เข้าร่วมโครงการเป็นอาจารย์ประจำวิชาเอกธุรกิจ การเกษตรและการประกอบการ จึงมุ่งเข้าร่วมประชุมวิชาการที่เกี่ยวข้องทั้งด้านการเกษตรและการจัดการธุรกิจ โดยการประชุมวิชาการ The International Conference on Informatics, Agriculture, Management, Business Administration, Engineering, Sciences and Technology (IAMBEST 2024) จัดโดยสถาบันเทคโนโลยีพระจอมเกล้าเจ้าคุณทหารลาดกระบัง เป็นการประชุมที่สอดคล้องกับจุดมุ่งหมายของโครงการ เป็นเวทีแลกเปลี่ยนเรียนรู้และการเผยแพร่ผลงานวิชาการในด้านดังกล่าว และเป็นการขยายองค์ความรู้สู่การปฏิบัติให้กว้างยิ่งขึ้น สำหรับคณาจารย์นักวิชาการ นักวิจัย

ผู้ประกอบวิชาชีพ นิสิต นักศึกษา และผู้สนใจทั่วไปในประเทศและต่างประเทศ รวมถึงสร้างเครือข่ายทางวิชาการที่เข้มแข็ง พร้อมทั้งจะพัฒนาไปเป็นแหล่งอ้างอิงระดับชาติและนานาชาติต่อไป

ดังนั้นการให้คณาจารย์ได้เข้าร่วมประชุมวิชาการนานาชาติดังกล่าว ทำให้ได้เพิ่มเติมความรู้และความก้าวหน้าเกี่ยวกับการวิจัยที่เกี่ยวข้องกับการเกษตรและการจัดการธุรกิจ เพื่อนำมาใช้ประกอบการจัดการเรียนการสอนและการวิจัยได้

5. วัตถุประสงค์ของโครงการ

- 5.1 เพื่อให้คณาจารย์ได้เข้าร่วมการประชุมวิชาการระดับนานาชาติ
- 5.2 เพื่อให้คณาจารย์ได้ข้อมูลความก้าวหน้าทางวิชาการด้านเกษตรและการจัดการธุรกิจ
- 5.3 เพื่อให้คณาจารย์ได้แลกเปลี่ยนความรู้และประสบการณ์กับผู้เข้าร่วมประชุมวิชาการระดับนานาชาติ

6. ระยะเวลาดำเนินการ เข้าร่วมประชุมระหว่าง 29 – 31 พฤษภาคม 2567 รวมระยะเวลา 3 วัน

7. วิธีดำเนินการ เข้าร่วมประชุมวิชาการและนำเสนอบทความวิจัย

8. รายละเอียดเกี่ยวกับการประชุมวิชาการ

8.1 หัวข้อการประชุม การประชุมวิชาการ IAMBEST 2024 เป็นการประชุมในด้าน and Informatics, Agriculture, Management, Business Administration, Engineering, Sciences and Technology ซึ่งเป็นการประชุมทั้งระดับชาติครั้งที่ 9 (The 9th National Conference) และ การประชุมระดับนานาชาติครั้งที่ 5 (The 5th International Conference) ซึ่งเป็นเวทีแลกเปลี่ยนเรียนรู้และเสนอผลงานวิชาการและวิจัย ของคณาจารย์นักวิชาการ/นักวิจัย ผู้ประกอบวิชาชีพ ตลอดจนนิสิต/นักศึกษา และผู้สนใจทั่วไป ซึ่งทวีความสำคัญยิ่งขึ้น ด้วยความเป็นมาและความสำคัญดังกล่าวมาข้างต้น สถาบันเทคโนโลยีพระจอมเกล้าเจ้าคุณทหารลาดกระบัง วิทยาเขตชุมพรเขตรอุดมศักดิ์ จังหวัดชุมพร จึงจัดการประชุมวิชาการระดับชาติและระดับนานาชาติขึ้น โดยเป็นการประชุมประจำปีแบบสหวิชาการ จาก 3 ภาควิชา ที่ประกอบด้วย 1) ภาควิชาพื้นฐานทั่วไป 2) ภาควิชาวิศวกรรมศาสตร์ และ 3) ภาควิชาเทคโนโลยีการเกษตรฯ เข้าด้วยกัน ซึ่งประกอบด้วยด้านสารสนเทศ (Information) การเกษตร (Agriculture) การจัดการ (Management) บริหารธุรกิจ (Business Administration) วิศวกรรมศาสตร์ (Engineering) วิทยาศาสตร์ (Sciences) และ เทคโนโลยี (Technology) ด้านสังคมศาสตร์และมนุษยศาสตร์ (Social Sciences & Humanities) ร่วมกันขึ้นในคราวเดียวกัน เพื่อเป็นพื้นที่ในการเผยแพร่ผลงานวิชาการและวิจัย และขยายองค์ความรู้สู่การปฏิบัติให้กว้างยิ่งขึ้น สำหรับคณาจารย์นักวิชาการ นักวิจัย ผู้ประกอบวิชาชีพ นิสิต นักศึกษา และผู้สนใจทั่วไปในประเทศและต่างประเทศ รวมถึงสร้างเครือข่ายทางวิชาการที่เข้มแข็งพร้อมที่จะพัฒนาไปเป็นแหล่งอ้างอิงระดับชาติและนานาชาติต่อไป

8.2 ผู้เข้าร่วมประชุม การประชุมวิชาการในครั้งนี้ได้รับความสนใจจากทั้งนักวิจัย นักวิชาการ อาจารย์และนักศึกษบัณฑิตศึกษาจากหลายสถาบัน จำนวนประมาณ 300 คน มีการนำเสนอผลงานจำนวน 114 เรื่อง เป็นการนำเสนอในระดับชาติจำนวน 61 เรื่อง และระดับนานาชาติจำนวน 53 เรื่อง โดยทางกองบรรณาธิการได้มีการคัดสรรและจัดส่งผลงานวิจัยให้ผู้ทรงคุณวุฒิ (Peer Review) ทั้งภายในและภายนอกสถาบันเทคโนโลยีพระจอมเกล้าเจ้าคุณทหารลาดกระบังเพื่อตรวจประเมินบทความวิจัยและผลงานทางวิชาการทุกเรื่อง นอกจากนี้ในการประชุมวิชาการครั้งนี้ยังมีการประกวดสิ่งประดิษฐ์และนวัตกรรม IAMBEST Inventor Award 2024 อีกด้วย

8.3 รูปแบบและวิธีการประชุม

1) การบรรยายพิเศษทางวิชาการ โดย Prof.Dr.Apanee Luengnaruemitchai, Board from Program Management Unit for Competitiveness (PMUC) หัวข้อ Driving Technology and Innovation with Bio-Circular-Green Economy

2) การนำเสนอผลงานวิจัยภาคบรรยาย (oral presentation) ภาคภาษาไทย และภาคภาษาอังกฤษ

3) การนำเสนอผลงานวิจัยภาคโปสเตอร์ (poster presentation) ภาคภาษาไทย และภาคภาษาอังกฤษ

4) การประกวดสิ่งประดิษฐ์และนวัตกรรม

8.4 การเข้าร่วมประชุม

ในการประชุมครั้งนี้เข้าร่วมในฐานะผู้นำเสนอผลงานวิจัยในการประชุมนานาชาติ โดยนำเสนอผลความวิจัยในหัวข้อ Enhancing Entrepreneurial Capability among Fruit Farmers: Insights from a Study of Entrepreneurial Elements and Styles in Chanthaburi Province, Thailand

8.5 ประมวลข้อบทความทางวิชาการที่เห็นว่าน่าเผยแพร่ให้ผู้อื่นได้ทราบ

เรื่องที่ 1 Effects of edible coating on the Quality and Shelf-life of fresh-cut ‘Kimju’ guava (*Psidium guajava*) โดยมีสาระสำคัญสรุปได้ดังนี้ Changes in appearance and physiochemical of fresh-cut fruits significantly impact consumer acceptance. This study explored the influence of edible coatings derived from 1% silk sericin with 2% ascorbic acid (SE), Aloe vera gel with 2% ascorbic acid (AA), and a commercial coating (ED) on the quality attributes of fresh-cut ‘Kimju’ guava (*Psidium guajava*) during storage at 8 ± 2 °C and 75% relative humidity for 16 days, with uncoated fresh-cut guava serving as the control. The application of SE, AA and ED coatings effectively maintained weight loss and firmness of fresh-cut guavas. SE and AA coated samples exhibited elevated total phenolic content and antioxidant activity compared to the control. Moreover, SE and ED coatings resulted in reduced bacterial, yeast, and mold counts compared to both the control and AA coated samples. In summary, SE emerges as a promising edible coating for fresh-cut guava, demonstrating its capacity to preserve quality and extend the shelf life of fresh-cut guava for 16 days.

เรื่องที่ 2 Simple and Effective Approach for Fresh or Frozen Fish Classification Using Image Processing and Deep Learning โดยมีสาระสำคัญสรุปได้ดังนี้ Computer and machine vision is an emerging topic that developed massively this decade in many fields, including the food and fish

industries. Image processing and deep learning as the core have been developed for various purposes in the fish industry. However, the authors could not find published work on classifying fresh and frozen fish based on deep learning and image processing, even though this work might be very useful for developing automation in that field. For this reason, this work is intended to fill this gap. The image dataset was made from tilapia fish obtained from traditional markets in Thailand. Several effective image pre-processing techniques were proposed. Resizing, cropping, and Lanczos resampling were utilized to minimize computation without eliminating (even focusing on) important features. Then a simple deeplearning algorithm was employed for classification. However, despite its simplicity, this approach could completely classify all fresh and frozen tilapia in the dataset. The resulting confidence score was also very high, reaching an average of 99.82% for all images in all classes.

เรื่องที่ 3 Detection of Coconut Black Headed Caterpillar Using Aerial Imagery Combined with Artificial Intelligence โดยมีสาระสำคัญสรุปได้ดังนี้ In this paper, the methods to detect coconut black headed caterpillars are investigated, which are presently difficult for locating and correcting in a timely manner. The infestation of coconut black headed caterpillars causes severe damage to the coconut trees resulting in reduction of yield significantly. The coconut trees, which are most facing this problem are mostly in the southern region, in Prachuap Khiri Khan Province and Surat Thani Province of Thailand that has the coconut trees, which are more than 20 meters high, making it impossible to observe and take care of it thoroughly. The developed drone can be used to inspect and find the abnormal area that may be caused by the infestation of coconut black headed caterpillars. The images from the drone will be processed by artificial intelligence system, when the flight is completed. These images are approved for the characteristic check by working with an entomologist, Department of Agriculture of Thailand, and additionally done for the ground check by placing the colour papers at the bottom of the coconut trees that are destroyed by coconut black headed caterpillars for labeling and for processing using the artificial intelligence system easily. RetinaNet model is used in this research for accuracy and precision. The result has 93% accuracy for rounds 3 of modeling.

เรื่องที่ 4 A Demonstration of Solar Pyrolysis of Agricultural Waste Biomass for Green Chemical Production โดยมีสาระสำคัญสรุปได้ดังนี้ Solar pyrolysis offers a promising carbon-neutral pathway to thermochemically convert waste biomass and solar energy into high-quality syngas

and green chemicals. In this study, solar pyrolysis of agricultural waste biomass from palm oil empty fruit bunch (EFB) was performed in a one kWth prototype chemical solar reactor to produce liquid bio-oil, syngas, and biochar. A study was experimentally conducted with a maximum temperature reaching 600 °C under heating rate of 12.2°C/min. As a result, syngas increased with increasing temperature. H₂ and CO were mainly produced, followed by CO₂, CH₄, and C₂H₆. Within 600 °C, the liquid tar was mainly produced, followed by char and syngas. The process demonstrated the concept of converting both renewable biomass and sunlight into chemicals in a single process.

เรื่องที่ 5 Influential Factors Of Digital Marketing Strategy On Purchase Intention Of Consumers: Case Study S Company โดยมีสาระสำคัญสรุปได้ดังนี้ The purpose of this paper is to detect the factors that influence digital marketing strategies on consumer purchase intention and to examine the impact of demographic characteristics on this issue. The research objectives of this paper are (1) To analyse the demographics of the customers of Company S. (2) To analyse the consumer behaviour of S-company customers. (3) To explore the impact of digital marketing mix on consumer purchase intention. This paper adopts the 6P's marketing mix, which are: product price, product type, product quality, product description, product delivery and promotion. Data from 400 samples were collected through an online questionnaire survey, and the questionnaire data were mainly analysed empirically in model relationship measurements, with descriptive analysis, regression analysis and analysis of variance (ANOVA) using SPSS statistical analysis software. The importance of this study is that it will enrich the research content of 6P theory on online marketing strategy in casual food industry. In addition, it can help Company S to highlight its strengths, improve corporate profitability, and provide empirical methods for the entire casual food industry. The results of the study show that product assortment, product quality and promotions in the digital marketing mix have a positive impact on consumers' purchase intention. In addition, the findings show that consumer intentions are also influenced by age, education and income.

เรื่องที่ 6 Marketing Mix Factors Influencing the Ice Cream Purchasing Decision Process of Chinese Consumers in Jiujiang City โดยมีสาระสำคัญสรุปได้ดังนี้ The objectives of this research article are to 1) study the demographic characteristics of Chinese consumers in Jiujiang, 2) compare the ice cream purchasing decision process of Chinese consumers in Jiujiang. Classified by demographic

characteristics, 3) Analyze the market mix factors that influence the ice cream purchasing decision process of Chinese consumers in Jiujiang City, and 4) to analyze market mix factors influencing the preference of major Chinese ice cream brands among consumers in Jiujiang City. The sample group used in this research was 400 Chinese consumers with experience consuming ice cream in Jiujiang City. An online questionnaire was used as a tool to collect data by means of convenience sampling. Statistics used in the analysis include frequency, percentage, mean, and standard deviation. Testing hypotheses with t-test statistics, One-way ANOVA or F-test statistics, and using multiple regression statistics to find relationships between variables. The results of the hypothesis testing found that Chinese consumers in Jiujiang City with different genders, ages and average monthly incomes have different influences on their ice cream purchasing decisions at a statistical significance at the .05 level. In terms of the marketing mix factors, price and marketing promotion have an influence on the ice cream purchasing decision process at a statistical significance at the .05 level.

8.6 การนำเสนอบทความวิจัยของผู้ช่วยศาสตราจารย์ ดร. ภาวัต เจียมจิณณวัตร

Enhancing Entrepreneurial Capability among Fruit Farmers: Insights from a Study of Entrepreneurial Elements and Styles in Chanthaburi Province, Thailand

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Abstract. Entrepreneurial capability is known as a crucial driver of sustainable economic growth, and it is required deep understanding within agribusiness sector as the foundation of Thailand economy. This study examined the entrepreneurial elements and entrepreneurial styles in a sample of 384 fruit farmers in Chanthaburi province. Data were collected through face-to-face interviews using a structured questionnaire and analyzed employing principal component analysis (PCA) and cluster analysis using the two-step clustering technique. The findings revealed that entrepreneurial elements among the fruit farmers were related to the entrepreneur, including rationality, originality, adaptability, and value focus, and to the enterprise, including intensification, accomplishment, internal focus, and external focus. Among these elements, the significant elements related to the entrepreneurial style included rationality, internal focus and originality, dividing the fruit farmers into four entrepreneurial styles: enthusiast, producer, laid-backer, and analyst. These findings have important implications for enhancing entrepreneurial capability among fruit farmers, as well as for relevant government and private organizations' policies and strategies to sustain the growth of Thailand fruit industry.

Index Terms—Agribusiness, Entrepreneurship, Entrepreneurial Elements, Entrepreneurial Styles, Fruit Farmers.

I. INTRODUCTION

Farm business has long played an important role in the development of the Thai economy and society. As the primary industry leading to the country's food security, it has been initially promoted to ensure sufficient production to support domestic consumption. Furthermore, agricultural products with high quality standards have also brought about export incomes over past decades. One of the important growth potentials of the farming industry is tropical fruit export, and Chanthaburi Province is considered to be the important source of fruit production in Thailand. It is also a province with a relatively high population income. Information from [1] reports that in 2022, at annual prices, Chanthaburi Province had a value of provincial products of 154,347 million baht, with the value of agricultural products reaching 87,570 million baht or 57.0 percent, while agricultural products of the whole kingdom is only 8.7 percent or 1,516,169 million baht out of a gross domestic product of 17,378,017 million baht. It is noted that Chanthaburi province's income depended mainly on fruit production, but it had an income per capita of 270,863 baht, which is the 12th highest in the country, showing the potential of fruit farm business can generate high incomes for the people.

However, in terms of marketing, most fruit products must rely heavily on foreign markets. Data from [2] indicated that

during 2016-2019, the export volume of Thai durian increased from 404 thousand tons to 655 thousand tons, an increase of 62 percent, with the value increasing from 503 million US dollars to 1,465 million US dollars increased by 191 percent with a tendency to continually increase. The main market was the People's Republic of China which accounted for more than 70 percent of the total export value. Although the growth of the fruit industry had a substantial growth trend, it was concentrated only in one main market, which accounted for a large proportion of exports. This caused the fruit industry to have high market risks if there are changes in economic factors [3]. Therefore, in order to maintain a competitive advantage in the fruit industry, there must be reduced the risk by more penetrating the domestic market to increase diversification of marketing channels, value-added products and other alternative international markets [2]. In this regard, one important factor leads to sustainable success of fruit farm business operations is farmers' entrepreneurship capability in developing quality produce, obtaining the ability to respond to the market as well as having creative ideas in developing products in order to increase more value.

Entrepreneurship development is considered an important component for economic development for sustainable growth. Numerous international studies have confirmed the importance of entrepreneurial characteristics for the survival and growth of businesses and economies. In Thailand, there were still limited studies on this issue. Most of which focus on studying entrepreneurship in small and medium-sized

businesses. As for the issue, studies of being an agribusiness entrepreneur in the context of the Thai agricultural sector were hardly found. Thai farmers are generally small-scale producers facing problems in their capability to be entrepreneurs. This problem will affect the development of the agricultural sector, which is the upstream supply chain in agricultural industries. As an important source of Thai fruit production, Chanthaburi Province has a large number of professional fruit farmers, demonstrating good examples of small-scale farm business entrepreneurs. Therefore, this study aimed to analyze the elements of entrepreneurship among fruit farm business entrepreneurs and typologies of them based on their entrepreneurial styles which reflected their ability to carry out the fruit farm business, bringing about recommendations to support entrepreneurship development for the Thai fruit economy.

Research objectives:

- 1) to analyze entrepreneurial elements of fruit farmer in Chanthaburi Province, and
- 2) to classify entrepreneurial styles of fruit farmer in Chanthaburi Province.

II. LITERATURE REVIEW

Entrepreneurship

Entrepreneurship knowledge has been widely studied in various fields such as economics, management, sociology, and psychology, resulting in a diverse concept of entrepreneurship [4]. This diversity is influenced by factors like psychological, personal, and socioeconomic aspects, and is applied to business operations. Entrepreneurship is defined as activities that create value through the development of new products, processes, or markets [5]. Entrepreneurship involves two key elements: the entrepreneur and entrepreneurial activities, consistent with research on entrepreneurial orientation and entrepreneurial competence:

1. *Entrepreneurial orientation* is indicative of the quality of entrepreneurship that leads to business success in a dynamic business environment. As identified by [6] there are five dimensions of entrepreneurial orientation: 1) autonomy in management, 2) innovation creation, 3) proactive work, 4) competitive aggressiveness, and 5) risk-taking. Also [7] highlighted five essential entrepreneurial traits, aligning with [6]: 1) risk-taking, 2) need for achievement, 3) independence, 4) internal locus of control, and 5) tolerance for ambiguity. Entrepreneurial studies often focus on specific characteristics influencing entrepreneurs' motivation to innovate in products, processes, and markets. As observed by [8], entrepreneurs with creative ideas drive innovations in products and processes. Additionally, [9] explored the significance of innovation for entrepreneurship, emphasizing its role in enhancing entrepreneurs' competitiveness and fostering innovation. Developed countries prioritize enhancing entrepreneurship to cultivate knowledgeable, visionary, and determined entrepreneurs capable of facing

risks, excelling in technology, leadership, and networking.

2. *Entrepreneurial competence* encompasses a range of actions that demonstrate the ability to engage in diverse activities within business operations. Entrepreneurship is about actions rather than mere attitudes or intentions, reflecting the essence of entrepreneurial activities [10]. These activities include: 1) starting a venture, 2) opportunity discovery and marketing operations, 3) strategic management, and 4) value creation. According to [5], entrepreneurial activities serve as a metric for assessing an entrepreneur's abilities, which can be honed through training, knowledge acquisition, and experiential learning to develop skills in business operations.

Agribusiness entrepreneurship

Traditional agriculture primarily focuses on local livelihoods. Farmers and agricultural workers are often depicted as traditional and less evolved [11]. This perception extends to agricultural businesses and industries, which are commonly viewed as low-tech and solely focused on enhancing production rather than innovation [12]. However, the global agricultural sector has continuously adapted to keep pace with evolving trends and market dynamics, driven by rapid changes in agricultural and food markets worldwide. Consumers now have greater access to information and are increasingly concerned about food safety standards. The integration of advanced technology in communication and distribution systems, alongside a growing emphasis on sustainability, has further reshaped the industry [11], [12].

This transformation is not unique to any specific region, including Thailand. Over the past few decades, particularly following the economic crisis of 1997, the Thai agricultural sector has swiftly adjusted to the changing economic landscape. Shifts in consumer behavior have led to a heightened focus on production quality standards and the expansion of modern retail businesses, presenting new challenges in marketing agricultural products and food within Thailand [13].

The evolving landscape of agriculture and agribusiness necessitates a shift towards innovation and adaptability. Modern farmers must possess a diverse skill set that extends beyond traditional farming practices. Embracing entrepreneurship is crucial in this evolving environment [14], [15]. The key question that emerges is how individuals can effectively transition into entrepreneurs within the agricultural sector.

III. METHODOLOGY

Data Collection

This study was quantitative research, using the survey research method. The study population was 9,035 fruit farmers in Chanthaburi province who obtained the good agricultural practices certifications from the Department of Agriculture, Ministry of Agriculture and Cooperatives, and

the sample size was 384 farmers, calculated using Taro Yamane's formula. The survey data were collected through face-to-face interviews using a structured questionnaire.

Questionnaire Development

The questionnaire was constructed based on the literature review together with empirical information from the study area of Chanthaburi province. Accordingly, a preliminary study was conducted by holding in-depth interviews with two farmer leaders and two extension officers in order to understand the fruit farm context in Chanthaburi and entrepreneurship qualifications of farmers. The draft of questionnaire was assessed its content validity by three experts in the related field of agribusiness. The complete questionnaire comprised basic information of farmers and their fruit farm business and 24 items of variables to measure entrepreneurial orientation and competence on a five-point Likert-type scale. Before the main survey implemented, the questionnaire was pre-tested with 30 farmers, and reliability of the items was analyzed, measuring Cronbach's alphas (> .70) to ensure internal consistency. The result of Cronbach's alpha was equal to .808, representing good internal consistency.

Data Analysis

Data analysis firstly employed principal component analysis (PCA) to obtain a more concise number of underlying factors (or entrepreneurial elements) from a vast amount of entrepreneurship information (24 items of variables). In order to assess factorability of the sample data, Kaiser-Meyer-Olkin's measure of sample adequacy (KMO) should be greater than .70 and Bartlett's test of multivariate normality and the adequacy of high correlations between variables should be satisfied [16]. In this study, factorability of the data set was checked and met with KMO equal to .747 and the Bartlett's test indicated a significant value ($p < .05$)

Regarding the PCA, a small number of underlying factors which contain as much information in the original variables as possible was derived by using Kaiser's criterion with the eigenvalue greater than one and employing a varimax rotation to identify a simple structure for interpretability [17]. The result of the analysis indicated eight underlying factors with a total variance of 68.44%. Each factor was represented by a number of strongly-loaded variables with significant factor loadings greater than .30 because the sample size was more than 350 cases at 95% confident interval [18].

The underlying factors obtained provided factor scores as standardized scores which were used as factors in cluster analysis using the two-step clustering technique to find patterns in entrepreneurial styles. Initially, cluster analysis used all the underlying factors to determine the distance measures between the data, using the Log-likelihood criterion method and finding the number of clusters indicated by Akaike Information Criterion (AIC). The cluster quality were also analyzed and tested by removing and adding the factors one by one in order to find the structure of the important elements that can classify the clusters with the best results.

IV. RESULTS AND DISCUSSION

General information of the sample

The results of the survey data from the sample of 384 fruit producers in Chanthaburi Province found that the age of fruit producers ranged from 25 to 70 years with an average of 47.41 years. Most of them had completed their highest education at the high school level or vocational education accounted for 58.60 percent, with an average experience of 16.61 years in fruit farming. They had farm areas ranging in size from 2 - 250 rai, with an average of 19.80 rai, generating an average annual income of 1,508,827 baht. Each farmer grew fruit from 1 - 4 varieties, including durian, mangosteen, rambutan, longan, longkong, salak, and other tropical fruits. Most of them or 58.90 percent grew durian. In terms of being members of farmer groups, the majority of 70.30 percent were not members of any group, but the remaining of 29.70 percent were farmer-group members such as agricultural cooperatives, collaborative farmer groups, young smart farmer group, and community enterprises.

Entrepreneurial elements

The results indicated eight elements of entrepreneurship in the case of Chanthaburi fruit farmers. According to the PCA, the findings demonstrated eight underlying factors pointing out important entrepreneurial elements of the fruit farmers. Table 1 shows factor loadings of variables across the eight factors and other related results. The variables were grouped for the factors, ordered by size of factor loadings.

**TABLE I
FACTOR LOADINGS OF VARIABLES ACROSS EIGHT COMPONENTS**

Variables	Components								R ²
	1	2	3	4	5	6	7	8	
Input management	.898	.043	.087	.049	.007	.043	.066	.118	.844
Production management	.892	.048	.123	.055	-.017	.055	.073	.164	.852
Financial management	.724	.055	.182	.294	.189	-.136	.039	-.015	.702
Risk taking	-.018	.816	.124	.055	.078	.022	-.012	-.148	.714
Flexibility	.164	.784	.125	-.080	.068	.107	.153	-.098	.717
Self-development	-.108	.749	.072	.165	.051	.013	-.047	.237	.698
Autonomy	.223	.670	.074	-.009	.022	.274	.166	-.212	.662
Analysis	.148	.111	.821	-.028	.062	.052	.082	.003	.896
Decision making	.180	.144	.885	-.040	.121	.051	.043	-.005	.857
Planning	.054	.092	.733	.133	.106	.075	.232	-.006	.837
Value creation	.058	-.040	.806	.825	-.034	.072	-.013	.046	.693
Leading	.194	.043	.032	.724	.111	-.027	.224	.048	.630
HR management	.508	.094	.057	.826	.153	-.037	.022	-.194	.604
Creative thinking	.076	.095	.169	.045	.802	.078	.064	.011	.809
Initiative thinking	.046	.113	.088	.065	.866	.202	.062	.036	.827
Competitive thinking	-.016	.248	.059	.121	.151	.801	.028	.048	.742
Pro-active thinking	-.081	-.033	.056	-.073	.074	.767	-.110	.046	.624
Sustainable thinking	.166	.414	.069	-.022	.122	.503	.221	-.130	.538
Organization management	.092	-.004	.197	.223	-.014	-.048	.763	.042	.683
Controlling	-.058	.162	.399	.242	.083	-.035	.597	.166	.638
Vision	.213	.170	-.014	-.263	.254	.077	.510	.066	.479
Communication	.110	.086	-.071	-.023	-.085	.072	.201	.707	.578
Networking	.236	.074	.179	.137	.330	-.130	-.029	.621	.624
Marketing management	.299	.111	.052	.314	.026	-.119	.060	.287	.349
Eigenvalues	2.828	2.687	2.556	1.961	1.904	1.704	1.500	1.285	
% of variance	11.8%	11.2%	10.6%	8.2%	7.9%	7.1%	6.3%	5.4%	

As shown in Table 1, factor loadings of variables with the components, the sum of squares of the factor loadings on all

components (communalities, h^2), the eigenvalues after varimax rotation, and percentage of variance indicates informative capability to the eight elements, ordered by percentage of variance. These results let to consideration of the contents of the individual variables that make up each element and interpretation to determine the appropriate name of each element. The results of interpreting the eight elements of entrepreneurship in the case of Chanthaburi fruit farmers are as follows:

1) *Internal focus* is an entrepreneurial element focusing on efficient management within the farm, e.g. appropriate input selection, compliance of good agricultural practices, production and financial recording and cost estimation.

2) *Adaptability* is the ability to face risks and uncertainties as well as to accept and learn from results in every situation, relying on independent self-sufficiency and trying to seek knowledge for self-development regularly.

3) *Rationality* is the ability to work appropriately to various situations by analyzing causes and methods for solving problems in a reasonable manner as well as planning and improving plans appropriately from changing situation information.

4) *Value focus* is giving importance to the idea in value creation by managing and supporting people to create quality work and to be able to work smoothly and efficiently

5) *Originality* is the ability to take the initiative to do new things by thinking outside the box, researching and developing various ideas to create useful works

6) *Intensification* is seeking opportunities for advancement, daring to face challenges and competition and always consider changing circumstances so that the farm can survive and grow sustainably.

7) *Accomplishment* is giving importance to success by setting long-term goals and allocating necessary resources for operations and control so that the goals can be achieved.

8) *External focus* is giving importance to management outside the farm, by using effective communication technology, creating networks for joint development with others, being aware of market opportunities and responding to market demands for the effectiveness of farm operations.

From results above, it was found that there are elements of fruit farming entrepreneurs in terms of entrepreneurial orientation that lead to success and entrepreneurial competence in operating the fruit farm, in order to achieve the goals. According the results, there are eight entrepreneurial elements, which can be classified as: elements related to the entrepreneur and elements related to the enterprise:

1. *Elements related to an entrepreneur* comprised of rationality, originality, adaptability, and value focus. According to [15], successful agricultural entrepreneurs must be able to think logically, be visionary, strategic, and decisive. Also, [14] mentioned that agricultural operators must use land resources efficiently, and they must be people who have the ability to think logically by analyzing, planning, and making decisions. Furthermore, [8] mentioned that the creative element is the factor that should be considered the most in being an entrepreneur because it is considered as intellectual capital and can be used in

operations that create value. Additionally, good entrepreneurs must be able to adapt under various situations and have the ability to deal with risks [6], [14] as well as being eager to learn, observe, and experiment to create new things [19].

2. *Elements related to the enterprise* consisted of intensification, accomplishment, internal focus, and external focus. Another important element of entrepreneurship is the ability to carry out work in order to lead the business to success by having a goal that leads to the business's survival and growth. This includes the ability to manage both inside and outside the business, which is consistent with the work of [14], [20], who stated that entrepreneurship is the ability to set goals, prepare financial resource and other resources for business operations and control to achieve goals. As stated by [21], entrepreneurs who have the ability to use competitive strategies well have the ability to manage both internal resources, such as finances and people, and external resources, such as access to various services and information from outside. Additionally, work by [22] indicates that agricultural entrepreneurship is related to market orientation by cooperating with buyers, having joint business activities, and communicating with outsiders.

Entrepreneurial styles

There were four entrepreneurial styles in the fruit farm operations of farmers in Chanthaburi Province. Based on the eight entrepreneurial elements described above, the results of cluster analysis which provided best cluster quality indicated three significant elements consisting of Rationality, Internal focus and Originality. These elements were the factors classifying the farmers into four clusters, demonstrating different entrepreneurial styles of them. The four clusters were explained by standardized scores of means and standard deviations on each significant entrepreneurial elements (Table 2).

TABLE II
THE FOUR CLUSTERS BASED ON THE SIGNIFICANT ENTREPRENEURIAL ELEMENTS

Clusters	Count	Percent	Significant entrepreneurial elements					
			Rationality		Internal focus		Originality	
			Mean	S.D.	Mean	S.D.	Mean	S.D.
1	68	17.70	-.458	.877	-1.591	.623	-.273	1.073
2	172	44.80	-.315	.433	.196	.476	.647	.447
3	90	23.40	-.291	.546	.736	.811	-1.139	.756
4	54	14.10	2.066	.260	.150	.765	.181	.692
Total	384	100.00	.000	1.000	.000	1.000	.000	1.000

The interpretation of the results above could depict the four clusters as entrepreneurial styles of the fruit farmers namely "Laid-backer", "Enthusiast", "Producer" and "Analyst". The descriptions of each styles based on the three significant elements are as follows (Figure 1):

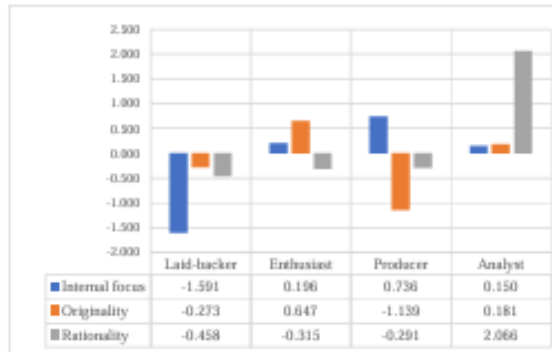


Fig. 1. Interpretation of clusters towards four entrepreneurial styles

1) *Laid-backer* is a type of farmers who have a simple lifestyle and operate their farm in a casual manner with the least stress in their internal management. They also have no emphasis on analytical thinking and rational planning and do not want to make any effort to initiate new things

2) *Enthusiast* is a type of farmers who are committed to creating new things for their farm business progress and kind of focusing on internal management as well. Conversely, they do not emphasize the use of skills in analytical thinking and rational planning.

3) *Producer* is a type of farmers who have good expertise in fruit farming, focusing on management within their farm, i.e. the management of production inputs, the good and efficient production process. However, they do not emphasize the use skills of analytical thinking, rational planning and creating new things apart from the expertise they have.

4) *Analyst* is a type of farmers who have analytical thinking to make rational decisions in various situations together with creative ideas to develop their own business and rather place importance to internal management with operational plans that suit the changing situation.

Different fruit farmers do not always have similar style in their farm operations. From the results of the cluster analysis, it was found that the elements of rationality, originality, and internal focus are important elements categorizing the fruit farmers to different entrepreneurial styles, which differ from other research conducted in different countries. This variation is due to farmers' way of life, types of agricultural production, and different contexts, as can be seen in the works of [23], [24] and [25], among others. The research results indicated that the largest cluster comprised Enthusiast (45%), followed by Producers (23%) and Laid-backer (17%). The smallest group was the Analyst (14%), showing that most farmers are eager to learn new things to develop their businesses, driven by the increasing prices of fruits, especially durian, due to rising international market demand over recent years [2]. Considering the characteristics of each cluster can lead to guidelines for developing entrepreneurship as follows.

1. Enthusiasts are the most innovative and seek new knowledge from various sources for self-development of

their businesses. They enjoy researching and experimenting to generate profits but may lack accurate and complete information and analysis. Therefore, the development of entrepreneurship among enthusiasts should focus on providing accurate and reliable information, developing information orientation skills, and sharing information and knowledge with stakeholders [26].

2. Producers tend to focus more on working in the farm than seeking external information and networks, lacking the idea of creating new activities as they are content with their current performance. To maintain competitiveness in the era of rapid technological change, producers should be open to internal management and external connections to obtain up-to-date business information [21].

3. Laid-backers prefer a slower pace, value internal focus and creative initiative, and are less reasonable than other groups. Developing the entrepreneurial ability of the laid-backers should emphasize learning through mentoring, observing, and experimenting to gradually create operations. Training and fostering an open atmosphere can help increase learning in this group [27].

4. Analysts focus on logical thinking and seek information for self-determination, being cautious about investing more in fruit farms. They tend to spread risks across various operational activities. Entrepreneurial development for the analysts should emphasize diversifying business activities for risk distribution, expanding various businesses to create incomes [14].

V. CONCLUSION

In summary, this study found that entrepreneurship of the fruit farmers was indicated by elements related to the entrepreneur comprised of rationality, originality, adaptability, and value focus, as well as elements related to the enterprise consisted of intensification, accomplishment, internal focus, and external focus. Specifically, the elements related to the entrepreneurial style include rationality, internal focus and originality: these significant elements divided the fruit farmers into four styles of entrepreneurship, namely enthusiast, producer, laid-backer, and analyst. These findings have important implications for entrepreneurial development among fruit farmers and other agribusiness entrepreneurs. Based on these results, fruit farm entrepreneurs can use the research results for their own development. By considering all the eight elements for self-improvement, they can evaluate their own strengths and weaknesses in related areas. This will enable them to develop their strengths and try to reduce their own limitations, thereby increasing their potential as agribusiness entrepreneurs and gaining a competitive advantage. Relevant government and private organizations, such as the Department of Agricultural Extension, Department of Business Development, Community Development Department, farmer groups, agricultural cooperatives, and associations of fruit traders and exporters, should collaborate to develop the entrepreneurial potential of fruit farmers,

assisting to strengthen the upstream production industry. Further research is needed to assess the characteristics of entrepreneurial styles and strategies leading to the competitive advantage. However, this study has made an important contribution to our understanding of entrepreneurial elements and entrepreneurial styles of fruit farmers in the Thai context.

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9. ประโยชน์ที่ได้รับ

9.1 ประโยชน์ต่อมหาวิทยาลัย

- 1) บุคลากรของมหาวิทยาลัยได้รับการพัฒนาด้านวิชาการและการวิจัยทั้งในสาขาวิชาที่บุคลากรมีความเชี่ยวชาญและในสาขาวิชาที่เกี่ยวข้อง
- 2) เป็นการเผยแพร่ชื่อเสียงของมหาวิทยาลัยในการเข้าไปมีส่วนร่วมในการประชุมวิชาการและการเสนอผลงานทางวิชาการของบุคลากร

9.2 ประโยชน์ต่อผู้ได้รับทุน

- 1) ได้รับการพัฒนาด้านวิชาการและการวิจัยทั้งในด้านการเกษตร การจัดการธุรกิจ และในสาขาวิชาที่เกี่ยวข้อง
- 2) ได้รับประสบการณ์ในการเผยแพร่ผลงานวิจัยโดยการนำเสนอในที่ประชุมวิชาการระดับนานาชาติ

ภาคผนวก



ภาพการเข้าร่วมประชุมวิชาการ



ENHANCING ENTREPRENEURIAL CAPABILITY AMONG FRUIT FARMERS: INSIGHTS FROM A STUDY OF ENTREPRENEURIAL ELEMENTS AND STYLES IN CHANTHABURI PROVINCE, THAILAND

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Abstract

Entrepreneurial capability is known as a crucial driver of sustainable economic growth, and it is required deep understanding within agribusiness sector as the foundation of Thailand economy. This study examined the entrepreneurial elements and entrepreneurial styles in a sample of 384 fruit farmers in Chanthaburi province. Data were collected through face-to-face interviews using a structured questionnaire and analyzed employing principal component analysis (PCA) and cluster analysis using the two-step clustering technique. The findings revealed that entrepreneurial elements among the fruit farmers were related to the entrepreneur, including rationality, originality, adaptability, and value focus, and to the enterprise, including intensification, accomplishment, internal focus, and external focus. Among these elements, the significant elements related to the entrepreneurial style included rationality, internal focus and originality, dividing the fruit farmers into four entrepreneurial styles: enthusiast, producer, laid-backer, and analyst. These findings have important implications for enhancing entrepreneurial capability among fruit farmers, as well as for relevant government and private organizations' policies and strategies to sustain the growth of Thailand fruit industry.

Methodology

- Data Collection**
This survey research with the sample size of 384 farmers from the study population of 9,035 fruit farmers in Chanthaburi province with GAP certifications. Data was collected through face-to-face interviews using a structured questionnaire
- Questionnaire Development**
- Questionnaire based on literature review and preliminary study with farmers and extension officers
 - Content validity assessed by three experts in agribusiness
 - Questionnaire comprised basic farmer/farm information and 24 items measuring entrepreneurial capability on a 5-point Likert scale
 - Pre-tested with 30 farmers, Cronbach's alpha = 0.808 (good internal consistency)
- Data Analysis**
- Principal component analysis (PCA) used to obtain underlying entrepreneurial factors from 24 variables
 - Factorability checked: KMO = 0.747, Bartlett's test significant ($p < 0.05$)
 - PCA derived 8 underlying factors explaining 68.44% of total variance
 - Factor scores used in two-step cluster analysis to identify entrepreneurial styles
 - Cluster analysis used Log-likelihood distance, AIC determined number of clusters
 - Cluster quality tested by removing/adding factors to optimize classification

Introduction

- Farm business in Thailand plays a crucial role in the economy and society, ensuring food security and generating export income from high-quality agricultural products.
- Chanthaburi Province is a significant source of fruit production in Thailand, with a high provincial product value of 154,347 million baht in 2022, mainly driven by agricultural products [1].
- The province's income heavily relies on fruit production, with an income per capita of 270,863 baht, showcasing the potential for high incomes from fruit farming [1].
- Thai fruit exports, particularly durian, have shown substantial growth, with the main market being China, accounting for over 70% of the total export value [2].
- To mitigate market risks and maintain competitiveness, diversification of marketing channels, value-added products, and exploring alternative international markets are essential for the fruit industry [3].
- The shift towards innovation and adaptability in fruit farm businesses highlights the need for farmers to develop entrepreneurial skills beyond traditional farming practices to thrive in the evolving agricultural landscape [4].
- Entrepreneurship development is vital for sustainable success in fruit farming, emphasizing the need for farmers to develop quality produce, respond to market demands, and innovate to increase product value [5], [6], [7].

Research Objectives:

- to analyze entrepreneurial elements of fruit farmers in Chanthaburi Province
- to classify entrepreneurial styles of fruit farmers in Chanthaburi Province.

Results

Entrepreneurial elements

According to the PCA, the findings demonstrated eight underlying factors pointing out important entrepreneurial elements of the fruit farmers (Table 1).

Table 1. FACTOR LOADINGS OF VARIABLES ACROSS EIGHT COMPONENTS

Variables	1	2	3	4	5	6	7	8	b ^a
Input management	.898	.049	.087	.049	.007	.019	.096	.118	.814
Production management	.892	.048	.123	.055	-.037	.055	.075	.151	.852
Financial management	.724	.055	-.187	.244	-.189	-.136	.039	.015	.707
Risk taking	-.045	.816	.124	.055	.018	.022	-.022	.198	.724
Flexibility	.161	.784	.125	-.080	.098	.107	-.135	-.098	.717
Self development	.155	.780	.077	-.162	.025	.083	.147	-.137	.666
Autonomy	.223	.870	.074	.099	.022	.274	.166	-.212	.602
Analysis	.148	.111	.921	-.028	.062	.052	.082	.003	.896
Decision-making	.180	.144	.885	-.040	.117	.011	.043	-.005	.853
Planning	.054	.097	.783	-.133	.106	.015	.292	-.006	.637
Value creation	.058	-.040	.006	.825	-.034	.072	-.023	.046	.695
Leadership	.129	.013	.022	.774	.112	-.027	.221	.098	.630
HR management	.508	.094	.077	.546	.133	-.017	.077	.194	.604
Creative thinking	.076	.025	.369	.015	.802	.018	.004	.011	.809
Innovative thinking	.076	.113	.088	.045	.866	.202	.022	.098	.827
Competitive thinking	.041	.242	.058	.131	.111	.881	.078	.048	.782
Pro-action thinking	.081	.033	.056	.077	.074	.787	.110	.046	.624
Sustainable thinking	.196	.111	.069	-.022	.122	.589	.221	-.130	.538
Quality management	.090	.094	.187	.223	.014	-.048	.783	.042	.683
Controlling	.058	.162	.359	.242	.083	-.035	.587	.165	.638
Vision	.213	.140	-.014	-.288	.254	.077	.510	.064	.479
Communication	.119	.046	-.071	-.023	-.085	.072	.201	.707	.578
Networking	.236	.074	.179	.137	.330	-.130	-.029	.821	.624
Marketing management	.749	.111	.067	.314	.018	-.119	.060	.887	.849
Eigenvalues	2.838	2.882	2.536	1.961	1.704	1.500	1.285	1.000	
% of variance	11.8%	11.2%	10.6%	8.2%	7.9%	7.2%	6.3%	5.4%	

Entrepreneurial styles

There were four entrepreneurial styles in the fruit farm operations of farmers in Chanthaburi Province, based on three significant elements: Rationality, Internal focus and Originality (Figure 1).

- Laid-backer:** Farmers with a simple lifestyle, casual farm management, and no emphasis on analytical thinking, rational planning, or initiating new things.
- Enthusiast:** Farmers committed to creating new things for their farm business progress, focusing on internal management, but not emphasizing analytical thinking or rational planning.
- Producer:** Farmers with expertise in fruit farming, focusing on managing production inputs and processes efficiently, but not emphasizing analytical thinking, rational planning, or creating new things beyond their expertise.
- Analyst:** Farmers who use analytical thinking for rational decision-making, have creative ideas to develop their business, prioritize internal management, and create operational plans suited to changing



Figure 1. INTERPRETATION OF CLUSTERS TOWARDS FOUR ENTREPRENEURIAL STYLES

Discussion and Conclusion

The success of fruit farming entrepreneurs hinges on specific entrepreneurial elements related to both the entrepreneur and the enterprise [4], [6], [7], [8]. These elements play a crucial role in the success and categorization of fruit farmers into different entrepreneurial styles: Enthusiasts, Producers, Laid-backers, and Analysts, each requiring tailored approaches for entrepreneurial development [7], [9]. Enthusiasts thrive on innovation and knowledge acquisition, Producers benefit from internal management and external connections, Laid-backers excel with a focus on creativity and gradual development, and Analysts emphasize logical thinking and risk diversification in their entrepreneurial endeavors. In summary, this study identifies key entrepreneurial elements that categorize fruit farmers into four distinct styles. The findings have important implications for entrepreneurial development, enabling fruit farmers to assess their strengths and weaknesses, and collaborate with relevant organizations to enhance their entrepreneurial potential and competitive advantage. Future research should further explore entrepreneurial styles and strategies to support the growth of the agricultural sector.

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