



## The role of human resource development and artificial intelligent (AI) in the competitive performance within e-sports business industry

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### ABSTRACT

This research aims to study the structure and operational characteristics of the e-sports industry and examine the components of value creation through technology, skills, and capabilities for sustainable competition. The objectives include 1) understanding the current status of the esports industry, 2) identifying the key components necessary for experts in the e-sports business sector to enhance value creation, and 3) developing a structural equation model for the approach to value creation for sustainable competition in the e-sports industry. The sample consists of 300 entrepreneurs or executives from e-sports businesses. The research tool used was a questionnaire, and hypotheses were tested using structural equation modeling (SEM). The results revealed that the approach to value creation in the e-sports industry includes the effective use of information technology, organizational management, innovation management, and marketing focus. The differences by business size, it was found that large e-sports organizations placed significantly more emphasis on these approaches compared to small and medium-sized businesses, with statistical significance at the 0.05 level.

**Keywords:** Creating Added Value, Technology Industrial, Skills, Esports Business.

### INTRODUCTION

The Role of Innovation in the Esports Industry (Allal-Chérif et al., 2024). In the ever-changing world of esports, remaining competitive requires constant innovation, strategic adaptation, and the integration of emerging technologies. As the esports industry grows, driven by increasing popularity among players and viewers alike, esports organizations must innovate to remain relevant and profitable. From adopting cutting-edge technologies to developing a highly skilled workforce (Babin et al., 2024), the focus on sustainable competition is crucial for long-term success. The following sections will explore the importance of technological advancements, the key skills required in esports, and how continuous innovation ensures a competitive edge. Leveraging Technology for Value Creation. Technology serves as the backbone of the esports industry, shaping every aspect of the experience for players, fans, and organizations. (Chen & Wu, 2024). Real-Time Data Analytics, Optimizing Performance. Real-time data analytics have

transformed how esports organizations approach performance improvement, both in terms of individual player growth and team strategies. By collecting and analyzing in-game data such as movement patterns, reaction times, and game decision-making processes (Jordan-Vallverdú et al., 2024), teams can optimize their gameplay strategies. For instance, in a game like CounterStrike, Global Offensive (CS), teams can use data analytics to track enemy positions, identify strategic mistakes, and predict opponent behavior. Data-driven insights allow teams to make adjustments in real-time, adapting to their opponents' tactics and capitalizing on opportunities to win. Beyond in-game performance, data analytics can be used to monitor players' physical and mental well-being. This holistic approach to player performance is becoming increasingly important as esports athletes are expected to perform at the highest levels for extended periods (Ke & Wagner, 2024).

AI and Machine Learning, Driving Innovation. Artificial Intelligence (AI) and Machine Learning (ML) are becoming integral to the esports ecosystem. AI can be used to analyze vast amounts of data from players' performances to provide recommendations on improving gameplay strategies. In addition, AI-driven tools are being implemented to create fairer matchmaking systems, detect cheating, and even predict the outcomes of games. Machine learning can also be applied to fan engagement. For instance, platforms use ML algorithms to personalize content recommendations, helping fans discover matches, highlights, and related esports content based on their preferences (Chanas et al., 2019). Blockchain technology and Non-Fungible Tokens (NFTs) have also entered the esports ecosystem, creating new revenue streams for teams and players. NFTs offer unique, verifiable digital assets that fans can buy, trade, or collect. These could include limited-edition skins, in-game items, or exclusive virtual experiences. Blockchain technology ensures the authenticity and scarcity of these assets, adding value to the digital collectibles market in esports (Mancı et al., 2024).

Developing Essential Skills and Competencies for Esports Professionals. While technological advancements play a critical role in enhancing the esports experience, the development of essential skills and competencies among esports professionals is equally important. To thrive in the esports industry, individuals need to possess a diverse range of technical, strategic (Baptista et al., 2020), and interpersonal skills (Ginting et al., 2020).

1. **Technical Skills, Mastery of Game Mechanics and Tools.** Esports professionals must have a deep understanding of the games they compete in and the technologies that support those games. Technical skills include proficiency in game mechanics, familiarity with gaming hardware and software, and the ability to quickly adapt to new technologies as they emerge. Additionally, esports professionals must be well-versed in the use of analytical tools that provide insights into player performance, allowing for continuous improvement.
2. **Strategic Thinking and Game Theory,** beyond technical expertise, esports professionals must possess strong strategic thinking abilities. Games like Starcraft II and League of Legends require players to develop and execute complex strategies that take into account multiple variables, including team composition, enemy positioning, and resource management. Esports coaches and analysts also play a vital role in helping teams develop strategic frameworks.
3. **Communication and Teamwork.** Esports is inherently a team-based activity, and success depends on seamless communication and collaboration between players. Teams must work together to execute strategies, coordinate actions, and adapt to changing in-game situations. Strong communication skills, both verbal and non-verbal, are essential for ensuring that every team member is on the same page.

4. Leadership and Management. In addition to technical and strategic skills, esports professionals must develop leadership and management abilities. Team captains, coaches, and managers must be able to motivate their players, foster a positive team culture, and make critical decisions under pressure. Leadership is also important off the battlefield.

## **2. Materials and Methods**

### **2.1 Population and samples**

The research population consisted of executives and entrepreneurs from 2,500 esports and technology-driven businesses registered in Thailand in 2024 (Department of Business Development, 2024). These companies were categorized into large organizations (fixed assets over 200 million baht or over 200 employees) and small and medium businesses (assets not exceeding 200 million baht or fewer than 200 employees), following Industry Ministerial Regulations, B.E. 2545. Using Taro Yamane's (1973) formula with a 0.05 error margin, the required sample size was determined to be 345. Barnes et al. (2012) suggest that a sample size of 300 is considered good for structural equation modeling (SEM) analysis. Therefore, this study opted for a sample size of 300 participants, utilizing multi-stage sampling methods (Abraham et al., 2020), which included cluster sampling. The esports businesses were divided into two categories based on size, 150 large esports organizations and 150 small and medium-sized esports businesses. Data collection was carried out from these sample groups to analyze their technological advancements, skills, and competencies needed for sustainable competition in the esports industry.

### **2.2 Designing research instrument**

We designed the questionnaires by studying the principles of questionnaire construction according to the conceptual research framework from books, documents, articles, and research results of various researchers, including Klarenberg et al. (2022), Verdugo et al. (2016). The research instrument was divided into three sections, as follows,

Content validity was established through a panel of 3 experts with extensive knowledge and experience in esports and technology industries. These experts evaluated the questionnaire for quality and relevance. The Index of Item–Objective Congruence (IOC) was determined to range between 0.70–1.00, which exceeded the minimum threshold of 0.50, following the criteria of Alotaibi and Alotaibi (2021), indicating that the questions accurately measured the intended objectives.

To assess reliability, the questionnaire was piloted with a sample group of 30 esports businesses similar to the target population. The Cronbach's Alpha Coefficient was calculated to be 0.95, indicating high reliability and internal consistency, which meets the standard of reliability accepted by Campo-Arias and Caballero-Dominguez (2021), (Makransky et al., 2017; Mardani et al., 2020; Marshall et al., 2013).

### **2.3 Statistical analysis**

The data were analyzed using descriptive statistics, including frequency and percentage for checklist questionnaires, and mean and standard deviation for estimation scales. Open-ended responses were analyzed for content and summarized as frequency. A comparative analysis using t-tests was conducted to compare the business characteristics of two groups: 150 large industrial businesses and 150 small and medium businesses, with statistical significance set at 0.05. Additionally, multivariate statistics and Structural Equation Modeling (SEM) were employed using AMOS for hypothesis testing and further analysis.

### 3. Results

The general status of esports business organizations revealed that respondents were primarily small and medium-sized enterprises (SMEs), comparable to large businesses, with each group representing 50.00% of the sample. Most esports organizations were structured as limited companies (45.00%). The majority of these businesses had been in operation for 10 to 20 years (40.20%). Additionally, 40.60% of the business models were fully invested by Thai stakeholders, with most companies being located in provincial areas (52.50%).

The analysis of the importance level, classified by business size, found that SMEs in the esports industry emphasized approaches to creating added value through technology and the development of skills and competencies for sustainable competition. Overall, the importance level was high, with a mean score of 3.61. When considering each aspect, it was revealed that all areas were of high importance, arranged in descending order as follows, 1) Information technology had a mean of 3.77, 2) Organizational management had a mean of 3.71, 3) Innovation management had a mean of 3.70, and 4) Market orientation had a mean of 3.65.

Similarly, large esports organizations placed a strong emphasis on creating added value through technological advancements and skills development for sustainable competition, with an overall mean score of 4.09. Each aspect was of high importance, with the following descending order, 1) Information technology had a mean of 4.11, 2) Innovation management had a mean of 4.09, 3) Market orientation had a mean of 4.08, and 4) Organizational management had a mean of 4.07, as illustrated in Table 1.

This analysis demonstrates that both small and large esports organizations recognize the critical role of technology, management, innovation, and market orientation in fostering sustainable competition within the rapidly growing esports industry.

**Table 1.** Mean and Standard Deviation Classified by Industry Size as an Overall and by Aspect

|                           | Small and medium industry Approaches |      |                  | Large industry business business |      |                  |
|---------------------------|--------------------------------------|------|------------------|----------------------------------|------|------------------|
|                           | $\bar{x}$<br>x                       | S.D. | Importance Level | $\bar{x}$<br>x                   | S.D. | Importance Level |
| Overall Importance Level  | 3.73                                 | 0.62 | High             | 4.21                             | 0.35 | High             |
| 1.Information Technology  | 3.89                                 | 0.57 | High             | 4.23                             | 0.38 | High             |
| 2.Organization Management | 3.83                                 | 0.71 | High             | 4.19                             | 0.40 | High             |
| 3.Innovation Management   | 3.82                                 | 0.58 | High             | 4.21                             | 0.41 | High             |
| 4. Market Orientation     | 3.77                                 | 0.76 | High             | 4.20                             | 0.44 | High             |

**Approaches**, approaches to creating added value of agro-industrial products for sustainable competition.

The table illustrates the importance levels of various approaches to creating added value for esports businesses, categorized by small and medium-sized industry businesses and large industry businesses. The mean and standard deviation (S.D.) are provided for each approach, along with the corresponding importance level. Overall Importance Level, for small and medium-sized businesses, the overall importance level is rated high, with a mean of 3.73 and a standard deviation of 0.62. Large industry businesses also consider this approach highly important, with a higher mean of 4.21 and a lower standard deviation of 0.35.

Information Technology, in small and medium-sized businesses, information technology is considered highly important, with a mean of 3.89 and a standard deviation of 0.57. For large businesses, it is rated slightly higher, with a mean of 4.23 and a standard deviation of 0.38.

Organization Management, Small and medium-sized businesses rate the importance of organizational management as high, with a mean of 3.83 and a standard deviation of 0.71. Large industry businesses also consider this highly important, with a mean of 4.19 and a standard deviation of 0.4.

Innovation Management, this approach is viewed as highly important in both business categories, with small and medium-sized businesses showing a mean of 3.82 (S.D. 0.58) and large businesses a mean of 4.21 (S.D. 0.41).

Market Orientation, Small and medium-sized businesses rate market orientation as highly important, with a mean of 3.77 and a standard deviation of 0.76. Large businesses give a slightly higher importance rating, with a mean of 4.2 and a standard deviation of 0.44.

In summary, all approaches to creating added value are considered highly important by both small and large esports businesses, with large businesses consistently assigning slightly higher importance levels across all categories.

**Table 2. Comparison of differences in importance classified by business size, the industry overall, and by aspect.**

| <b>Approaches</b>          | <b>t-value</b> | <b>p-value</b> |
|----------------------------|----------------|----------------|
| Overall Importance Level   | -9.36          | 0.00*          |
| 1. Information Technology  | -7.07          | 0.00*          |
| 2. Organization Management | -10.87         | 0.00*          |
| 3. Innovation Management   | -8.08          | 0.00*          |
| 4. Market Orientation      | -8.05          | 0.00*          |

**Approaches**, approaches to creating added value of agro-industrial products for sustainable competition. \*Statistically significant at 0.05 level.

The structural equation model analysis results regarding approaches to creating added value through technology and the necessary skills and competencies for esports business professionals for sustainable competition indicated that the chi-square probability (CMIN- $\rho$ ) was 0.161, which is greater than 0.05. This suggests that the model was statistically insignificant. Additionally, the relative chi-square (CMIN/DF) value was 1.085, which is below the threshold of 2.00, indicating a good fit.

The goodness of fit index (GFI) was recorded at 0.941, exceeding the acceptable level of 0.90, while the root mean square error of approximation (RMSEA) was found to be 0.061, which is less than 0.08. These results indicate that all four statistical measures met the assessment criteria and are consistent with empirical data.

In conclusion, the analysis demonstrates that the proposed model for creating added value through technological advancements and skill development in the esports industry is valid and well-aligned with real-world data, supporting sustainable competition among esports business professionals. The results are illustrated in Figure 2.

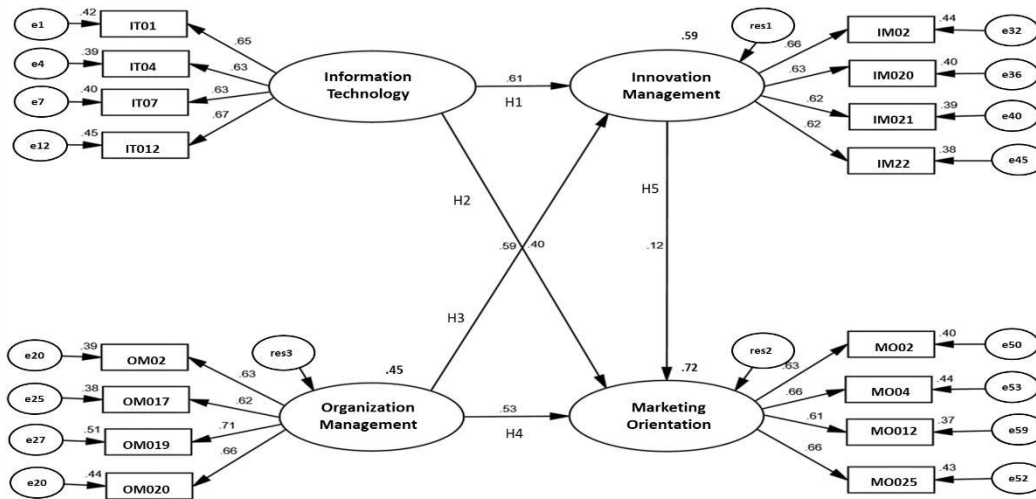


Figure 2

Structural equation model

The hypothesis testing result of 5 hypotheses to analyze the causal influence between the latent variables in the structural equation model for approaches to creating added value of agroindustrial products for sustainable competition was consistent with the set assumptions. In the context of approaches to creating added value through technology and the skills and competencies required for esports business professionals to achieve sustainable competition, the following hypotheses were tested,

H1, Information technology directly affects organizational innovation. Accept Hypothesis

H2, Information technology directly affects market orientation. Accept Hypothesis

H3, Organizational management directly affects organizational innovation. Accept Hypothesis.

H4, Organizational management directly affects market orientation. Accept Hypothesis

H5, Organizational innovation directly affects market orientation. Accept Hypothesis.

These results indicate that effective integration of information technology and strong organizational management significantly contribute to fostering innovation and enhancing market orientation within esports organizations. This, in turn, underscores the importance of these elements in creating added value and achieving sustainable competitive advantages in the rapidly evolving esports industry.

#### 4. Discussion

The findings regarding approaches to creating added value in the esports industry for sustainable competition can be discussed as follows.

1. Information Technology. In the esports sector, organizations have prioritized establishing secure access rights to sensitive data, ensuring that information is protected while allowing for efficient sharing across departments. Implementing robust backup systems is crucial to prevent data loss, and transitioning from paper-based to electronic storage has streamlined operations and reduced costs (Sawangrat, 2021). This approach not only facilitates easier data management but also fosters collaboration among team members, enhancing overall efficiency. A study by Soto et al. (2018) supports this by highlighting that technological capabilities can significantly improve organizational workflows, leading to increased creativity and innovation among personnel. The adoption of information technology enables esports organizations to

systematically store knowledge in a centralized repository, making it readily accessible for decision-making and collaboration (Ben Zammel and Najjar, 2022).

2. **Organizational Management.** Effective organizational management in esports promotes a culture of innovation and sustainability. Organizations encourage their staff to think creatively about developing sustainable practices, fostering an environment where new ideas can flourish from operational levels to executive management. Which emphasize that effective management standardizes operations and enhances teamwork in line with organizational policies. Additionally, the integration of technology into management practices generates new knowledge and facilitates more effective workflows, ultimately providing a competitive advantage (Cote et al., 2022).

3. **Innovation.** Innovation is crucial in the esports industry for improving tools and technologies used in gameplay, broadcasting, and fan engagement. Organizations continually enhance their products and services based on player and audience feedback, ensuring they remain competitive in a rapidly changing environment. Management innovations play a key role in aligning products with current market trends and consumer demands. Rambe and Khaola (2022) indicate that organizational innovation can significantly boost productivity and operational success. Furthermore, Tang et al. (2022) emphasizes that adopting innovative practices is vital for building stability and resilience in business operations. Abubakre et al. (2022)

4. **Market Orientation.** Market orientation in the esports industry involves a strong focus on understanding and meeting consumer demands, which is essential for product development and marketing strategies. This approach encourages the adoption of advanced marketing methods aimed at establishing a competitive edge. Royo et al. (2021) found that market orientation enhances organizational learning, competitive awareness, and coordination, leading to improved marketing efficiency. Moreover, Borazon et al. (2021) highlighted the importance of market orientation in cultivating strong relationships among employees, shareholders, and stakeholders, thereby contributing to economic efficiency and reducing pressures from competitors and regulatory environments. Akgun and Polat (2021) also noted that effective market orientation in branding, customer relationship management, pricing, and distribution can facilitate quicker responses to market needs.

The integration of information technology, effective organizational management, continuous innovation, and strong market orientation are critical approaches for creating added value in the esports industry, enabling businesses to achieve sustainable competition in a dynamic market.

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