FACTORS AFFECTING THE EFFECTIVENESS OF INNOVATIVE TOOLS FOR FOOD SAFETY MANAGEMENT: A CASE STUDY OF HOTEL INDUSTRIES IN THAILAND

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ABSTRACT

There are many studies of knowledge-intensive business service (KIBS) on communication technology and specialties. However, there is no study on factors affecting the efficiency of food safety management KIBS in the hotel business. The objective of this study is to consider characters that influence the capability of food safety knowledge-intensive business service in hotel business by using qualitative mixed-method from the in-depth interview of 30 hotel's stakeholders and quantitative research of 377 samples from target hotels. Data were statistically analyzed by SPSS ver.21. The result shows that factors that positively and significantly influence (alpha = 0.05) food safety management KIBS are food safety knowledge in hotels, hotel resources, hotel size, and location and development of food safety KIBS platform. This information can be used for further study of the development of knowledge-intensive business service for hotel staff.

Keywords: Food Safety Management, T-KIBS, P-KIBS, Hotel Business.

INTRODUCTION

A safety and quality management system is an important tool to enhance efficiency and add value to products and services which leverages negotiation and increase market share in food catering services. Using service from experts who have various skills to work on Knowledge-Based Management for managing data and knowledge of staffs in the organization makes the system more efficient and effective. Then Knowledge-Intensive Business Service (KIBS) was presented to respond to the business competition. Miles et al. (1995; 2018) defined the concept of KIBS as a business group that provides specialists to serve specific deep information for production such as engineering services, advertising, marketing communication, Industrial design, Audit activity, Management consulting service, and Tax audit consulting.

Due to the continuous increase of foodborne illness outbreak and pandemic of COVID-19 (Dewey et al., 2018) it affects the hotel food and beverage business which is growing as well as national and international conventions held in Thailand. The fact that the hotel could be successful depends on how good revenue is which, relies on qualified staff who respond to guests' needs. However, previous studies showed that lack of training to hotel staff can be one factor that affected foodborne illness cases in hotels (Zanin et al., 2017; Abdelhakim et al., 2018). Caccamo et al.

(2018); Wen-Hwa (2013) explained that education and internal communication within an organization are key factors that brought movement and continuous improvement of food safety. However, food safety movement and improvement were difficult because there were gaps in knowledge transfer between food and beverage operators and knowledge service providers (Ovca et al., 2014; Majowicz et al., 2015). Other challenges of food safety implementation are communication between executives and supervisors from each operational section to perform their work effectively (Bolton et al., 2008) and lack of food safety knowledge in purchasing staffs and raw material suppliers to provide good quality products which comply with standards and regulations and reasonable price (Madaki & Bavorova, 2019).

In the term "Knowledge-Intensive Business Services (KIBS)" when they are dealing with a crisis or found problems during implementation while defining as solution provider services that affect tangible things by using intangible factors such as software, information system, communication, and system management (Miles et al., 2018).

Besides, two types of KIBS were defined in the Traditional professional services (P-KIBS) with professional knowledge such as accountancy, management system, and Advertising and market research services. The other one technology-based KIBS (T-KIBS) such as IT computer, technical testing, Architectural, and engineering activities services (Landry et al., 2012).

Bettiol et al. (2015) state that P-KIBS and T-KIBS are combined to develop specific business for better performance, while Doloreux et al. (2019) explained Technology-oriented KIBS (T-KIBS) connecting with traditional professional services (P-KIBS) is an alternative for innovation management to integrate for promoting the business operations for the client.

Hence, implementing T-KIBS and P-KIBS were used as a framework to develop a complicated strategy to support managing systems, standards and regulation and also culture change which tended to increase and be more complex (Andersson & Mattsson, 2015). Hotels could not use T-KIBS and P-KIBS due to the limit of resources, manpower, time, language, and budget (Bartsch et al., 2018).

From the information above, there are gaps of research to study on factors of innovative KIBS for staff which leads to the effectiveness of implementing food safety management in the hotel business in Thailand. Therefore, the result of this study would help KIBS entrepreneurs to sustainably increase their business capability.

LITERATURE REVIEW

Knowledge-Intensive Business Services (KIBS)

Mile et al. (1995) defined Knowledge-Intensive Business Service (KIBS) as a group of business which requires specialists who are experts in specific knowledge to provide knowledgeable service to improve other organization efficiencies. Hertog (2000) analyzed the roles of KIBS in the service business. Service business innovation was explained by the 4-dimension model. He indicated that the importance of the model is not technology but a new service concept to connect with customers in various roles of five basic services as described in Weng et al. (2012). Weng defined service innovation that it is a strategic concept which entrepreneurs were interested in. Service innovation was also an important tool for success in business that leads to market expansion and increases competency in competition. Miles et al. (2018) studied and summarized the KIBS concept that Knowledge-intensive is knowledge and expertise in a specific field such as architecture, lawyer, etc. Business in KIBS included small and

large businesses, non-profit organizations, and government sectors. Service is an action that affects the change of something tangible or intangible.

H₁: Specialists and Technology-Oriented Knowledge-Intensive Business Service (T-KIBS) positively and significantly affects the efficiency of innovative hotel food safety management knowledge service provider

Food Safety Management System in the Hotel

The food safety management system in a hotel is not the only person doing all roles to control food safety throughout the food chain. Dittmer et al. (2009) explained that executives were required to take responsibility and to manage for whole food production chain, there are many departments in the hotel required to work in food safety to ensure that food is safe for customers. Wu (2012) support the study of Dittmer that food safety system in hotels depends on management system and marketing competition in terms of product quality. There is a concern about food safety management in Thailand because the foremost food risk, contaminated equipment & water supply, chemical contamination, food vendor personal hygiene concerns linked to COVID-19, and bacterial/viral contamination were issues (Takeuchi & Boonprab, 2006); (Poolklai, 2015). Therefore, the key stakeholders who are involved in the food safety management system in the context of hotel businesses are Food safety champions in hotels, Hotel suppliers, Food safety Consultants, Certification bodies, Officers from the ministry of public health, and Customers in the hotel's restaurant (Wang et al., 2011). Providing knowledge and support from the government would assist hotels to set up a food safety system more efficiently. ISO 22000 is a food safety program conducted by the International Organization of Standardization. ISO 22000 emphasizes the communication of stakeholders both internal and external interested parties on the risks information of food and control measures from the government throughout the food chain until food served to customers or service recipients. Moreover, Hotel size, location, and resources are factors influencing the implementation. Inadequate facility and lack of prerequisite programs were also identified as barriers in the food safety management systems in hotels (Yapp & Fairman, 2006); (Wu, 2012); (Jaffee et al., 2018); (Lee et al., 2019).

H₂: Roles, responsibility, and food safety management in an organization positively and significantly affect the efficiency of innovative hotel food safety management knowledge service providers.

H₃: Hotel resource, size, and location positively and significantly affect the efficiency of innovative hotel food safety management knowledge service providers.
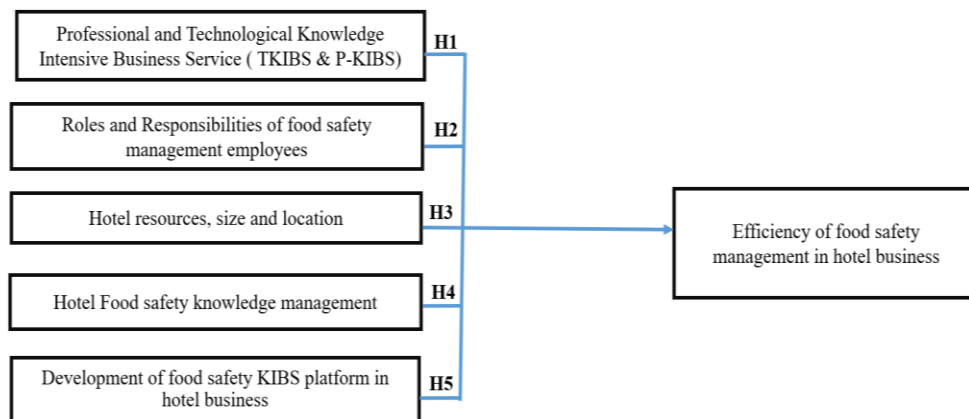
Innovation in Servicing Knowledge

Kang and James (2004) mentioned that important dimensions of service quality consisted of technical quality and functional quality. Professions and skills of the service provider are keys that customers perceive through the quality of service. This study also aligned with the study from Pace and Miles (2019) who explained that collaboration affected knowledge absorptive capacity and forms of interaction varied by relevant objectives of a knowledge management system which is an important factor for hotel customers. The study indicated that selecting specialists or specific service providers could escalate financial performance (Espino-Rodríguez et al., 2017). Innovative knowledge provider through communication technology applications from the various database, decision support system, online search engines, specialist networks, emails, and telecommunication are helping tools to create knowledge management in terms of exchanging tacit and explicit knowledge in process of work among hotel executives (Okumus, 2013) To achieve

goals, hotels should plan and describe how to develop staff performance by concerning roles and responsibility of them which are key factors. The interaction between KIBS providers and hotel administrators is important because it can provide technical service innovation through explicit knowledge and by transferring tacit Knowledge (Miles et al., 1995). Consequently, a KIBS provider requires the technical consultant (P-KIBS) to deliver services across relevant stakeholders or hotel administrators who are responsible for a committee in the hotel that is positively related to the effective implementation of a food safety management system (Fotopoulos et al., 2009). However, implementing a food safety management system and providing food safety knowledge to prevent food poisoning outbreak is the cost consuming that affects business margin (Bartsch et al., 2018) Providing knowledge to staffs cannot sustain knowledge, skills, and attitude but communication and trust are essential to developing knowledge and performance of hotel staff. Facilitation of knowledge management is also important for performance continuous improvement (Caccamo et al., 2018). Wong French and Wickham (2016) also mentioned that challenges of knowledge management in hotel staff are lack of quality management knowledge, struggles when hotels train local staffs to adapt themselves to organization culture, and the limitation of recruiting skilled staff in organization and labor market. In the matter of food safety knowledge management, teaching methods, and sufficiency of food safety training, there are other challenges to improve food safety culture in hotels (Tuncer & Akoğlu, 2020) shows in Figure 1.

H₄: Food safety knowledge management in hotels positively and significantly affects the efficiency of innovative hotel food safety management knowledge service providers.

H₅: Forms of innovative knowledge service provider positively and significantly affect the efficiency of innovative hotel food safety management knowledge service provider.

(Source: Researchers proposed)

FIGURE 1
RESEARCH MODEL FOR STUDY FACTORS AFFECTING THE EFFECTIVENESS OF INNOVATION IN SERVICING FOR FOOD SAFETY MANAGEMENT EMPLOYEES
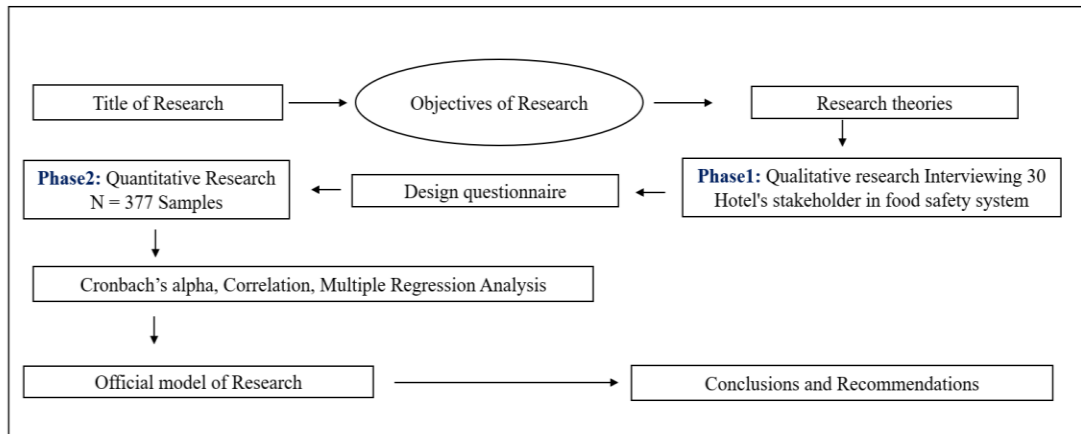
FIGURE 2
RESEARCH PROCESSING

Figure 2 shows the processing of research methodology with a mixed-method study both of qualitative language and quantitative, technical for collecting data and analysis (Creswell, 1999). The study divides into 2 phases which are described as follows;

Phase 1: Data were collected by in-depth interviewing with 30 hotel food safety stakeholders in Thailand who are involved with hotel food safety management and aware of the hotel food safety management situation under this study. It consists of two Food safety consultants from KIBS providers, 16 food safety control staff, two hotel suppliers, two Certification bodies (CB) auditors, four officers from the ministry of public health, and four customers in the hotel's restaurant. Each interview took place around 60 minutes. Interview data were analysed to derive useful insights into deciding the research population size and questionnaire design (Hair et al, 1998). Thus, factors and feedback received from the in-depth interview were used to design the questionnaire.

Phase 2: The data was verified validity and reliability by the specialist's verification. The verified tool was tried out with a sampling group (30 people) then it was tested accuracy by calculating Cronbach's alpha coefficient and analyzed observed factors for target hotels staffs in Thailand (377 samples) who are relevant to hotel food safety management. The researcher surveyed and collected data from December 2019 to June 2020 in Bangkok and other provinces in Thailand. Data was collected in form of a Likert scale structured questionnaire and then analyzed statistically by SPSS program package Version 21 (George and Mallery, 2010) for dependent and independent factor correlation analysis and stepwise multiple regression analysis. These analyses were used to determine significant factors and create a loading factor model of each factor.

RESULTS

Phase 1: Result of an in-depth interview on factors affecting the efficiency of food safety management in the hotel business.

Baser et al. (2017); Rossi et al. (2017) explained factors that relate to the hotel food safety management system; standard and regulations, skills and knowledge of hotel staffs, Knowledge-Intensive Business Service and target customer. Therefore, in-depth interview, the data are

analyzed as follows 4 hypothesizes of hotel food safety stakeholders which could be summarized as below.

Thirty interviewees give priority to P-KIBS, T-KIBS, digital platforms, and big data to develop a food safety management system in the hotel business more efficiently and effectively. Food safety specialists give certain information to the executive team that helps them to make a good final decision for the food production and service team (Hoffmann et al., 2007). Digital platform motivates all stakeholders in terms of good collaboration and develops flexible communication to the team (McBride et al., 2019).

Twenty of Thirty interviewees mentioned hotel's policy and food safety management strategy from executives, review and follow up meeting of food safety management in the hotel, yearly plan of food safety training for hotel staff and also verification plan for food sampling as back up information when there is food poisoning allegation occurs in the hotel. Executives should have visions, missions, and clear strategic plan of food safety management for hotel staffs (Wang, Hung, and Li (2011); Wu (2012).

All interviewees explained that hotel location affected the quality of food safety management and hygiene. They mentioned the challenge of hotels located in tourism provinces and highly contagious areas that it is difficult in aspects of sourcing quality of raw material, human resources, and communication technology that hotel staffs can use in food safety management and hygiene. Hotels which are located in a place where good transportation and good raw material supply chain provided would help the hotel to produce and provide safe food more efficiently Wu (2012); Jaffee et al. (2018).

Fifteen of Thirty interviewees mentioned about training plan of food safety management system which are GMP, HACCP, and/or ISO22000:2018. Yearly food safety training plan from specialists is an essential tool to implement a food safety system successfully Wang, Hung, and Li (2011); Kwon et al. (2014). International food safety training (ServSafe, CIEH, etc.) were also mentioned supervisor food safety training to control operational staff to perform better in hotel food safety practices is fundamental to implement food safety system in hotels (Kwon, et al. (2014).

Twenty of Thirty interviewees suggested that food safety KIBS in Thailand should be created in forms of knowledge integration of various specific field expertise with effective communication system and transferring information. Hotel staff would like to use an interactive platform that is easy to use, convenient, and fast such as using an online messaging application (LINE, WhatsApp, etc.). The promptness of IT and digital platform helped to manage food safety system in hotels more conveniently Sirirak et al. (2011); Greis and Nogueira (2017); Rodríguez et al. (2018).

Phase 2: Results of quantitative study on factors affecting the efficiency of food safety management in the hotel business.

Data from an in-depth interview with hotel food safety stakeholders would be used to create a questionnaire and quantitative survey of phase 2: factors affecting the KIBS platform. The content validity was assessed by using the Index of Item-objective Congruence, the questionnaire was evaluated by 7 experts on the score range from -1 to +1. The questionnaire was also tested with 30 hotel food safety stakeholders that were not in the sample group. Table 1 summarizes the reliability value was examined by using statistical analysis Cronbach's alpha (George and Mallery, 2010). This is to confirm that the questionnaire has high quality and consistency within the factors according to the study objective. In this phase, a total of 377 questionnaires were distributed to hotel food stakeholders in Thailand.

Table 1
RELIABILITY OF QUESTIONNAIRE

Factors	Cronbach's alpha
Expertise and technology in KIBS (A)	0.899
Roles and duties in hotel food safety management (B)	0.902
Hotel Food safety knowledge management (C)	0.916
Hotel resources, size, and location (D)	0.836
Development of food safety KIBS platform in the hotel business (E)	0.950
The efficiency of food safety management in the hotel business (Y)	0.808

Table 2
THE AVERAGE SCORE, STANDARD DEVIATION AND KOLMOGOROV-SMIMOV OF FACTORS AFFECTING THE EFFECTIVENESS OF INNOVATION IN SERVICING FOR FOOD SAFETY MANAGEMENT EMPLOYEES IN THAILAND

Factors	$\bar{x}$	SD	Kolmogorov-Smirnov
Expertise and technology in KIBS (A)	3.85	0.699	0.085
Roles and duties in hotel food safety management (B)	4.11	0.608	0.061
Hotel Food safety knowledge management (C)	4.02	0.687	0.093
Hotel resources, size, and location (D)	4.08	0.551	0.079
Development of food safety KIBS platform in the hotel business (E)	4.08	0.811	0.061
The efficiency of food safety management in the hotel business (Y)	3.29	1.148	0.075

From Table 2, the average score ($\bar{x}$) of factors are in the range of 3.85 to 4.11, Expertise and technology in KIBS (A) has the lowest average score at 3.85 while Roles and duties in hotel food safety management (B) shows the highest average score at 4.11. On the other hand, the Standard deviation is in the range of 0.551 to 1.148, Hotel resources, size and location (D) has the lowest average score at 0.551 while Efficiency of food safety management in the hotel business (Y) shows the highest average score at 1.148. Moreover, all factors' values of Kolmogorov-Smirnov were all above 0.05 indicated that each factor met the normality standard for ongoing regression analysis.

Table 3
THE CORRELATION OF INDEPENDENT AND DEPENDENT FACTORS AFFECTING THE EFFECTIVENESS OF INNOVATION IN SERVICING FOR FOOD SAFETY MANAGEMENT EMPLOYEES IN THAILAND

Factors	Factors affect the efficiency of KIBS for food safety management employees					Y
	A	B	C	D	E	
Expertise and technology in KIBS (A)	1	0.001	0.009	0.060	0.036	0.303
Roles and duties in hotel food safety management (B)		1	0.071	0.039	0.040	0.143
Hotel Food safety knowledge management (C)			1	0.215	0.086	0.418*
Hotel resources, size, and location (D)				1	0.228	0.455**
Development of food safety KIBS platform in the hotel business (E)					1	0.486**

*$p <= 0.05$, **$p<=0.01$

From Table 3, Expertise and technology in KIBS (A) was not significantly associated with Roles and duties in hotel food safety management (B), Hotel Food safety knowledge management (C), Hotel resources, size and location (D), Development of food safety KIBS platform in the hotel business (E). Roles and duties in hotel food safety management (B) was not significantly associated with Hotel Food safety knowledge management (C), Hotel resources, size and location (D) Development of food safety KIBS platform in the hotel business (E). Also, Hotel Food safety knowledge management (C) was not significantly associated with Hotel resources, size, and location (D), Development of food safety KIBS platform in the hotel business (E). Therefore, we could prevent our regression formula against multicollinearity problem. As predicted, efficiency of food safety management in the hotel business (Y) was significantly and positively correlated with Hotel Food safety knowledge management (C), Hotel resources, size and location (D), Development of food safety KIBS platform in the hotel business (E).

Table 4
SUMMARY OF MULTIPLE REGRESSION MODELS

Factors	Model 1	Model 2
	Coefficient	Coefficient
Constant (β_0)	2.648**	2.152**
Hotel Food safety knowledge management (C)		0.842**
Hotel resources, size, and location (D)	0.786**	0.615*
Development of food safety KIBS platform in the hotel business (E)	0.839**	0.851**
Coefficient of Multiple Determination (R2)	0.284	0.352
Adj. R^2	0.280	0.345
SEE	0.535	0.415
F	31.446**	66.629**

*$p <= 0.05$, **$p <= 0.01$*

Table 4 summarizes the results of different multiple regression models proposed. As can be observed, Model 2 is a better fit with the obtained data than Model 1 with the statistically significant coefficients. R-squared = 0.352 (Adjusted R-square = 0.345) is generally considered non-big effect size. Nevertheless, the factor involved, there is a value F= 66.629 at a significant level (alpha = 0.01). (Hoyt, Leierer and Millington, 2006). Additionally, t-test statistics show that each independent factor is statically significant (alpha = 0.05 or 0.01). So that the results obtained can be interpreted that had significant positive regression weights for the three variables (C, D, E) and one constant in Model 2 as follows:

$$Y = 2.152 + 0.842*C + 0.615*D + 0.851*E$$

In this equation, Y (Efficiency of food safety management in the hotel business) is the predicted score on three dependent variables, Hotel Food safety knowledge management (C), Hotel resources, size and location (D), and Development of food safety KIBS platform in the hotel business (E)

CONCLUSION

The study shows that factors affecting hotel food safety KIBS are hotel resources, hotel size, and location, KIBS of food safety in hotels, and KIBS platforms. Those three factors can be described from the correlation equation and used to develop KIBS innovations for target customers who want to improve the food safety management system efficiency. These factors can be used to develop a hotel food safety KIBS platform to prevent innovative service failure from external factors (Janssen et al., 2012).

The results additionally confirm most of the hypotheses put forward. Thus, we statistically accepted Hypotheses H3, H4 and H5. On the contrary to the prediction, Hypotheses, H1 and H2 are not statistically accepted based on the acquired data from the questionnaire.

DISCUSSION

The study of factors affecting food safety knowledge service providers for hotel staff unveils vital characters and implementation of KIBS theory to improve the efficiency of food safety practice. Food safety knowledge management, resources, hotel size, location, and innovative technology platforms are key factors of innovative food safety knowledge service providers in the Thai hotel business. However, in Roles and duties in hotel food safety management, the obtained effect is lower or no significant statistically. Food safety management employees from companies that employed seasonal workers indicated in staff turnover rate as a challenge (Wilcock et al., 2011) Therefore, Appropriate training service would create motivation to attend training (Jaffee et al., 2018) and improve their performance relate to relevant staff in the process (Doroshenko et al., 2013).

Furthermore, this study also contributes to explaining part of the integration of Expertise (P-KIBS) and technology (T-KIBS). Both two types of KIBS connect knowledge, understanding, and relationship with all hotel stakeholders. There are some additional research results supporting that the integration of Expertise (P-KIBS) and technology (T-KIBS) is differentiating features of KIBS services and affect their ability to success (Rodríguez et al., 2018). Also, Both P-KIBS and T-KIBS are the role of the client an external source of cooperation for innovation in specific KIBS sub-sectors (Freel, 2006); (Doloreux et al., 2019).   It helps to carry forward hotel staff to apply and implement a food safety management system in hotels more effectively. T-KIBS can be promoted new technology implementation and developing complex engineering or IT solutions (Miozzo & Grimshaw 2011) while P-KIBS may help the relationship between attitudes and food safety knowledge (Ko, 2013). In addition, we can see that expertise in KIBS technology is not as important as the appropriate utilization of KIBS as a platform to promote efficiency in food safety management resulting in higher level of successful food safety performance.

As highlighted above, the food safety service platform is one of the main sources of knowledge advantage that a hotel can have nowadays; hence, the hypotheses of the study were focused on factors of innovative KIBS are linked to the effectiveness of implementing food safety management in a hotel.

LIMITATIONS AND RECOMMENDATIONS

This study focused on innovative knowledge intensive business service of food safety management in hotel staff. Further research should focus on other aspects that may affect this innovation, such as environmental management, power management in hotel staff. Scope of

research population is another challenge; this research population was 4-5-star, not including 2-3 stars hotels. Research data was collected before the COVID-19 pandemic occurred. Hence, there should be a post-COVID-19 pandemic study and also other hotel population which may have a different effect from the pandemic. The additional study can reveal new findings to develop and improve the hotel food safety KIBS platform.

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