

TEAM KNOWLEDGE SHARING: A GAME-BASED LEARNING APPROACH

N. B. H. Phung

*Thu Duc City People's Committee, Ho Chi Minh City, Vietnam.
E-mail: nbhphung.tpthuduc@tphcm.gov.vn*

T. Q. Dung

*Ho Chi Minh City University of Technology (Hutech), Ho Chi Minh City, Vietnam.
E-mail: tq.dung@hutech.edu.vn*

N. T. Duong*

*Ho Chi Minh City University of Economics and Finance (UEF), Ho Chi Minh City, Vietnam.
E-mail: tiendn@uef.edu.vn*

** Corresponding author*

Abstract. *Introduction.* Business simulation games that have been widely used in teaching in recent years have been proven to help students develop teamwork and problem-solving skills.

Aim. The current research *aims* to assess how team cohesion and knowledge sharing attitudes relate to organisational climate and knowledge sharing (KS) intentions.

Methodology and research methods. Through the use of a game-based team learning environment, this study examined the students' attitudes and intentions regarding KS. As part of the study, questionnaires were also administered to 202 students at business colleges in Ho Chi Minh City, Vietnam. Bootstrapping estimation was used to test all hypotheses using a structural equation model (SEM).

Results. The research findings showed that (1) organisational climate positively influenced team cohesion, as well as KS attitudes positively influencing KS intentions; (2) organisational climate was positively related to KS attitudes and intentions; (3) team cohesion was positively associated with KS attitudes and intentions; and (4) a significant relationship exists between organisational climate and KS intentions through the mediation of team cohesion and KS attitudes.

Scientific novelty. The study helps to examine the relationships between the four variables that have been done before.

Practical significance. The research findings suggest that teachers should establish grading standards and encourage students to express their opinions. In addition, it is crucial to create a good atmosphere and enhance cohesion in the class so that they can trigger students' KS attitudes and intentions.

Keywords: organisational climate, team cohesion, knowledge sharing attitudes, knowledge sharing intentions.

For citation: Phung N. B. H., Dung T. Q., Duong N. T. Team knowledge sharing: A game-based learning approach. *Obrazovanie i nauka = The Education and Science Journal*. 2023; 25 (10): 133–152. DOI: 10.17853/1994-5639-2023-10-133-152

ОБМЕН ЗНАНИЯМИ В КОМАНДЕ: ИГРОВОЙ ПОДХОД К ОБУЧЕНИЮ

Н. Б. Х. Пхунг

Городской народный комитет Тху Дука, Хошимин, Вьетнам.
E-mail: nbhphung.tpthuduc@tphctn.gov.vn

Т. К. Дунг

Хошиминский городской технологический университет, Хошимин, Вьетнам.
E-mail: tq.dung@hutech.edu.vn

Н. Т. Дуонг

Городской университет экономики и финансов Хошимина, Хошимин, Вьетнам.
E-mail: tiendn@uef.edu.vn

Аннотация. *Введение.* Было доказано, что игровые бизнес-симуляторы, которые широко используются в преподавании в последние годы, помогают студентам развивать командную работу и навыки решения проблем.

Цель исследования – оценить, как сплоченность команды и отношение к обмену знаниями связаны с намерениями создавать организационный климат и обмениваться знаниями.

Методология, методы и методики. Используя игровую среду обучения, авторы изучили отношения и намерения студентов, касающиеся обмена знаниями. В рамках исследования анкеты были направлены 202 студентам бизнес-колледжей в Хошимине, Вьетнам. Оценка методом бутстрепа использовалась для проверки всех гипотез с использованием модели структурных уравнений (SEM).

Результаты. Результаты исследования показали, что: 1) организационный климат положительно повлиял на сплоченность команды, а также на отношение к обмену знаниями, позитивно воздействующее на намерения обмениваться знаниями; 2) организационный климат был положительно связан с отношением к обмену знаниями и намерениями обмениваться знаниями; 3) сплоченность команды была положительно связана с отношением к обмену знаниями и намерениями обмениваться знаниями; 4) существует значительная связь между организационным климатом и намерениями обмениваться знаниями через посредничество сплоченности команды и отношения к обмену знаниями.

Научная новизна. Исследование помогает изучить взаимосвязи между четырьмя переменными, которые были упомянуты выше.

Практическая значимость. Результаты исследования показывают, что преподаватели должны устанавливать стандарты оценивания и побуждать учащихся выражать свое мнение. Кроме того, крайне важно создать хорошую атмосферу и повысить сплоченность в классе, для того чтобы формировать положительное отношение к обмену знаниями и намерения студентов использовать эти навыки.

Ключевые слова: организационный климат, сплоченность коллектива, отношение к обмену знаниями, намерения обмениваться знаниями.

Для цитирования: Пхунг Н. Б. Х., Дунг Т. К., Дуонг Н. Т. Обмен знаниями между группами: игровой подход к обучению // Образование и наука. 2023. Т. 25, № 10. С. 133–152. DOI: 10.17853/1994-5639-2023-10-133-152

INTERCAMBIO DE CONOCIMIENTOS EN EQUIPO: UN ENFOQUE DE APRENDIZAJE BASADO EN JUEGOS

N. B. H. Phung

*Comité Popular de la ciudad de Thu Duc, Ciudad Ho Chi Minh, Vietnam.
E-mail: nbhphung.tpthuduc@tphcm.gov.vn*

T. Q. Dung

*Universidad Tecnológica de la ciudad de Ho Chi Minh, Ciudad Ho Chi Minh, Vietnam.
E-mail: tq.dung@hutech.edu.vn*

N. T. Doung

*Universidad de Economía y Finanzas de la ciudad de Ho Chi Minh, Ciudad Ho Chi Minh, Vietnam.
E-mail: tiendn@uef.edu.vn*

Abstracto. Introducción. Se ha demostrado que las simulaciones de negocios basadas en juegos, que se han utilizado ampliamente en la enseñanza en los últimos años, ayudan a los estudiantes a desarrollar habilidades de trabajo en equipo y resolución de problemas.

Objetivo. El propósito del estudio es evaluar cómo la unidad del equipo y las actitudes de intercambio de conocimientos se relacionan con el clima organizacional y las intenciones de compartir conocimientos.

Metodología, métodos y procesos de investigación. Utilizando un entorno de aprendizaje basado en juegos, los autores examinaron las actitudes e intenciones de intercambio de conocimientos de los estudiantes. Como parte del estudio, se dirigieron cuestionarios a 202 estudiantes de facultades de negocios en la ciudad de Ho Chi Minh, Vietnam. Se utilizó la estimación Bootstrap para probar todas las hipótesis mediante el modelado de ecuaciones estructurales (SEM).

Resultados. Los resultados del estudio mostraron que: 1) el clima organizacional tuvo un efecto positivo en la unidad del equipo, así como en las actitudes hacia el intercambio de conocimientos, lo que influyó positivamente en las intenciones de compartir conocimientos; 2) el clima organizacional se asoció positivamente con las actitudes y las intenciones de compartir conocimientos; 3) la unidad del equipo se asoció positivamente con las actitudes y las intenciones de compartir conocimientos; 4) Existe una relación significativa entre el clima organizacional y las intenciones de compartir conocimientos a través de la mediación de la unidad del equipo y las actitudes de intercambio de conocimientos.

Novedad científica. El estudio ayuda a explorar las relaciones entre las cuatro variables mencionadas anteriormente.

Significado práctico. Los resultados del estudio sugieren que los profesores deberían establecer estándares de evaluación y animar a los estudiantes a expresar sus opiniones. Además, es fundamental crear un buen ambiente y aumentar la unidad en el aula para desarrollar actitudes positivas hacia el intercambio de conocimientos y las intenciones de los estudiantes de utilizar estas habilidades.

Palabras claves: clima organizacional, unidad del equipo, actitudes hacia el intercambio de conocimientos, intenciones de intercambio de conocimientos.

Para citas: Phung N. B. X., Dung T. Q., Doung N. T. Intercambio de conocimientos en equipo: Enfoque de aprendizaje basado en juegos. *Obrazovanie i nauka = Educación y Ciencia*. 2023; 25 (10): 133–152. DOI: 10.17853/1994-5639-2023-10-133-152

Introduction

Knowledge has become a source of accumulated capital and innovation capabilities among enterprises [1, 2]. The most valuable asset of the 21st century is the productivity of knowledge workers [3], and how managers can make knowledge workers willing to dedicate themselves to the organisation and stay in the organisation for a long time has become an important topic. Suppose enterprises want to transfer and utilise knowledge capital in the organisation effectively. In that case, they must strengthen the added value of knowledge, improve the quality and quantity of knowledge within the organisation, enterprises rich in high creativity can innovate products and services, and the process of knowledge accumulation will also improve productivity and performance [4]. Knowledge management has thus become the key to maintaining a competitive advantage for organisations in recent years [5].

Knowledge management must depend on effective knowledge sharing (KS). C. L. Witherspoon et al. [6] mentioned that KS is the cornerstone of business success. KS is the knowledge transfer between individuals, groups, and organisations [7, 8]. However, organisations cannot create knowledge on their own because knowledge is stored in individuals, and the knowledge of organisations is shared among their members through internal members [9]. According to the Theory of Reasoned Action (TRA) [10], individual attitudes towards specific behaviour determine behavioural intentions, and behavioural intentions determine individual behaviours. Many scholars have used attitudes and intentions to validate KS behaviours [11–13]. This study uses KS attitudes and intentions as variables to deduce that attitudes and intentions are important factors influencing KS behaviour.

This study shows differences in research results in the context of the study that students are expected to have a high interest in learning and can feel the process of interacting with others, and game learning is an interactive way of knowledge exchange [14, 15]. The results of previous studies found that games can increase the willingness to learn and interact with students [16]. Students' motivation and learning effectiveness have increased through the use of business simulation games in recent years [17, 18]. Because game-based learning creates a better learning environment and intrinsic motivation [19], from a student's perspective, instructional simulation games are more likely to trigger students' learning motivation than textbook contents [20]. Students' motivation to learn is increased through simulation games and opportunities for learning are increased [16]. Teamwork, data analysis, problem-solving, decision-making, and communication skills are among the skills students believe can help them organise and apply new skills in the future workplace [21]. They can understand the basics of business management and the effective use of resources [21, 22].

However, much of the research is focused on the learning benefits of simulation games [15, 23] but not on KS behaviours. This is a research gap in this area. So this study aims to fill this research gap. The research subjects were mainly business school students, and the online business warfare simulation game was used as a

group team task. Each group simulates the store's operation in the classroom, and the decision-making content includes purchases, marketing methods, pricing, etc. The system will rank the business according to the decisions of each group, adopt the non-compete mode to increase the authenticity, and simulate the actual store operation during the game process to explore the students' attitudes and intentions in participating in the process of KS.

This study aims to gain a closer understanding of the factors that influence KS among members of an organisation. According to Social Cognitive Theory [24], individual behaviour is caused by the interaction of personal traits and environmental factors, and the members of the organisation achieve learning effects through the behaviour of others and the organisational environment. The organisational climate is the individual's direct or indirect perception of the environment, which will affect the attitude and value of members and will trigger other behavioural motivations such as improving work performance [25, 26]. Thus, it also influences an individual's KS behaviours [12, 27, 28]. In this study, organisational climate is defined as a student's organisational climate for the team within the playgroup. Organisational climate has a direct and significant impact on team cohesion, and it also has an indirect impact on team cohesion through organisational commitments; when team members with a high degree of cohesion interact well, the organisation will have a higher centripetal force [29]. Therefore, each other will be more willing to share and learn and have a solid social identity, motivating team members to help and contribute to the team [30]. In addition, members are more willing to share information and knowledge [31, 32]. However, research on team cohesion is mainly aimed at sports, studying the impact of team cohesion between athletes and teams. There is also relatively little research on organisational climate and team cohesion [26]. This study intends to increase the study of organisational climate and team cohesion in simulated game learning scenarios to fill the second research gap. Therefore, organisational climate is an essential factor affecting team cohesion, and these two variables are important variables that affect KS attitudes and intentions, so they are included in this study.

Past research was conducted on the impact of climate on KS attitudes and intentions in organisations [12, 27, 28], but mostly use KS attitudes as a mediator to explore the influencing factors of KS [11, 12, 27, 28, 33]. No research framework explores the remote mediating effects of organisational climate on KS intentions, mediated by team cohesion and KS attitudes.

Therefore, based on the above research background and motivation, and referring to the rational behaviour theory proposed by M. Fishbein and I. Ajzen [10], and the social cognition theory of A. Bandura [24], this study aims to understand: (1) whether the two variables of team cohesion and KS attitude have a mediating effect between organisational climate and KS intention; (2) whether the organisational climate affects the intention of KS through team cohesion; (3) whether the organisational climate in the organisation affects the intention of KS through the attitude of KS; (4) whether the organisational climate in the organisation will affect the intention of KS through team cohesion and KS attitudes.

Literature Review

Organisational Climate and Team Cohesion

Social Cognitive Theory can be used to interpret the relationship between behaviour, environment, and person [24], and the behaviour of individuals can be regarded as the interaction of personal traits and environmental factors. That is, human beings will achieve learning effects through the behaviour and results of others. For example, if members of the group are encouraged by the organisation to innovation and openness, other members will observe these results and act in the future. Therefore, individual behaviour will be affected by the interaction of the environment and will change the behaviour of others and organisations.

Organisational climate can define an individual's direct or indirect perception of the environment in a given environment, which affects the attitudes and values of organisational members and triggers other behavioural motivations, such as job performance, productivity, etc. [25, 26]. Organisational managers can use the organisational climate to grasp members' behavioural motivations and influencing factors, which cannot only improve management effectiveness and efficiency but also effectively achieve organisational goals [34]. Cohesion is the dynamic process of group members working closely together to pursue goals and ideals [35]. Research shows that team cohesion can improve employee identity, morale, and satisfaction [29, 36] and influence productivity and performance [29, 37].

According to the social cognition theory, individuals will influence behaviour because of their perception of the environment. Team members learn the role model of supervisors and colleagues through social learning [24]. Therefore, if the members are in a team with high cohesion and interact well with others, the team will have a more heightened sense of centripetal force and belonging. Therefore, the team members will be more willing to share and learn from each other. The members who belong to the high team cohesion have a solid social identity, which will prompt the team members to be willing to help and contribute to the team [30]. The better the team climate is, the higher the team cohesion will be. A higher organisational climate will significantly impact the organisation members' behaviour, attitudes, and morale and ultimately reflect team performance [26]. Previous studies showed that the organisational climate of players shows a clear positive relationship with team cohesion [38]. Besides, members' perceived and expected organisational culture positively correlates with team cohesion [39].

H1: There is a positive correlation between organisational climate and team cohesion.

KS Attitudes and Intentions

An individual's attitude towards behaviour is a strong predictor of the intention of that behaviour. Attitude has to do with how they perceive people, things, and the environment. The KS attitude describes an individual's perception of KS behaviour, and the intention of KS is determined by the KS attitude. An individual's attitude

towards behaviour is a reflection of how he/she views the potential consequences of engaging in a particular behaviour. The more people believe that engaging in a particular behaviour will result in positive results; the more likely it is that they will engage in that behaviour. An individual's behavioural intention is the degree to which they intend to engage in a particular behaviour, which represents their subjective likelihood of engaging in it. An individual is more likely to engage in a particular behaviour when his/her intention is more substantial.

As M. Fishbein and I. Ajzen [10] propose, an individual's behaviour is determined by his/her behavioural intentions, which in turn are determined by his/her attitudes towards specific behaviours. The focus of this study is personal inner feelings, but subjective norms refer to how other people perceive behaviour. As a result, subjective norms are omitted from the discussion, and only attitude is considered as the influence on behaviour intention. Individuals are more likely to engage in behaviour when they have a positive attitude towards it.

According to previous studies [11, 13, 40], individual attitudes appear to affect behavioural intentions when examining KS behaviours. KS attitudes, for example, refer to how people feel about KS, while KS intentions refer to how much they plan to engage in KS. In accordance with G.-W. Bock et al. [12], attitudes and intentions of organisational members towards KS are positively correlated. W. S. Chow and L. S. Chan [33] also found that positive attitudes towards KS are associated with a greater commitment to KS. The study believes that individuals' KS intentions increase if their attitude towards KS is positive.

H2: There is a positive relationship between KS attitudes and KS intentions.

Organisational Climate, KS Attitudes, and Intentions

According to social cognitive theory, individuals are influenced by the actual behaviour of the environment, so the organisational climate affects the behaviour of individuals. Therefore, when organisations encourage members to be open and transparent, they make them more willing to share information. For example, when members believe that the organisation will give fair rewards, it encourages them to be more inclined to help others and share knowledge. In addition, information sharing is also triggered if members consider themselves affiliated with a group. The group culture promotes trust and KS among members, contributing to the joint creativity and cooperation necessary for innovation. Previous studies indicated that organisational climate and enhanced leadership influenced individual attitudes towards KS, which affected individual knowledge-sharing behaviour, and thus inferred that knowledge-sharing intentions were affected [27, 28]. The results show that trust in an organisational climate influences individuals' internal and external KS behaviours.

To sum up, organisational climate internally influences individual subjective attitudes and thus KS intentions and behaviours [12, 28]. For example, A. Anand, P. Centobelli and R. Cerchione [40] pointed out that when individuals are not motivated to share knowledge and do not reciprocate it, they tend to hide and not share it with others. Conversely, when organisations reward sharing knowledge

within an organisation, people are motivated to learn from each other, leading to organisational learning.

H3: There is a positive correlation between organisational climate and KS attitudes.

H4: There is a positive correlation between organisational climate and KS intentions.

Team Cohesion, KS Attitudes, and Intentions

A study by A. C. Inkpen and E. W. Tsang [31] argues that when individuals develop friendly relationships in an organisation, there are more opportunities for knowledge exchange, which is usually generated in the organisation in person and with social capital [41]. According to the social cognitive theory mentioned above, individuals influence behaviour by perceiving the environment. According to the study by S. Zhou et al. [42], people's trust and interaction links are interconnected. Networking should be established between individuals to promote KS and transfer. That is, we should let members of the organisation perceive that they are one. When members trust each other, there will be better interaction, and good interaction with others, which will produce more team cohesion. Therefore, each other will be willing to share and learn from each other, have a strong social identity, and prompt team members to be ready to help and contribute to the team, so it will positively affect the attitude and intention of personal KS.

Y. Xue et al. [27] argued that promoting KS is of practical significance and that a cohesive innovation team and members trusting each other will have a higher level of KS. The study by S. M. Toh and E. S. Srinivas [32] showed that people are willing to share information and build trust with others when they feel that there is task cohesion in the organisation and that organisational support increases members' cohesion. S.-S. Chen et al. [28] pointed out that organisational culture influences attitude and behavioural control over KS.

H5: There is a positive correlation between team cohesion and KS attitudes.

H6: There is a positive correlation between team cohesion and KS intentions.

Mediating Effects

Social cognitive theory shows that individuals and the environment will influence each other's behaviour. A better organisational atmosphere may produce better interactions [26]. A better atmosphere increases the centripetal force of the individual on the team, and they have more opportunities for KS when they are friendly with each other [31, 43]. Therefore, when individuals perceive the level of the organisational climate, it should affect the individual's perception of team cohesion and thus influence the intention of KS. Therefore, this study explores whether team cohesion can mediate between organisational climate and knowledge-sharing intentions.

From the Theory of Reasoned Action, we can see that the behaviour and intentions of individuals are determined by their attitudes towards specific behaviours [10]. According to many previous studies, the knowledge-sharing attitude is used as a

mediator to explore the influencing factors of KS [11, 12, 28]. Therefore, this study will use “team cohesion” and “KS attitudes” as mediators of the research structure. In addition, it is necessary to explore whether knowledge-sharing attitudes in team learning will mediate the organisational climate and KS intentions.

This study uses this conceptual model proposed by S. Wang and R. A. Noe [44] to discuss remote mediation, organisational climate (environmental factors) → team cohesion (motivators) → KS attitudes → KS intentions.

H7: Organisational climate influences KS attitudes through team cohesion, which in turn affects KS intentions.

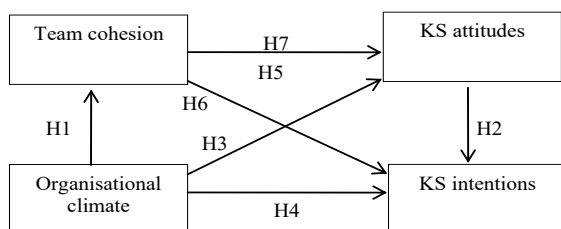


Fig. 1. Conceptual Model
Methods

Participants

In this research, students from business colleges took part in online business simulation games in the classrooms in business colleges in Ho Chi Minh City, Vietnam. For group activities, we let students form groups of 5–8 people. This research activity involved 50 groups in 5 classes.

Virtual entrepreneurship is simulated in the online business simulation game. Students can simulate starting a business in the system. There are several tasks involved in this game, including personnel management, raw material procurement, marketing strategy, and market analysis. Students’ performance in group activities was observed, and course performance was not allowed to interfere with research activities. It was explained to students before this activity that the simulation game performance would not be included in the course grade calculation. Eight to ten rounds of games were played with each group of students for 15–20 minutes.

Questionnaire Delivery

Course activities were used to deliver questionnaires in this study. Using an online simulation game, this study must be presented to classroom game participants. Identities of respondents and rates of correct answers are checked to ensure that they align with subjects being tested. To ensure excellent answering status, we distributed paper questionnaires and collected them on the spot. Between 25 December 2021 and 08 January 2022, questionnaires were delivered and recovered. A total of 257 paper questionnaires were delivered in batches over the course of five courses. Invalid questionnaires with poor answers were deducted after

manual inspection. We obtained 202 valid questionnaires, and the effective recovery rate was 78.60%.

Measurements

Organisational climate. In this study, the organisational climate is that students perceive within a playgroup. The scale items used in this study were developed by G. W. Bock and Y.-G. Kim [11]. According to the scale items, there are three potential variables: sense of belonging, innovation, and fairness. Some of the items are modified according to the context of the study. A Likert 7-point scale was used, with 9 items (1 – strongly disagrees, 7 – strongly agrees).

Team cohesion. The scale items were developed by G. H. Dobbins and S. J. Zaccaro [45]. Modifications were made based on the context of the study. Using a Likert 7-point scale (1 – strongly disagrees, 7 – strongly agrees), 8 items were measured.

KS attitudes. G. W. Bock et al. [11–12] developed scale items and we used them in this study. Some of the items were modified according to the context of the study. A Likert scale measuring 7 points (1 – strongly disagrees, 7 –strongly agrees) is used with 5 items.

KS intentions. We used scale items by G. W. Bock et al. [11–12]. The items are modified according to the study's context. With a total of five items, the Likert 7-point scale is used to measure the response.

Results

Descriptive Statistics

This study contains 202 valid questionnaires. Due to the fact that all the participants were college students, only the gender of the participants was surveyed. The valid questionnaires had 61 males (30.2%) and 141 females (69.8%).

Correlation Analysis

In order to determine the relationship between the two variables, Pearson's correlation coefficient was used. Overall, the mean ranged from 5.195 to 5.859, and the standard deviation ranged from 0.909 to 1.133. Between -1 and 1, the Pearson coefficient measures the degree of correlation between two variables. In correlation analysis, organisational climate, team cohesion, KS attitudes, and KS intentions were positively correlated, with correlation coefficients ranging from 0.471 ($p < .01$) to 0.806 ($p < .01$).

Table 1
Descriptive statistics and correlation analysis

	Mean	SD	1.	2.	3.	4.
Organisational climate	5.499	1.133	0.837			
Team cohesion	5.378	0.929	0.806**	0.874		
KS attitudes	5.859	0.909	0.471**	0.516**	0.823	
KS intentions	5.195	0.910	0.474**	0.549**	0.562**	0.845

Note: * $p < .05$; ** $p < .01$

Confirmatory Factor Analysis (CFA)

The normal recommended factor loading is 0.5, and 0.6 is higher than the recommended value [47]. The question is not representative if it is less than 0.5. This item should be removed. As a result, team cohesion 3 (TC3) with a factor loading of 0.47 and KS intentions 4 (KI4) with a factor loading of 0.42 were deleted (Table 2).

Reliability analysis

Cronbach's alpha tests the consistency of the measurement variables of each construct and takes into account Construct Reliability (CR) [48]. In Table 2, all four potential variables have CR values over 0.79, indicating good reliability for the research model. A Cronbach's value greater than 0.7 is also considered sufficient [50]. Table 2 shows that the Cronbach's alpha varies between 0.78 and 0.93 for our four latent variables, all of which are greater than 0.7, indicating that the model is reliable.

Table 2

CFA, reliability, and validity analysis

Constructs	Items	Factor loadings	Cronbach's alpha	CR	Average variance extracted (AVE)
Organisational climate	Sense of belonging	0.834	0.781	0.793	0.569
	Innovation	0.546			
	Fairness	0.844			
Team cohesion	TC1	0.504	0.886	0.894	0.559
	TC2	0.529			
	TC4	0.624			
	TC5	0.852			
	TC6	0.764			
	TC7	0.938			
	TC8	0.892			
	KS attitudes	KA1			
KA2		0.743			
KA3		0.885			
KA4		0.850			
KA5		0.869			
KS intentions	KI1	0.801	0.889	0.893	0.677
	KI2	0.819			
	KI3	0.920			
	KI5	0.741			

Validity Analysis

Convergent validity was tested using the average variance extracted (AVE). The AVE measures how well the latent variable can explain the variation in the observation index. Hence, a higher mean-variance extraction indicates a higher convergent validity. A convergent validity criterion [47] states that the average variance extraction estimator (AVE) should be greater than 0.5 (Table 2). There is more than 0.5 significance for each latent variable, so the model is valid.

Common Method Variance (CMV)

Recently, previous studies suggested that Confirmatory Factor Analysis (CFA) should be verified with CMV. Therefore, we used Harman's one-factor for testing. The results showed a first principle component of 43.279%, less than 50% represented no significant common method variation. In addition, the CFA comparison method is also used to test again. The results showed that the four-factor model ($\chi^2 = 275.667$, $df = 146$, $\chi^2/df = 1.888$, GFI = 0.880, AGFI = 0.843, RMSEA = 0.066) is superior to the one-factor model ($\chi^2 = 1169.995$, $df = 152$, $\chi^2/df = 7.697$, GFI = 0.518, AGFI = 0.398, RMSEA = 0.183), which indicates that this architecture does not have serious CMV problems.

Structural Model Fit

The model fit index evaluates whether the research model is compatible with the collected data to confirm its compatibility. To measure overall model fit, this study uses absolute and incremental fit metrics [49] (Table 3).

Table 3

Structural model fit

Statistical test	Results	Standard indices of model fit
χ^2/df	1.888	< 3
GFI	0.880	> .80
AGFI	0.843	> .80
RMSEA	0.066	< .10

Structural Equation Modelling (SEM)

SEM was used to verify the hypothesis.

H1: Cohesion and organisational climate are correlated with 0.834, $p < 0.001$. As a result, hypothesis 1 can be accepted.

H2: Intentions and attitudes in KS are correlated with 0.644, $p < 0.001$. As a result, hypothesis 2 can be accepted.

H3: Organisational climate is positively correlated with KS attitudes by 0.486, $p < 0.001$. As a result, hypothesis 3 can be accepted.

H4: Organisational climate is positively correlated with KS intentions by 0.455, $p < 0.001$. As a result, hypothesis 4 can be accepted.

H5: Team cohesion is positively correlated with KS attitudes by 0.389, $p < 0.001$. As a result, hypothesis 5 can be accepted.

H6: Team cohesion is positively correlated with KS intentions by 0.468, $p < 0.001$. As a result, hypothesis 6 can be accepted.

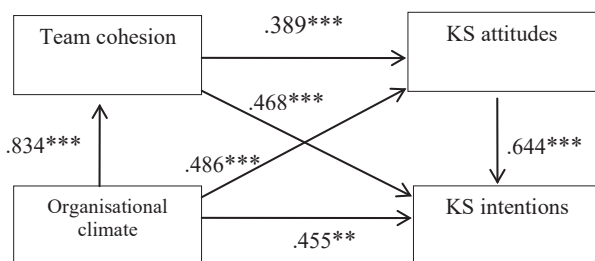


Fig. 2. Structural equation modelling

Mediating Effects

The research model is a remote mediation model, using team cohesion and KS attitude as the mediating variables, to explore whether they have a significant mediating effect on organisational climate and KS intention, and to determine whether it is a fully mediated or partially mediated model. If there are other simple mediation or direct effects in the research framework besides the remote mediation indirect effect, the framework can be judged as partially mediated. Due to the characteristics of remote mediation, there are three mediating paths in this study: (1) organisational climate → team cohesion → KS attitude → KS intention; (2) organisational climate → team cohesion → KS intention; and (3) organisational climate → KS attitude → KS intention.

We used bootstrapping to test moderating effects. According to previous studies, if the CI does not include 0, it indicates that the mediation effect exists. Therefore, in this study, bootstrapping was used to simulate 5000 samples. Under the 95% confidence level CI, the bias value CI and the percentage CI were separately examined to determine whether the total effect, indirect effect, and direct effect included 0. If not, it indicates a significant effect.

A mediating effect of team cohesion and KS attitudes is shown in Table 4. Indirect effects have Z values ranging from 0.904 to 2.186, direct effects with Z values of 0.184, and total effects with Z values of 4.591. When the Z value is more significant than 1.96, the effect exists, and the total effect of this model, the two indirect effects (organisational climate → team cohesion → intentions, and organisational climate → team cohesion → attitudes → intentions) achieve significant results. And the direct effect and the indirect effect (organisational climate → KS attitudes → KS intentions) do not exist. Besides, the bias confidence interval (0.264 and 0.625) and the percentage confidence interval (0.364 and 0.884) of the total effect do not contain 0 and therefore are significant. Next, we checked the bias confidence interval of the indirect effect of “organisational climate → team cohesion → KS intentions” (0.017 and 0.502), and the percentage confidence interval (0.019 and 0.709) does not contain

0. Then, “Organisational climate → team cohesion → KS attitudes → KS intentions” with the bias confidence interval (0.042 and 0.324) and percentage confidence interval (0.009 and 0.284) do not contain 0, reaching a significant level. Next, the bias confidence interval (- 0.022 and 0.176) and percentage confidence interval (- 0.069 and 0.265) of “organisational climate → KS attitudes → KS intentions” contains 0, indicating that the mediating effect of this indirect effect does not exist. The bias confidence intervals (-0.225 and 0.311) and percentage confidence intervals (- 0.308 and 0.438) for the observed direct effects contain 0, so they do not reach a significant level. Therefore, the remote mediating effects of team cohesion and KS attitudes on organisational climate and KS intentions are partial.

Table 4

Mediating effects

	Estimate	Multiplying coefficients		Bootstrapping			
		Product of coefficients		Bias-corrected 95% CI		Percentile 95% CI	
		SE	Z	Lower	Upper	Lower	Upper
Total effects							
Organisational climate → KS intentions	0.606	0.132	4.591	0.264	0.625	0.364	0.884
Indirect effects							
Organisational climate → Team cohesion → KS intentions	0.344	0.173	1.988	0.017	0.502	0.019	0.709
Organisational climate → KS attitudes → KS intentions	0.075	0.083	0.904	-0.022	0.176	-0.069	0.265
Organisational climate → Team cohesion → KS attitudes → KS intentions	0.153	0.07	2.186	0.042	0.324	0.009	0.284
Direct effects							
Organisational climate → KS intentions	0.034	0.185	0.184	-0.225	0.311	-0.308	0.438

Discussions

In recent years, knowledge management and sharing have become a new trend in human resources [53, 54]. Consequently, this study examined KS attitudes and KS intentions, and found that KS attitudes were positively associated with KS intentions, which is consistent with previous studies [12]. This study addresses three research gaps. Firstly, business simulation games have replaced traditional teaching models in business education to motivate students and increase interest in learning [17, 18]. Research on simulation games has primarily focused on the learning effects of games [15, 22, 23], but little has been done on KS behaviour in simulation games. Therefore, this study jumps out of the framework and explores students' KS attitudes and intentions in a business simulation game of team learning situations. Thus, this study fills the research gap in this field. The second research gap is that game-based learning in the field of KS behaviour is a situation that few scholars studied in the past. Therefore, this study can also complement the research in this field. Third, studies on

team cohesion are mostly aimed at the field of sports, and there are relatively few studies on organisational climate and team cohesion. Therefore, it is essential to add a study related to simulated game learning situations.

This study aims to understand the factors that affect KS among members in an organisation to understand how to motivate members to share knowledge. The social cognition theory [24] highlights that the behaviour of individuals interacts with environmental factors, while organisational climate is the individual's direct or indirect perception of the environment, which affects the attitudes, values, and KS behaviours of members [12, 27, 28]. Furthermore, past studies have shown that organisational climate has a direct and significant impact on team cohesion [31, 43]. Members are, therefore, more willing to share information and knowledge [31, 32], but past research on team cohesion primarily focused on the field of sports. Therefore, this study aims to increase the study of simulated game learning scenarios and organisational climates for team cohesion.

The impact of organisational climate on KS attitudes and intentions was studied in the past [12, 27, 28]. Several previous studies have explored the factors influencing KS using KS attitudes as a mediator [11, 12, 27, 28, 33]. However, no studies have been conducted to explore the remote mediating effects of organisational climate on KS intentions, mediated by team cohesion and KS attitudes. Therefore, this study hopes to fill this research gap and provide a complete research contribution in this field. Four variables were examined through a game-based learning context: organisational climate, team cohesion, KS attitudes, and KS intentions. This research has brought new contributions and breakthroughs since no previous study has used such a framework. In this study, organisational climate and knowledge-sharing attitudes were found to have a mediating effect on KS intentions, affecting their relationship.

Conclusions

Creating an excellent organisational atmosphere can indirectly trigger students' attitudes and intentions to share knowledge. According to the results, an outstanding organisational climate will produce a high centripetal force. Therefore, it is a critical factor that influences KS. Because students will evaluate the cost and benefit of KS, only when students feel that there is fairness, innovation, and belonging in the classroom will their willingness to share knowledge be enhanced. Therefore, from a teacher's perspective, classroom norms are essential, and they must clearly define the grading standards and treat every student fairly. In this way, they will be more likely to share knowledge if they believe that KS behaviour will be rewarded. Moreover, teacher support plays an essential role in promoting KS among students. Students who perceive high levels of teacher support tend to be more willing to share their knowledge with others. This result emphasises the importance of building a positive teacher-student relationship and providing effective support to students in the classroom. Additionally, peer learning and collaboration can significantly enhance KS among students. When students work together and collaborate in groups, they have more opportunities to exchange ideas, learn from each other, and develop their own

knowledge. Therefore, teachers should encourage students to engage in collaborative learning activities and provide opportunities for them to work in groups.

The results suggest that students have a higher willingness to share knowledge when they feel a positive organisational climate within the team, which is a key factor affecting knowledge sharing. Students evaluate the costs and benefits of knowledge sharing, and only when they feel fairness, innovation, and a sense of belonging in the classroom will their willingness to share knowledge increase. Therefore, from the perspective of the teaching staff, classroom norms are crucial. Clear grading criteria should be established, and each student should be treated fairly. When students feel that their sharing behaviour will be rewarded, they will be more willing to contribute. On the other hand, teachers should also encourage students to express their opinions in the teaching process. When students' ideas differ from the teacher's or other people's, there should be no refutation or strong opposition to avoid making students dare not express their ideas. Thus, it will create a creative learning atmosphere that helps students' KS behaviour. Creating an open and inclusive learning environment is also crucial for promoting KS behaviour. Teachers should respect and value diversity, and create a safe space where students feel comfortable expressing themselves. When students feel that their unique perspectives and experiences are appreciated, they are more likely to share their knowledge and engage in meaningful discussions.

The findings show that if KS attitudes and intentions are not significantly affected by the establishment of the organisational climate, it is necessary to facilitate KS through the mediating effect of team cohesion. Therefore, in classroom management, in addition to formal classroom teaching, teachers can condense the class emotions by holding teacher-student gatherings, off-campus visits, etc. Suppose there are similar team reports and group cooperation content in the classroom. In that case, teachers can also use teamwork games and activities to enhance the cohesion of each group in advance, join the teamwork link to create an atmosphere in which each member should cooperate, and enhance the team cohesion within each group through the general classroom. Additionally, teachers can use various online platforms and tools to facilitate KS. For example, online discussion forums or chat rooms can be set up for students to share and exchange their knowledge and ideas. These platforms can provide students with a safe and open space to express their opinions and receive feedback from their peers and teachers.

Furthermore, to reduce the gap between academic and practical, it is essential to cultivate students' ability to have a future workplace. Although coupled with the rapid progress of science and technology in recent years, students are prone to external temptations. It is an excellent way to use business simulation game tools to increase learning concentration and motivation. Therefore, teachers can add it to the curriculum design to increase the motivation and richness of the classroom and combine business knowledge and teamwork concepts so that students can have the required abilities in the workplace in advance. Overall, using business simulation games in the classroom is an effective way to cultivate students' abilities to succeed in the future workplace. By combining academic knowledge with practical skills, teachers can prepare students to be well-rounded and capable employees in various fields.

Limitations and Future Research

The study was limited to students studying at business colleges in Ho Chi Minh City, Vietnam. It will be possible to include students from other counties and cities in future studies in order to increase the sampling diversity. Due to this study focus on team activities, we also only consider subjects' feelings at a specific point in time. Future scholars can conduct similar studies by collecting samples for the same subject group over time. The study mediating model can also be extended by including additional moderating variables (such as organisational climate or cultural moderating variables) in future research.

References

1. Yi J. A measure of knowledge sharing behavior: Scale development and validation. *Knowledge Management Research & Practice*. 2009; 7 (1): 65–81.
2. Donate M. J., et al. Total quality management and high-performance work systems for social capital development: Effects on company innovation capabilities. *Journal of Intellectual Capital*. 2020; 21 (1): 87–114.
3. Shujahat M., et al. Translating the impact of knowledge management processes into knowledge-based innovation: The neglected and mediating role of knowledge-worker productivity. *Journal of Business Research*. 2019; 94: 442–450.
4. Iqbal A., et al. From knowledge management to organizational performance: Modelling the mediating role of innovation and intellectual capital in higher education. *Journal of Enterprise Information Management*. 2018; 32 (19). DOI: 10.1108/JEIM-04-2018-0083
5. Mahdi O. R., Nassar I. A., Almsafir M. K. Knowledge management processes and sustainable competitive advantage: An empirical examination in private universities. *Journal of Business Research*. 2019; 94: 320–334.
6. Witherspoon C. L., et al. Antecedents of organizational knowledge sharing: A meta-analysis and critique. *Journal of Knowledge Management*. 2013; 17 (2). DOI: 10.1108/13673271311315204
7. Crossan M. M., Lane H. W., White R. E. An organizational learning framework: From intuition to institution. *Academy of Management Review*. 1999; 24 (3): 522–537.
8. Ipe M. Knowledge sharing in organizations: A conceptual framework. *Human Resource Development Review*. 2003; 2 (4): 337–359.
9. Nonaka I., et al. The knowledge-creating company: How Japanese companies create the dynamics of innovation. Vol. 105. OUP USA; 1995. 284 p.
10. Fishbein M., Ajzen I. Belief, attitude, intention, and behavior: An introduction to theory and research. Reading, MA: Addison-Wesley; 1975. 480 p.
11. Bock G. W., Kim Y. G. Breaking the myths of rewards: An exploratory study of attitudes about knowledge sharing. *Information Resources Management Journal (IRMJ)*. 2002; 15 (2): 14–21.
12. Bock G. W., et al. Behavioral intention formation in knowledge sharing: Examining the roles of extrinsic motivators, social-psychological forces, and organizational climate. *MIS Quarterly*. 2005; 29 (01): 87–111.
13. Cabrera E. F., Cabrera A. Fostering knowledge sharing through people management practices. *The International Journal of Human Resource Management*. 2005; 16 (5): 720–735.
14. Gosen J., Washbush J. A review of scholarship on assessing experiential learning effectiveness. *Simulation & Gaming*. 2004; 35 (2): 270–293.

15. Tao Y.-H., Cheng C.-J., Sun S.-Y. Alignment of teacher and student perceptions on the continued use of business simulation games. *Journal of Educational Technology & Society*. 2012; 15 (3): 177–189.
16. Schwabe G., Göth C. Mobile learning with a mobile game: Design and motivational effects. *Journal of Computer Assisted Learning*. 2005; 21 (3): 204–216.
17. Faria A. J., et al. Developments in business gaming: A review of the past 40 years. *Simulation & Gaming*. 2009; 40 (4): 464–487.
18. Loon M., Evans J., Kerridge C. Learning with a strategic management simulation game: A case study. *The International Journal of Management Education*. 2015; 13 (3): 227–236.
19. Randel J. M., et al. The effectiveness of games for educational purposes: A review of recent research. *Simulation & Gaming*. 1992; 23 (3): 261–276.
20. Papastergiou M. Digital game-based learning in high school computer science education: Impact on educational effectiveness and student motivation. *Computers & Education*. 2009; 52 (1): 1–12.
21. Borrajo F., et al. SIMBA: A simulator for business education and research. *Decision Support Systems*. 2010; 48 (3): 498–506.
22. Fitó-Bertran À., Hernández-Lara A. B., Serradell-López E. Comparing student competences in a face-to-face and online business game. *Computers in Human Behavior*. 2014; 30: 452–459.
23. Kiili K., et al. Flow framework for analyzing the quality of educational games. *Entertainment Computing*. 2014; 5 (4): 367–377.
24. Bandura A. Social foundations of thought and action. Albert Bandura Englewood Cliffs, New Jersey: Prentice Hall; 1986. 617 p.
25. Berberoglu A. Impact of organizational climate on organizational commitment and perceived organizational performance: Empirical evidence from public hospitals. *BMC Health Services Research*. 2018; 18 (1): 1–9.
26. Luo X., Xie S. A study on leadership behaviors of coach, team climate, and team cohesion – an example of football players. *Journal of Interdisciplinary Mathematics*. 2018; 21 (2): 351–359.
27. Xue Y., Bradley J., Liang H. Team climate, empowering leadership, and knowledge sharing. *Journal of Knowledge Management*. 2011; 15 (2). DOI: 10.1108/13673271111119709
28. Chen S.-S., Chuang Y.-W., Chen P.-Y. Behavioral intention formation in knowledge sharing: Examining the roles of KMS quality, KMS self-efficacy, and organizational climate. *Knowledge-Based Systems*. 2012; 31: 106–118.
29. Black J., et al. Self-efficacy and emotional intelligence: Influencing team cohesion to enhance team performance. *Team Performance Management: An International Journal*. 2018; 25 (4). DOI: 10.1108/TPM-01-2018-0005
30. Stevens M., Rees T., Polman R. Social identification, exercise participation, and positive exercise experiences: Evidence from parkrun. *Journal of Sports Sciences*. 2019; 37 (2): 221–228.
31. Inkpen A. C., Tsang E.W. Social capital, networks, and knowledge transfer. *Academy of Management Review*. 2005; 30 (1): 146–165.
32. Toh S. M., Srinivas E. S. Perceptions of task cohesiveness and organizational support increase trust and information sharing between host country nationals and expatriate coworkers in Oman. *Journal of World Business*. 2012; 47 (4): 696–705.
33. Chow W. S., Chan L. S. Social network, social trust and shared goals in organizational knowledge sharing. *Information & Management*. 2008; 45 (7): 458–465.
34. Zacharias T., Rahawarin M. A., Yusriadi Y. Cultural reconstruction and organization environment for employee performance. *Journal of Ethnic and Cultural Studies*. 2021; 8 (2): 296–315.
35. Kao C.-C. Development of team cohesion and sustained collaboration skills with the sport education model. *Sustainability*. 2019; 11 (8): 2348.

36. Ruan Z., Liu W. Coach authentic leadership connected with performance satisfaction and psychological well-being of team: The mediating role of team cohesion and psychological capital. *Revista de Psicologia del Deporte (Journal of Sport Psychology)*. 2021; 30 (1): 189–203.
37. Grossman R., et al. The team cohesion-performance relationship: A meta-analysis exploring measurement approaches and the changing team landscape. *Organizational Psychology Review*. 2021; 12 (3): 20413866211041157.
38. Carron A. V., Bray S. R., Eys M. A. Team cohesion and team success in sport. *Journal of Sports Sciences*. 2002; 20 (2): 119–126.
39. Sancaktar C., Küçükaltan E. Organizational culture, team cohesion and team performance in Dragon Festival. *Anatolia: Turizm Arastirmalari Dergisi*. 2020; 31 (2): 138–148.
40. Anand A., Centobelli P., Cerchione R. Why should I share knowledge with others? A review-based framework on events leading to knowledge hiding. *Journal of Organizational Change Management*. 2020; 33 (2): 379–399.
41. Ghobadi S., D'Ambra J. Knowledge sharing in cross-functional teams: A cooperative model. *Journal of Knowledge Management*. 2012; 16 (2): 285–301.
42. Zhou S., Siu F., Wang M. Effects of social tie content on knowledge transfer. *Journal of Knowledge Management*. 2010; 14 (3): 449–463.
43. García-Calvo T., et al. Perceived coach-created and peer-created motivational climates and their associations with team cohesion and athlete satisfaction: Evidence from a longitudinal study. *Journal of Sports Sciences*. 2014; 32 (18): 1738–1750.
44. Wang S., Noe R. A. Knowledge sharing: A review and directions for future research. *Human Resource Management Review*. 2010; 20 (2): 115–131.
45. Dobbins G. H., Zaccaro S. J. The effects of group cohesion and leader behavior on subordinate satisfaction. *Group & Organization Studies*. 1986; 11 (3): 203–219.
46. Williams L. J., McGonagle A. K. Four research designs and a comprehensive analysis strategy for investigating common method variance with self-report measures using latent variables. *Journal of Business and Psychology*. 2016; 31 (3): 339–359.
47. Podsakoff P. M., et al. Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*. 2003; 88 (5): 879–903.
48. Mossholder K. W., et al. Relationships between bases of power and work reactions: The mediational role of procedural justice. *Journal of Management*. 1998; 24 (4): 533–552.
49. Bagozzi R. P., Yi Y. On the evaluation of structural equation models. *Journal of the Academy of Marketing Science*. 1988; 16 (1): 74–94.
50. Fletcher T. D. Methods and approaches to assessing distal mediation. In: *66th Annual Meeting of the Academy of Management* [Internet]. Atlanta, GA; 2006 [cited 2023 Mar 23]. Available from: https://www.researchgate.net/publication/252951744_Methods_and_Approaches_to_Assessing_Distal_Mediation
51. Preacher K. J., Hayes A. F. Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods*. 2008; 40 (3): 879–891.
52. Zhao X., Lynch Jr J. G., Chen Q. Reconsidering Baron and Kenny: Myths and truths about mediation analysis. *Journal of Consumer Research*. 2010; 37 (2): 197–206.
53. Gourlay S. Knowledge management and HRD. *Human Resource Development International*. 2001; 4 (1): 27–46.
54. Blankenship S. S., Ruona W. E. Exploring knowledge sharing in social structures: Potential contributions to an overall knowledge management strategy. *Advances in Developing Human Resources*. 2009; 11 (3): 290–306.

Information about the authors:

Nguyen Bach Hoang Phung – PhD Candidate (Management), Thu Duc City People’s Committee, Ho Chi Minh City, Vietnam. E-mail: nbhphung.tpthuduc@tphcm.gov.vn

Truong Quang Dung – PhD (Management), Lecturer, Ho Chi Minh City University of Technology (Hutech), Ho Chi Minh City, Vietnam. E-mail: tq.dung@hutech.edu.vn

Nam Tien Duong – PhD (Management), Lecturer, Ho Chi Minh City University of Economics and Finance (UEF); ORCID 0000-0001-6757-797X; Ho Chi Minh City, Vietnam. E-mail: tiendn@uef.edu.vn

Conflict of interest statement. The authors declare that there is no conflict of interest.

Received 28.04.2023; revised 25.10.2023; accepted for publication 01.11.2023.

The authors have read and approved the final manuscript.

Информация об авторах:

Пхунг Нгуен Бах Хоанг – аспирант PhD (менеджмент), Городской народный комитет Тху Дука, Хошимин, Вьетнам. E-mail: nbhphung.tpthuduc@tphcm.gov.vn

Дунг Труонг Куанг – PhD (менеджмент), преподаватель, Хошиминский городской технологический университет, Хошимин, Вьетнам. E-mail: tq.dung@hutech.edu.vn

Дуонг Нам Тьен – PhD (менеджмент), преподаватель Городского университета экономики и финансов Хошимина; ORCID 0000-0001-6757-797X; Хошимин, Вьетнам. E-mail: tiendn@uef.edu.vn

Информация о конфликте интересов. Авторы заявляют об отсутствии конфликта интересов.

Статья поступила в редакцию 28.04.2023; поступила после рецензирования 25.10.2023; принята к публикации 01.11.2023.

Авторы прочитали и одобрили окончательный вариант рукописи.

Información sobre los autores:

Nguyen Bach Hoang Phung: Estudiante de PhD (Administración), Comité Popular de la ciudad de Thu Duc, Ciudad Ho Chi Minh, Vietnam. Correo electrónico: nbhphung.tpthuduc@tphcm.gov.vn

Truong Quang Dung: PhD (Administración), Profesor, Universidad Tecnológica de la Ciudad de Ho Chi Minh, Ciudad Ho Chi Minh, Vietnam. Correo electrónico: tq.dung@hutech.edu.vn

Nam Tien Duong: PhD (Administración), Profesor en la Universidad de Economía y Finanzas de la ciudad de Ho Chi Minh; ORCID 0000-0001-6757-797X; Ciudad de Ho Chi Minh, Vietnam. Correo electrónico: tiendn@uef.edu.vn

Información sobre conflicto de intereses. Los autores declaran no tener conflictos de intereses.

El artículo fue recibido por los editores el 28/04/2023; recepción efectuada después de la revisión el 25/10/2023; aceptado para su publicación el 01/11/2023.

Los autores leyeron y aprobaron la versión final del manuscrito.