UDC 658.84

ANALYSIS OF THE POSSIBILITY OF INFORMATION TECHNOLOGIES INTEGRATION INTO THE PROCESS OF CORPORATE TRAINING FOR EMPLOYEES OF MILK PROCESSING ENTERPRISES IN UKRAINE

SENYK Yurii
West Ukrainian National University
https://orcid.org/0000-0002-8164-7783
jurasenyk08@gmail.com

Nowadays, the use of the latest IT technologies for educational purposes at milk processing enterprises is at a low level. That is why, to study the motives that have a significant impact on the intention to use technology in the process of training specialists of various directions and levels, a study was conducted based on one of the milk processing enterprises of the western region.

The methodology of the analysis was based on the concept of TAM, 32 specialists of various services of the milk processing enterprise in the western region of Ukraine, who are engaged in personnel training in addition to the job, took part in the survey. To obtain primary data, a questionnaire was developed based on literature data of similar studies.

The analysis includes testing for the adequacy of the data and the research model – the relationship between the six research elements. The obtained data indicate a relatively low level of confidence in the effectiveness of using computer technologies during corporate training, and the indicator of internal motivation or personal intentions (PI) is the lowest of all values - 3.44. Thus, it can be assumed that such data are related to certain internal beliefs of each member of the group of interviewed employees of the enterprise. To test this assumption, multiple-cause modeling (MIMIC) was used to assess whether there are correlations in respondents' intrinsic motivation with their age and level of education. The calculated coefficients will make it possible to assess the presence of a direct influence of these two variables on the level of employees' motivation, and their value can be interpreted as the possible presence of an additional factor i.e. the presence of a degree or its absence, as well as the difference in the age of the respondents.

Conclusions. The obtained results of the statistical analysis established a correlation between motivation and higher education among employees, indicating that the presence of a specialist or master's degree increases the probability of using computer technologies in the learning process. This is probably related to the use of electronic learning technologies in the programs of their training at the university. Thus, it is obvious that in order to increase the use of IT technologies in the process of corporate training, it is necessary to form among the company's employees computer literacy skills necessary for life in modern society and to develop the ability to use the latest technologies for searching, analyzing, using and transmitting information.

Keywords: statistical analysis, information technologies, milk processing, corporate training, multiple-cause modeling.

INTRODUCTION

The progress of corporate training suggests the introduction of e-learning, which will allow to optimize the time of the educational process, prepare didactic material to ensure quality assimilation of knowledge and, accordingly, to obtain effective assimilation of theoretical knowledge and formation of practical skills. The traditional approach to the educational process involves exclusively oral transmission of information with a possible demonstration of the used equipment or documentation. An important loss for the educational process is the omission of employees' self-education, which would reduce the time of employee training and reduce the burden of the employee in the company engaged in training. Such a change in the paradigm of corporate training would make it possible to increase the efficiency of the process and stimulate employees to self-development, and would serve as the primary stage of selection. To ensure this process, it is necessary to use modern technologies of distance learning and knowledge testing, which must be integrated into the process of corporate training quickly and effectively. [3].

Nowadays, the use of the latest IT technologies for educational purposes at milk processing enterprises is at a low level. That is why, in order to study the motives that have a significant impact on the intention to use technology in the process of training specialists of various directions and levels, a study was conducted on the basis of one of the milk processing enterprises of the western region.

The scientific research has not described a holistic concept of integrating the latest technologies into the process of corporate training so far. Nevertheless, a number of models have been proposed to describe the mechanism and factors affecting the adoption of technologies, among them it is necessary to highlight such as: "unified theory of acceptance and use of technology" (hereinafter UTAUT) and " technology acceptance model" (hereinafter TAM). The above models are formed on the basis of two psychological theories: "theory of reasoned action" [9] and "theory of planned behavior" [2]. The UTAUT model identifies four determinants for distinguishing the achievement of a terminal result [29]:

- achievement of expected results;
- applied efforts;
- social impact of the obtained result;

- conditions of the corporate environment.

A number of authors [30] believe that the influence of these determinants is modeled by the gender of the participants of the educational process, their age, available empirical experience and awareness of the use of technologies in the process of corporate learning.

Another model is the "Technology Acceptance Model" (TAM), which is used to analyze the effectiveness of using technology in the educational process [8]. TAM and UTAUT are not the only models that have been developed to achieve the above goal [25], nevertheless, it is the TAM model that dominates scientific works for describing the theoretical foundations and actual results of using the latest technologies in the educational process, including corporate training [12, 15,17].

The technology acceptance model first proposed by Davis F.D. [8], considers the final result of introducing new technologies into the educational process based on two motivational elements:

1. motivation of process participants, which includes:

- "perceived ease of user", the degree to which a person believes that using technology does not require effort [8];

- awareness of the necessity in the work process of the provided information ("perceived usefulness"), the degree to which a person believes that the use of technology will improve his work [8];

- the individual attitude of process participants to the latest technologies ("attitudes toward technology"), a person's assessment of technology or specific behavior related to the use of technology [31].

2. variable results, which include:

- formed practical skills;

- use of technologies to achieve learning outcomes.

On the basis of the above-mentioned variables "perceived usefulness" (PU) and "perceived ease of user" (PEU), a conclusion is formed about the effectiveness of the integration of the latest technologies into the educational process, as well as the level of information perception by the participants of training [17]. In addition to the described variables, other indicators were developed that described the difference between the perception of the need for information and ease of use of information [1, 15]:

- subjective norms (SN) - a person's acceptance of the fact that the majority of people important to him believe that he should or should not have certain norms of behavior [10];

- self-efficacy (CSE) is the degree of subjective assessment of the ability to perform a certain task or carry out training with the help of a computer [7]

- facilitating conditions (FC) the degree to which a person believes that there are organizational and technical resources to optimize the use of technologies [29]

In general, Scherer R., Siddiq F. and Teo T. in their work [21] showed that the described variables can be used to describe the effort that is required to use the technology, and therefore is closely related to their beliefs about competence.

As the TAM model evolved, researchers introduced new variables to characterize the main concepts of the model further. Thus, two more variables are introduced based on the theory of "reasoned action" [24]:

- behavioral intentions (BI) a person's intention to use technology;

- technology use (USE) is the actual use of technology by a person.

Based on the large number of variables in the theory of TAM, their interaction and mutual influence were studied empirically [26]. Nowadays, four main models are distinguished, which are shown in Figure 1.

Model 1 represents the core of TAM and focuses on behavioral motivation as a terminal outcome of the educational process. Model 2 extends this model by using the latest technology. The reason for the formation of model 2 is the absence in the results of empirical studies of the connection between the intentions to use technologies and their actual application, which is taken into account when the concept of USE is introduced. Models 3 and 4 are formed on the basis of models 1 and 2, while SN, CSE and FC predictors were added to them [17,18].
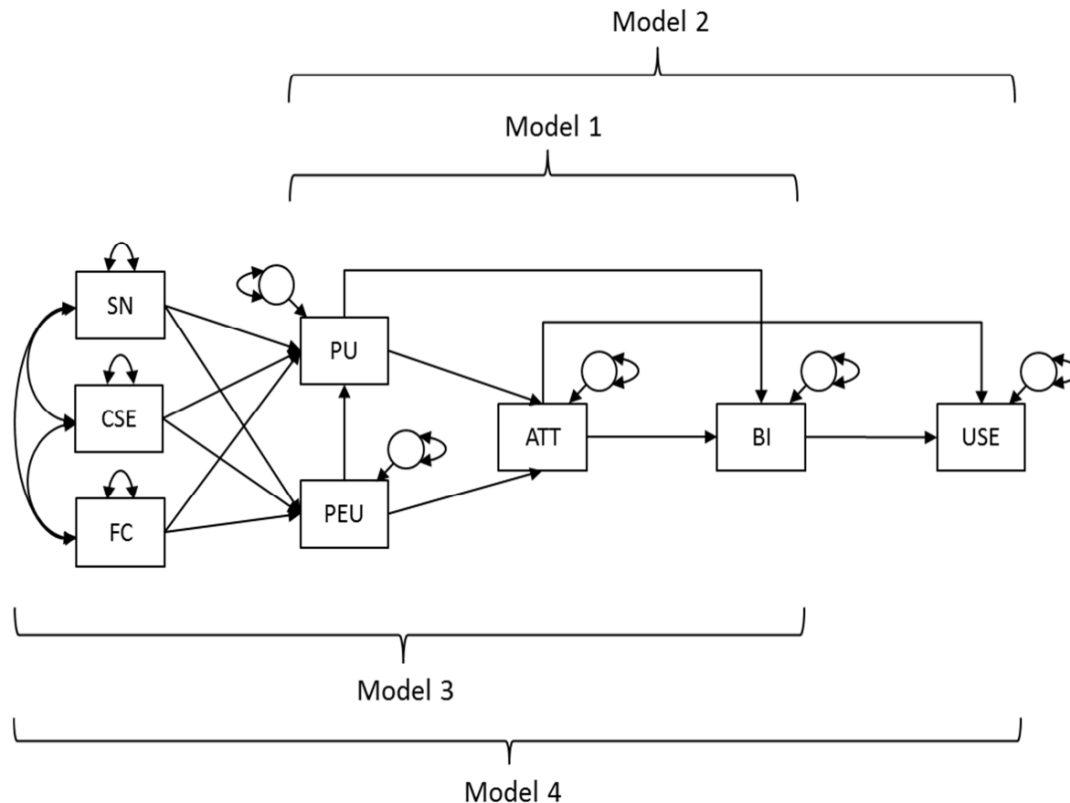
Fig. 1. Models of the TAM concept according to [20]

Empirical studies based on the TAM model revealed a number of problems:

1.   lack of ambiguity in the interaction of the elements of the TAM model presented in models 1-4. A clear example of this is the drastic discrepancy in the results of establishing the relationship between perceived usefulness (PU) and behavioral intentions (BI), so the researchers [6,19] established an unambiguous interdependence, while in other studies the results were opposite [16,27].

2. the role of external variables that provide additional characteristics to the main concepts of the TAM system is different [5].

3. low reproducibility of research results conducted on a group of educational workers of different nationalities and ages [28]. Such studies often fail to reveal complete invariance between groups, which indicates the inability of the TAM model to characterize all contexts and groups of individuals fully.

RESEARCH MATERIALS AND METHODS

The methodology of the analysis was based on the concept of TAM, 32 specialists of various services of the milk processing enterprise in the western region of Ukraine, who are engaged in personnel training in addition to the particular job, took part in the survey. To obtain primary data, a questionnaire was developed based on literature data of similar studies [5,27].

The developed questionnaire was formed for objective analysis of respondents and processing of the results as quickly as possible, for this it is divided into separate blocks: attitude to computer use or SN, perception of ease of use on computer technologies in the learning process (PEU), awareness of the need the use of the latest technologies in the process of corporate training (ATCU), the establishment of internal motivation for the use of technologies or BI, the subjective assessment of the effectiveness of the use of the latest technologies in the educational process or PU and the characteristics of the facilitating conditions (FC). The numerical expression of the obtained results was carried out on a 5-point Likert scale, where 1 means "totally disagree", and 5 means "completely agree".

The obtained data were analyzed using a structural equation modeling (SEM) approach. This method was used because of its ability to analyze relationships between latent and observed variables and directly estimate random errors in the observed variables. SEM has an additional advantage over traditional data analysis methods, which is related to the ability to model relationships between latent variables [11] In addition, a two-step approach to SEM construction was used [22], where the first step involves estimating a CFA model that describes the ability of the observed measures (survey items) to

measure the latent constructs indirectly. At the second stage, the structural part of the model establishing relationships between exogenous and endogenous latent variables is evaluated.

OBTAINED RESULTS AND DISCUSSION

The analysis includes testing for the adequacy of the data and the research model – the relationship between the six research elements. All obtained data were subjected to statistical analysis and presented in Table 1.

Table 1

The results of the statistical analysis of the survey of the company's employees

Object of study	Average value	Average square deviation	Average variance extracted (AVE)	Composite reliability (CR)	Cronbach's alpha
SN	4,34	0,70	0,585	0,733	0,744
PCU	3,89	1,00	0,685	0,876	0,867
ATCU	3,78	0,98	0,948	0,981	0,982
BI	3,44	1,02	0,56	0,79	0,792
PU	3,81	0,86	0,733	0,889	0,911
FC	3,76	0,77	0,514	0,76	0,812

As you know, convergent reliability is determined by composite reliability indicators (CR) and average variance extracted (AVE). A cumulative reliability of 0.7 or higher means that reliable conclusions can be drawn from the data obtained. Thus, the average value of the average variance indicator in this study is 0.67, while this indicator above 0.5 indicates high reliability of the studied model [23]. Another indicator of the obtained results' reliability is the Cronbach's alpha, so in all studies this indicator is in the range of 0.744-0.982, which is higher than the recommended criterion of 0.7. Thus, it can be argued that the taken measures are reliable and internally consistent.

The obtained data indicate a relatively low level of confidence in the effectiveness of using computer technologies during corporate training, and the indicator of internal motivation or personal intentions (PI) is the lowest of all values - 3.44. This attitude towards the use of world practice in the educational process at milk processing enterprises of Ukraine has a negative effect on the efficiency of production, and, therefore, on its competitiveness both on the domestic and on the foreign market. No less indicative is the value of the mean square deviation of this indicator - 1.02, which indicates diametrically opposite answers to the same questions. Thus, it can be assumed that such data are related to certain internal beliefs of each member of the group of interviewed employees of the enterprise.

To test this assumption, multiple-cause modeling (MIMIC) was used to assess whether there are correlations in respondents' intrinsic motivation with their age and level of education. MIMIC modeling is used when the observed variables are believed to be manifestations of an underlying unobserved latent variable that may be influenced by other exogenous variables that directly or indirectly affect the latent factor [14].

The use of MIMIC modeling has a number of advantages:

1. allows simultaneous analysis of the model both with selected research objects and with hidden factors;

2. the obtained data allow obtaining accurate and representative results;

3. allows comparison of dichotomous groups using indicators as exogenous variables.

This method is often used as an alternative to conducting statistical comparisons of many groups of outcomes where larger sample sizes are required [4]. Thus, for MIMIC analysis, the resulting sample was not divided into subsamples and was not subjected to additional identification.

To conduct statistical analysis according to the MIMIC model, we assume that there is a single latent variable that is induced by several experimental variables and manifests itself through several exogenous variables [13].

Meanwhile, it is necessary to assume that these exogenous variables are the age and level of education of employees, thus, the analyzed model was considered as a series of separate regressions of the dependence of the internal motivational component of respondents on the other seven variables: attitude to computer use or subjective norms (SN), perceived ease of computer use of computer technologies in the learning process (PEU), awareness of the need to use the latest technologies in the corporate learning process (ATCU), subjective assessment effectiveness of using the latest technologies in the educational process or perceived usefulness (PU), characteristics of facilitating conditions (FC), level of education and

age of employees. Visualization of the model of the influence of the level of education and age of the respondents on their internal motivation to use computer technologies during education is presented in Figure 2.

In order to determine the influence of the last two factors, they were conditionally dichotomized, while the education indicator of the respondents was marked as 0 – "employees do not have a degree", and 1 – "respondents have a degree". Similarly, the age of the interviewed employees was marked, the average value was 35 years, thus, 0 and 1 corresponded, respectively, to the categories of employees below and above this conditional limit. The calculated coefficients will make it possible to assess the presence of a direct influence of these two variables on the level of employees' motivation, and their value can be interpreted as the possible presence of an additional factor i.e. the presence of a degree or its absence, as well as the difference in the age of the respondents.
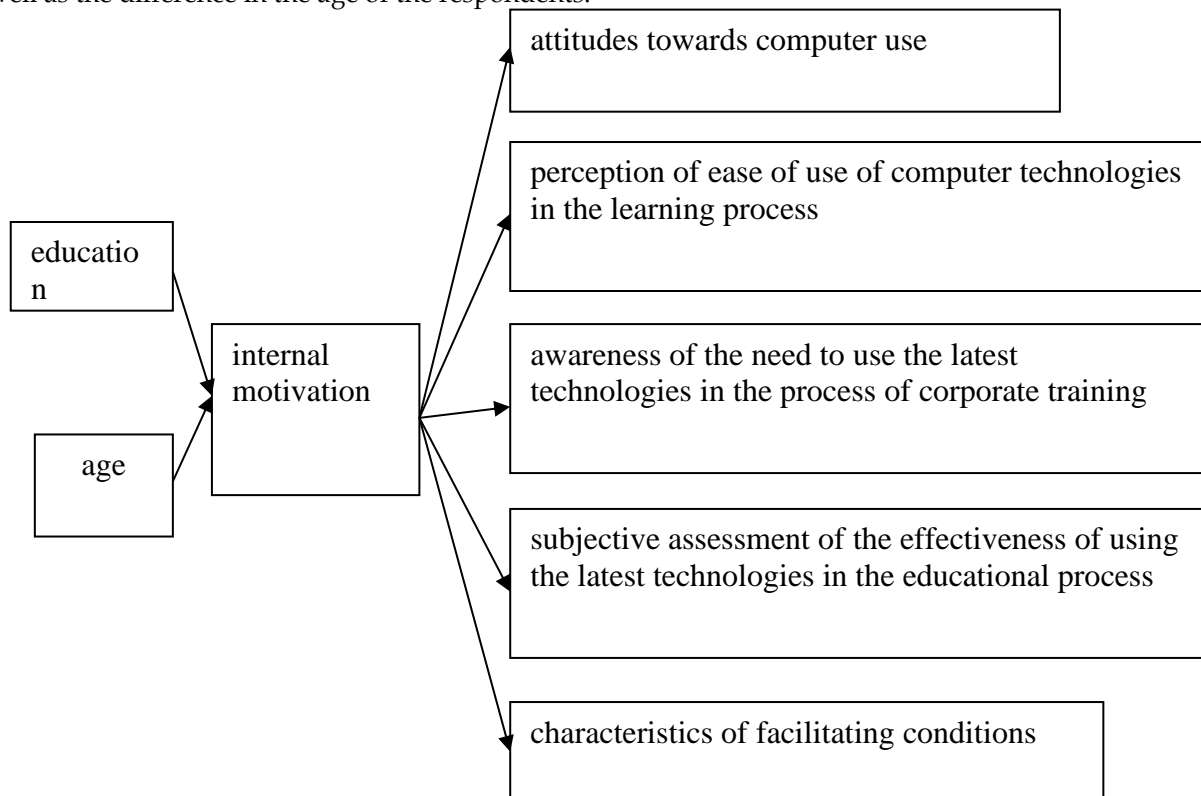

Fig. 2. The model of the influence of the respondents' level of education and age on their internal motivation

The analysis of the obtained results of statistical processing (Table 2) showed an existing correlative relationship between the internal motivation of the company's employees, who are involved in corporate training, and the studied variables.

Table 2

Results of hypotheses' statistical analysis using MIMIC modeling

№	Hypothesis	Calculation coefficient
1	the influence of intrinsic motivation on attitudes toward computer use	0,703
2	the influence of internal motivation on the perception of ease of use of computer technologies in the learning process	0,524
3	the influence of internal motivation on the awareness of the need to use the latest technologies in the process of corporate training	0,409
4	the influence of internal motivation on the subjective assessment of the effectiveness of the use of the latest technologies in the educational process	0,398
5	the influence of internal motivation on the subjective assessment of the effectiveness of the use of the latest technologies in the educational process	0,228
6	the influence of the level of education on internal motivation	-0,361
7	the influence of the respondents' age on internal motivation	0,289

The obtained data confirm the hypothesis about the influence of internal motivation on the research variable, meanwhile, the highest coefficient is set for the "attitude towards computer use" factor of 0.703. This value is important for understanding all the results of the conducted research, because their application in the educational process will depend on the internal attitude towards the latest technologies.

CONCLUSIONS

The obtained data indicate a relatively low level of confidence in the effectiveness of using computer technologies during corporate training, and the indicator of internal motivation or personal intentions (PI). This attitude towards the use of world practice in the educational process at milk processing enterprises of Ukraine has a negative effect on the efficiency of production, and, therefore, on its competitiveness both on the domestic and on the foreign market. Thus, it can be assumed that such data are related to certain internal beliefs of each member of the group of interviewed employees of the enterprise.

No less indicative are the results of the correlation between the internal motivation of the company's employees to use information technologies during the training as well as their age and the availability of higher education. Thus, the existence of a dependence of motivation on the age of the respondents is probably connected with their insufficient computer literacy. This is especially noticeable in the educational process involving managers who received their education before the widespread use of computer technologies.

On the other hand, the obtained results of the statistical analysis established a correlation between motivation and higher education among employees, indicating that the presence of a specialist or master's degree increases the probability of using computer technologies in the learning process. This is probably related to the use of electronic learning technologies in the programs of their training at the university. Thus, it is obvious that in order to increase the use of IT technologies in the process of corporate training, it is necessary to form among the company's employees computer literacy skills necessary for life in modern society and to develop the ability to use the latest technologies for searching, analyzing, using and transmitting information.

REFERENCES:

1. Abdullah F., Ward R. Developing a General Extended Technology Acceptance Model for E-Learning (GETAMEL) by analysing commonly used external factors. *Computers in Human Behavior,* 2016. Vol. 56. P. 238-256

2. Ajzen I. The theory of planned behavior. *Organizational Behavior and Human Decision Processes*. 1991. Vol. 50(2). P. 179-211.

3. Anderson R. Implications of the information and knowledge society for education. / Eds. Voogt J., Knezek G.. *International handbook of information technology in primary and secondary education*. NewYork: Springer. 1999. P. 5-22.

4. Brown T. Confirmatory factor analysis for applied research. New York, NY: Guildford Press. 2006. 380 p.

5. Burton-Jones A., Hubona G.S. The mediation of external variables in the technology acceptance model. *Information & Management*. 2006. Vol. 43(6). P. 706-717.

6. Cheung E.Y.M., Sachs J. Test of the Technology Acceptance Model for a Web-Based Information System in a Hong Kong Chinese Sample. *Psychological Reports*. 2006. Vol. 99(3). P. 691-703.

7. Compeau D.R., Higgins C.A. Computer self-efficacy: development of a measure and initial test. *MIS Quarterly*. 1995. Vol. 19(2). P. 189-211.

8. Davis F.D. Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *MIS Quarterly*. 1989. Vol. 13(3). P. 319-340.

9. Fishbein M. A theory of reasoned action: Some applications and implications. *Nebraska Symposium on Motivation*. 1979. Vol. 27. P. 65-116.

10. Fishbein M., Ajzen I. Belief, attitude, intention, and behavior: An introduction to theory and research. MA: Addison-Wesley. 1975. 573 p.

11. Hoyle R.H. Structural equation modeling for social and personality psychology. London: Sage. 2011. 120 p.

12. Hsiao C.H., Yang C. The intellectual development of the technology acceptance model: A co-citation analysis. *International Journal of Information Management*. 2011. Vol. 31(2). P. 128-136.

13. Jöreskog K.G., Sörbom D. LISREL 8: User's reference guide. Chicago, IL: Scientific Software International. 1996. 378 p.

14. Joreskog K., Goldberger S. Estimation of a model with multiple indicators and multiple causes of a single latent variable. *Journal of American Statistical Association*. 1975. Vol. 70, P. 631-639.

15. King W.R., He J. A meta-analysis of the technology acceptance model. *Information & Management*. 2006. Vol. 43(6). P. 740-755.

16. Kirmizi Ö. Measuring Technology Acceptance Level of Turkish Pre-Service English Teachers by Using Technology Acceptance Model. *Educational Research and Reviews*. 2014. Vol. 9(23). P. 1323-1333.

17. Marangunić N., Granić A. Technology acceptance model: a literature review from 1986 to 2013. *Universal Access in the Information Society*. 2015. Vol. 14(1). P. 81-95.

18. Nistor N., Heymann J.O. Reconsidering the role of attitude in the TAM: An answer to Teo (2009). *British Journal of Educational Technology*. 2010. Vol. 41(6). P. 142-145.

19.   Teachers' acceptance and use of an educational portal / Pynoo B. et al. *Computers & Education*. 2012. Vol. 58(4). P. 1308-1317.

20.   Scherer R., Siddiq F., Tondeur J. The technology acceptance model (TAM): A meta-analytic structural equation modeling approach to explaining teachers adoption of digital technology in education. *Computers & Education*. 2019. Vol. 128. P. 13-35.

21.   Scherer R., Siddiq F., Teo T. Becoming more specific: Measuring and modeling teachers' perceived usefulness of ICT in the context of teaching and learning. *Computers & Education*. 2015. Vol. 88. P. 202-214.

22.   Schumacker R.E., Lomax R.G. A beginner's guide to structural equation modeling (3rd ed.). New York: Routledge. 2010. 536 p.

23.   Srinivasan R., Lilien G.L., Rangaswamy A. Technological opportunism and radical technology adoption: An application to e-business. *J. Mark*. 2002. Vol. 66. P. 47-60.

24.   Straub E.T. Understanding Technology Adoption: Theory and Future Directions for Informal Learning. *Review of Educational Research*. 2009. Vol. 79(2). P. 625-649.

25.   Taherdoost H. A review of technology acceptance and adoption models and theories. *Procedia Manufacturing*. 2018. Vol. 22. P. 960-967.

26.   Taylor S., Todd P.A. Understanding Information Technology Usage: A Test of Competing Models. *Information Systems Research*. 1995. Vol. 6(2). P. 144-176.

27.   Teo T., Milutinovic V. Modelling the intention to use technology for teaching mathematics among pre-service teachers in Serbia. *Australasian Journal of Educational Technology*. 2015. Vol. 31(4). P. 363-380.

28.   Teo T., Lee C.B., Chai C.S., Wong S.L. Assessing the intention to use technology among pre-service teachers in Singapore and Malaysia: A multigroup invariance analysis of the Technology Acceptance Model (TAM). *Computers & Education*. 2009. Vol. 53(3). P. 1000-1009.

29.   Venkatesh V., Morris M.G., Davis G.B., Davis F.D. User Acceptance of Information Technology: Toward a Unified View. *MIS Quarterly*. 2003. Vol. 27(3). P. 425-478.

30.   Williams M.D., Rana N.P., Dwivedi Y.K. The unified theory of acceptance and use of technology (UTAUT): a literature review. *Journal of Enterprise Information Management*. 2015. Vol. 28(3). P. 443-488.

31.   Zhang L., Zhu J., Liu Q. A meta-analysis of mobile commerce adoption and the moderating effect of culture. *Computers in Human Behavior*. 2012. Vol. 28(5). P. 1902-1911.

АНАЛІЗ МОЖЛИВОСТІ ІНТЕГРАЦІЇ ІНФОРМАЦІЙНИХ ТЕХНОЛОГІЙ У ПРОЦЕС КОРПОРАТИВНОГО НАВЧАННЯ ПРАЦІВНИКІВ МОЛОКОПЕРЕРОБНИХ ПІДПРИЄМСТВ УКРАЇНИ

СЕНИК Юрій
Західноукраїнський національний університет

Нині на молокопереробних підприємствах використання новітніх IT-технологій в освітніх цілях знаходиться на низькому рівні. Саме тому, з метою вивчення мотивів, які суттєво впливають на намір використовувати техніку в процесі підготовки фахівців різного спрямування та рівня, було проведено дослідження на базі одного з молокопереробних підприємств західних областей.

Методологія аналізу базувалася на концепції TAM, в опитуванні взяли участь 32 спеціалісти різних служб молокопереробного підприємства західного регіону України, які займаються навчанням персоналу, крім конкретної роботи. Аналіз включає тестування на адекватність даних і модель дослідження – зв'язок між шістьма елементами дослідження. Отримані дані свідчать про відносно низький рівень впевненості в ефективності використання комп'ютерних технологій під час корпоративного навчання, а показник внутрішньої мотивації або особистих намірів (ВН) є найнижчим з усіх значень – 3,44. Таким чином, можна припустити, що такі дані пов'язані з певними внутрішніми переконаннями кожного члена групи опитаних працівників підприємства. Щоб перевірити це припущення, було використано багатопричинне моделювання (MIMIC), щоб оцінити, чи існує кореляція внутрішньої мотивації респондентів з їхнім віком і рівнем освіти. Розраховані коефіцієнти дозволять оцінити наявність прямого впливу цих двох змінних на рівень мотивації працівників, а їх значення можна інтерпретувати як можливу наявність додаткового чинника – наявність або відсутність наукового ступеня , а також різниця у віці респондентів.

Отримані результати статистичного аналізу встановили кореляційний зв'язок між мотивацією та вищою освітою працівників, вказуючи на те, що наявність ступеня спеціаліста чи магістра підвищує ймовірність використання комп'ютерних технологій у процесі навчання. Імовірно, це пов'язано з використанням електронних технологій навчання в програмах їх підготовки в університеті. Таким чином, очевидно, що для розширення використання IT-технологій у процесі корпоративного навчання необхідно формувати у співробітників компанії навички комп'ютерної грамотності, необхідні для життя в сучасному суспільстві та розвивати вміння використовувати новітні технології. для пошуку, аналізу, використання та передачі інформації.

Ключові слова: статистичний аналіз, інформаційні технології, переробка молока, корпоративне навчання, багатопричинне моделювання.