Increasing the sustainability level in agriculture and Natural Resources Universities of Iran through students' engagement in the value Co-creation process

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ABSTRACT

The scholars of sustainable development and education mostly believe that universities have an underlying role in explaining the movement of human societies towards sustainable development; but universities can play such a role, only if they themselves are sustainable as well. However, the subjects on sustainable development in Iran's higher education are still in their early stages and face many challenges. Some of these challenges are associated with the lack of engagement of university operators, especially students, in sustainability activities. Value Co-creation process in academic environments might be very effective in overcoming these challenges. Moreover, few studies have been conducted yet on what the relationship between Value Co-creation and sustainability level is and revealing the effective key factors in academic environments. In addition, the causal relationships between the factors influencing Value Co-creation in academic environments have not been taken into consideration by researchers. The overall aim of this study is to explore the effective factors in the engagement of universities and students in Value Co-creation process and to introduce a model for improving the level of Value Co-creation in academic environments. For this purpose, Mixed Method within a sequential-explanatory design was used. The results obtained from the content analysis showed that a total of eight factors affect the students' engagement in Value Co-creation process. The factors were classified into two general categories: (1) university-related factors (including university management support for sustainability-oriented activities, sustainability-oriented education, ICT infrastructures, and teaching quality of instructors); and (2) students-related factors (including Sustainability-oriented values, social capital, perceived self-efficacy, and trust in faculty members). The Structural Equation Model (SEM) of the study indicated that sustainability-oriented values, university management support for sustainability-oriented activities, trust in faculty members, social capital, and perceived self-efficacy have a direct and significant impact on the Value Co-creation process in the studied universities. There was also a positive and significant relationship between the engagement of students in Value Co-creation process and university sustainability.

1. Introduction

UNESCO trainings and the 21st Century Agenda centered on achieving sustainable development during the period from 2005 to 2014 have extended the Green Universities movement and got the universities to create a broader instructional program on a larger scale for sustainable development (Thomas, 2009). However, due to

the focus of issues around sustainability on top-down approaches, lack of interest in volunteering to engage in the sustainability process, constraints on the commitment and support of universities for training of Sustainable Development, and lack of cooperation of internal and external operators, these programs are still in their early stages in higher education and face many challenges (Ferrer-Balas et al., 2009; Leal Filho, 2009; Leal Filho et al., 2015).

The researches have recently focused on the Value Co-creation approach to engage operators in organizational activities (Cossío-Silva and Revilla-Camacho, 2016; See-To and Ho, 2014). Value Co-creation is a form of a business strategy that emphasizes the

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establishment and continuity of shared values between organizations and customers (Arnold, 2017). This approach is different from the traditional model in the past, i.e. "activity of organization with passive customers", and describes the role of Value Co-creation in innovation management processes (Hoffmann, 2007). Value Co-creation is a way of sharing, combining, and renewal of resources and capabilities among the organizations and their active customers to create value through new forms of interaction, service, and learning mechanisms (Zwass, 2010). University scholars consider Value Co-creation as a practice theory. Functions are the interactions and activities which are formed within the social system, where people work on the basis of their own social structures, interests and values (Kjellberg and Helgesson, 2007). In practice, Value Co-creation means the interaction among operators to create common value (Wong et al., 2016). The Value Co-creation related to university sustainability means the combination of sources, knowledge, abilities, and capacities of various university activists to improve instructional services and academic activities based on the sustainable development criteria. Therefore, applying the Value Co-creation approach in the issues related to sustainable development has provided the grounds for: (1) knowledge acquirement by the operators, (2) an increase in the level of ownership, (3) reducing contradiction, (4) encouraging innovation (management perspective); 5) comprehensive decision making, 6) promotion of equality, 7) creation of social capital (ethical perspective); 8) more dialogue; 9) reflection of individual values and attitudes; and 10) development of common attitudes and goals (social learning perspective) (Mathur et al., 2008). Accordingly, it can be deduced that Value Co-creation process by itself is an effective way to promote the sustainable development goals (Kruger et al., 2018).

Nevertheless, there is little empirical evidence on the role of Value Co-creation in integrating sustainable development into the academic structure. It is mostly outside the academic environment focusing on the issues like: customer loyalty to the organization (Cossio-Silva et al., 2016), market-oriented knowledge production (Jaakkola and Hakanen, 2013), tendency to buy through social networks (See-To and Ho, 2014), environmental planning (Reed et al., 2009), rural development and society (Thabrew et al., 2009), doing voluntary work or local and regional policy-making (Lozano, 2010). Considering the limited study resources both theoretically and empirically over the role of Value Co-creation process in explaining the sustainability level in the academic environment, the need for further research in this area will be felt more than ever (Aquilani et al., 2018; Sarmah et al., 2015). Additionally, very few studies have ever been done on the effective factors in the students' engagement in Value Co-creation process to achieve sustainability. Furthermore, the lack of a model which universities could use to promote the Value Co-creation level is strongly felt. On this basis, the current study looks forward to answering the following questions: 1) what is the relationship between the level of students' Value Co-creation in academic environments and university sustainability? 2) What factors affect the students' engagement in Value Co-creation to increase the level of University Sustainability? 3) How is the relationship between these factors?

2. Development of theoretical model and hypotheses

2.1. Value co-creation and sustainable university

According to Scoulos (2010), a Sustainable University is the one that contributes to sustainable development; a university that can provide a comprehensive and advanced message in all aspects of sustainable development for promoting social justice, economic prosperity and avoiding a negative impact on the environment through the concepts, principles and methods of education for

sustainable development. According to this definition, we face three levels of analysis: (1) curriculum and programs; (2) governance, processes, and culture; and (3) infrastructure. In addition, Wright (2004) indicates the basic elements of activity in universities for sustainability institutionalization within five elements identified during the analysis and updating processes in the academic system: 1) establishment of cooperation in universities; 2) development of interdisciplinary sciences; 3) use of sustainable development in the academic environment experiences combined with sustainable development in daily activities; 4) training of academic instructors on how to teach sustainable development issues to their students and prepare them for multiple roles; and 5) combining sustainable development within the university's institutional framework, in which sustainable development as a "golden theme" should be merged into all parts.

The systematic studies of legal declarations and documents related to sustainable development at the universities suggest that approximately five elements are considered by all declarations to institutionalize sustainability at universities: 1) curriculum; 2) external community and cooperation; 3) academic environment activities; 4) research; and 5) university management (Dagiliūtė and Liobikiene, 2015; Lee et al., 2013; Green, 2013; Mintz and Tal, 2014; Zsóka et al., 2013; Vicente-Molina et al., 2013). These studies concentrate on the required structures to achieve a sustainable university. Their least common expectation from a sustainable university is to integrate sustainability into education, research, operations, and social activities. Based on this, a sustainable university is a reflection of thoughts and activities whose members put their activities in direction of sustainable development, and active engagement among the university internal operators in sustainability plans is one of the key principles of the university's organizational change in order to be developed into a sustainable university. (Tilbury et al., 2011; Mauser et al., 2013).

Participatory processes are based on the use of experiences and values of all operators in planning, production and execution of programs (Arnold, 2017). The experiences exchange within interactive processes provides the conditions for identifying and combining resources, as well as providing the necessary substrates for cooperation in order to create common knowledge and values through exchange processes (Payne et al., 2008). Furthermore, when the university's production services on the sustainable development have the support of operators and come from the co-creativity process, they are more likely to be accepted (Disterheft et al., 2015). Therefore, the operators' participation in the Value Co-creation process can create new capabilities for the university in order to achieve the sustainability adaptable to the characteristics of Sustainable University (Song et al., 2011; Spohrer et al., 2008; Vargo, Maglio and Akaka, 2008; Jaakkola and Hakanen, 2013; Tuli et al., 2007).

H1. Students' engagement in Value Co-creation process has a significant impact on the level of university sustainability.

2.2. Effective factors in students' engagement in value co-creation process

Hassan et al. (2015) have divided the factors affecting Value Co-creation in higher education institutions into three categories: 1) Management-related factors; 2) Student-related factors (personal, psychological, etc.), and 3) Information and Communication Technology (ICT) Infrastructures. Alves et al. (2016) analyzed the effects of factors such as self-efficacy and social capital on the customer engagement in Value Co-creation process. Their research findings indicated that organizational activities (such as education), self-efficacy and social capital impact on the engagement of customers along with organization in Value Co-creation process have

made an impact. Using the linear hierarchy model in their study, Hsiao et al. (2015) showed that management support systematically affects Value Co-creation between hoteliers and their customers. Meanwhile, the customers' self-efficacy acts as a key intermediary. See-To and Ho (2014), taking advantage of deep and systematic library and field studies, pointed out that trust in others affects the level of Value Co-creation among individuals. Grissemann and Stokburger-Sauer (2012), using the Structural Equation Model, indicated that support of company directors for Value Co-creationsignificantly increases the Value Co-creation level. Using Delphi technique and semi-structural interviews, Disterheft et al. (2015) revealed that the success of participatory approaches (such as Value Co-creation) for sustainability at the universities depends on the structural conditions of institution and skills and competencies of involved individuals. In a study entitled "Use of Sustainability in Universities Based on the Perception of Faculty Members and Staff - a Model from the Sweden University", Sammalisto et al. (2015) explained that the integration of sustainability into the academic processes is such a devastating process that requires the commitment of senior university management for sustainability and ongoing educations on sustainability. In their research entitled "Promoting of Sustainability in Workplace: A Survey on the Environmental Supportive Behavior of University Staff", Blok et al. (2015) offered a model in which both internal and external factors influencing the application of sustainability by university staff had been demonstrated. These factors are internal factors (environmental knowledge and environmental values), and external factors (managers support and positional factors).

According to the conducted research, the effective factors on the students' engagement in Value Co-creation process can be categorized into Effective Student Sources and Effective University Sources (Table 1). The relationships between these factors are depicted in Fig. 1.

2.3. University leadership and value co-creation

Leadership is the process of influencing others in order to understand the needs and make an agreement on how to achieve them. Leadership is the process of facilitating individual and collective efforts to achieve common goals (Sidrat and Frikha, 2018). These definitions represent the importance of leadership as a management function that helps maximize the effectiveness and achievement of organizational goals. In academic environments, effective management has been known as an effective component to achieve academic goals. Unger et al. (2012) doing a field study indicated that the engagement of senior management in executive projects has a positive and significant effect on the outcome and quality of project implementation. They also improve the project implementation process through monitoring and developing strategies.

University leadership has a critical role in improving the Value Co-creation process. Nuttavuthisit (2010), Payne et al. (2008) and Strobacka et al. (2016) have demonstrated that academic community members are inherently capable of Value Co-creating and developing their own personal relationships and accept a wide range of roles; though, their performance around Value Co-creation depends on the organizational and management capacities in order to integrate the resources and human force abilities into other organizational resources and develop appropriate strategies and approaches (Trumbull, 2006; Lambert et al.). Integration of sources and capacities in Value Co-creation process is important, because; 1) on one hand, individual resources and abilities in the Value Co-creation process cannot be exploited alone and it will be valuable when integrating with other resources. On the other hand, students' intentions for the sustainability subjects are considered as a source of information, and by providing ICT infrastructures, university management should provide the necessary requirements for the sharing of these informational sources by students. (Xie et al., 2016); 2) Innovations are often the result of recombination of existing sources. This implies that the role-players of Value Co-creation process at the university share their resources with each other and create a new form of service, which has more efficiency and effectiveness than the previous ones and meets the operators' needs. For instance, combination of university sources with student sources provides the required conditions for more appropriate and effective activities acceptable to the groups engaged in Value Co-creation process (Lusch et al., 2010).

When there are interactive contacts between students as the consumers of goods and services and university as the providers of those goods and services, an opportunity of Value Co-creation is provided for the university (Grönroos and Helle, 2010). Thus, Frow et al. (2015) stated that development of physical and communicative structures through management had an impact on the improvement of instructional services and Value Co-creation process at the universities. Development of ICT infrastructures provides the basis for developing interactive contacts in the academic environments and Web-based sustainability trainings. Furthermore, teaching quality in academic environments will improve through the mutual feedback between faculty members and students, as well as

Table 1
Effective sources of universities and students to engage in the value Co-creation process.

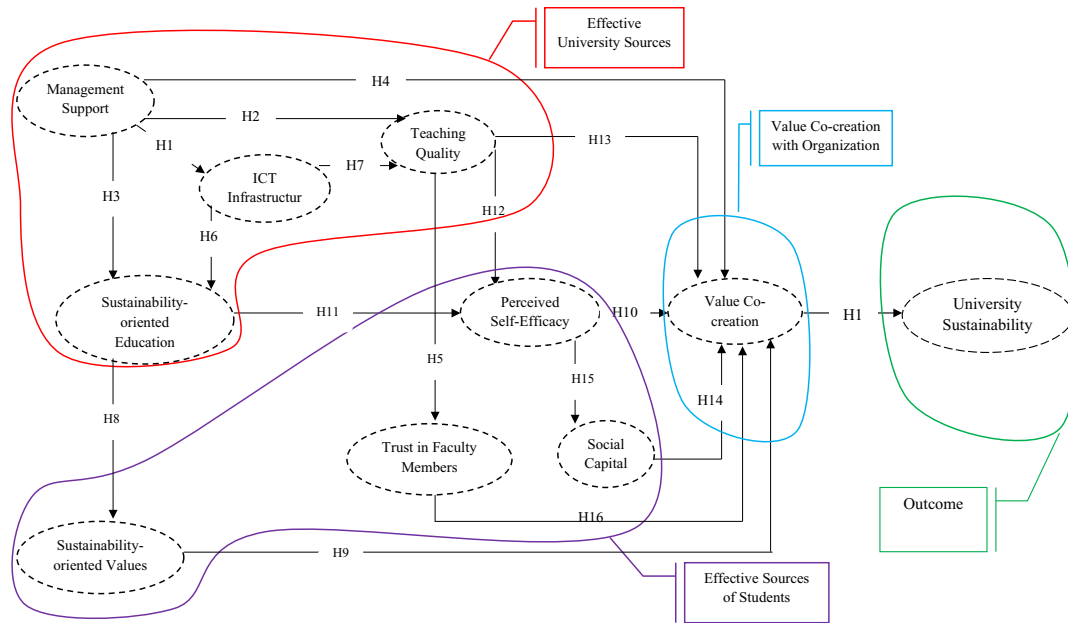| Researcher	Year	Effective Student Sources				Effective University Sources			
		Self-Efficacy	Social Capital	Trust in Faculty Members	sustainability-oriented values	University Management Support	ICT Infrastructures	Teaching Quality	Sustainability-oriented Education
Alves et al.	2016	√	√						√
Hasan et al.	2015					√	√		
Tseng & Chiang	2016		√	√					
Sammalisto et al.	2015					√			√
Krasny & Delia	2015							√	√
Hsiao et al.	2015	√				√			
Disterheft et al.	2015		√			√			
See-To & Ho	2014			√					
Blok et al.	2014	√	√		√	√	√		
Sidiropoulos	2014							√	√
Zsóka et al.	2013				√				√
Grissemann & Stokburger-Sauer	2012					√			
Brown and Reed	2012				√				
Kurland	2011				√				
Lukman & Glavic	2007					√			
Stern et al.	1999				√				

Fig. 1. Theoretical framework.

the formation of student social networks (Pattinson, 2017). Having an impact on other variables, this can in turn cause an increase in the level of Value Co-creation in university.

H2. University management support has a significant effect on the development of ICT infrastructures.

H3. University management support has a significant effect on the teaching quality of faculty members.

H4. University management support has a significant effect on the education related to Sustainable Development.

H5. University management support for the sustainability issues has a significant effect on enhancing the level of Value Co-creation in academic environments.

H6. Teaching quality affects the students' trust in faculty members.

H7. Physical and communicative structures of the university are effective in sustainability-oriented education at the university.

H8. Physical and communicative structures of university are effective in the professors' teaching quality.

2.4. Values education and value co-creation

Values are known as a critical subject in formation of human attitudes, including sustainability-oriented behaviors (Deveci, 2015; Schwartz, 2012; Zsóka et al., 2013; Mascia et al., 2003; Robertson and Hull, 2001). The values impact the decisions and judgments of people in the environment, thereby helping with the prediction of behavioral tendency and treatment. Arrow (2012) claims that values can be regarded as the principles which guide us as a human, family, company, and society in the direction of our wishes and say how we use our resources to achieve our goals (Caprara et al., 2006; Dietz et al., 2005; Moore and Asay, 2017; Alas et al., 2006). Moreover, the Value-Belief-Norm (VBN) Theory in the field of sustainable development emphasizes the correlation between values and decisions in terms of sustainability (Stern, 2000; Fransson and Gärling, 1999). VBN theory points out that the values influence the fundamental beliefs of individuals related to the environmental changes and consequently, act in the way of doing the activities parallel to sustainability (Sténs et al.,

2016). It's obvious that values can be passed through family training, school education, literature, art and media (Kostina et al., 2015). Education can strengthen the sustainability-oriented attitudes amongst students through the transfer of sustainability-oriented values (Zsóka et al., 2013; Lukman et al., 2013). Therefore, teaching of sustainability-oriented values is recognized as the most principal approach to the higher education system in order for students to achieve sustainability and empowerment and build a sustainable future (Leal Filho et al., 2018). Teaching of values is an aspect of instructional activities aimed at teaching of ethical or political values, norms, orientations and skills rooted in the values (Thornberg, 2016; Jones, 2009; Lovat et al., 2010). Not only should teaching of values help students broadcast ethical values, but also empower them to express ideas and be accountable for their activities (Brownlee et al., 2016). Accordingly, teaching of sustainability-oriented values follows two general objectives: (a) to grow the learners' ethical values in order to raise awareness, commitment, and accountability toward sustainability; and (b) to develop the individual and social capabilities of learners to turn into aware, committed, accountable and active citizens in terms of sustainable development (Halstead and Pike, 2006).

H9. There is a positive and significant correlation between teaching of values and sustainability-oriented values among students.

H10. There is a positive and significant correlation between the students' sustainability-oriented values and their engagement in the Value Co-creation process for the sustainability institutionalization at the university.

2.5. Sustainability-oriented education, self-efficacy, and value co-creation

From the point of view of Social- Cognitive Theory, human attitude is involved in an exchange action, and this action depends on individual behaviors, internal factors (such as thoughts and beliefs) and environmental factors (Sallis et al., 2015). The assumption of this theory is that individuals are involved in their development and can influence their own attitudes. This theoretical perspective considers people as self-organizing, predictive and self-regulating individuals and not as the reactive organisms which

are absolutely influenced by the environment. It implies that how people act and perceive the reality is affected by their control and influence on life. Before doing a specific kind of behavior, individuals would initiallythink of the environmental and social outcomes. Therefore, human activities are a result of dynamic action of individual characteristics and environmental factors (Federici and Skaalvik, 2011).

Considering the relationship between individual characteristics and attitudes, the studies have suggested that self-efficacy, as a key component of cognitive-social theory, impacts on the individuals' attitude (van Dinther et al., 2011). Confirming this, Bandura (1997; cited by Montano and Kasprzyk, 2015) states that self-efficacy affects decision-making, action methods, effort, hard-working and flexibility. People are more likely to do the things they are capable of and avoid the things they are not capable of doing. Accordingly, the self-efficacy theory says that all the processes related to mental and behavioral change are influenced by one's feelings of individual abilities (Montano and Kasprzyk, 2015). So, it can be clearly argued that self-efficacy can act as a fundamental element in Value Co-creation to achieve sustainability.

H11. Students' perception of their self-efficacy has an impact on their engagement in Value Co-creation process.

Social-cognitive theory has identified four sources for promoting the self-efficacy of students: Direct Individual Experiences, Observational Experiences, Social Proof, and Psychological Situations. Direct individual experiences refer to the reliable successes that arise from being faced with different situations (Bandura, 1997; sited by van Dinther et al., 2011). This kind of experience is considered as a powerful source for students to enhance their self-efficacy, because of providing reliable evidence regarding their ability to do things (Palmer, 2006). Cantrell et al. (2003) argue that instructors provide students with the opportunity to acquire direct experiences by providing the students the subject matter and assigning the time they need for teaching, and this, in turn, helps to raise the students' self-efficacy.

The second source of self-efficacy is fulfilled by the observation of social experiences (also called "indirect experiences"). Students gather information about their ability level by observing others' behavior (Schunk, 1987). Comparing their abilities with others and their achievements in performing similar activities, students feel a strong sense of self-efficacy. Wingfield et al. (2000) illustrated that participatory and web-based instructional programs affect the level of student self-efficacy in different ways: 1) participatory activities bring direct experiences to students through interaction with their classmates; 2) provides background for observational experiences by comparing the students' abilities with other classmates while performing participatory evaluations and structuring the curriculum; 3) students' abilities receive verbal (social) approval from the instructor, university management and colleagues.

The third source of self-efficacy formation is Social Proof. Students often receive the information which confirms their ability to do activities (Schunk, 1987). Confirmatory communication and feedback assessment are very effective in self-efficacy formation, especially if they come from the people who are considered to be knowledgeable and reliable by students (such as faculty members and university management) (Bong and Skaalvik, 2003). The fourth information source for the students' self-efficacy refers to their psychological, emotional and sentimental situations. The symptoms and emotions such as worry, anxiety and stress are interpreted as a sign of failure. On the contrary, showing positive emotions can help to promote their perceived self-efficacy (Pajares, 1997).

Based on the improving sources of self-efficacy, the studies suggest that instructional programs have an indisputable role in development of students' self-efficacy (van Dinther et al., 2011;

Abbitt and Klett, 2007; Milman and Molebash, 2008).

H12. Education is effective in promoting the students' self-efficacy.

H13. Teaching quality is effective in promoting the students' self-efficacy.

H14. Teaching quality is effective in the students' engagement in Value Co-creation process.

2.6. Social capital and value co-creation

The studies conducted in the past decade have concentrated on the Service Dominant Logic (SDL) both in academic and managing aspects (Karpen et al., 2012). The mainstay to the concept of SDL is to rely on the activity and participation of individuals in real exchanges and Value Co-creation through engagement in interactive processes (Yi and Gong, 2013; Grönroos and Voima, 2013). SDL says that experiences don't create value by themselves, and interaction provides a way to develop a two-way process of value creation. In other words, each actor cannot create value by oneself and only when the actors interact with each other, can value creation occur (Vargo and Lusch, 2004). The level of interaction expresses the degree of operators' participation with each other and other operators. Therefore, the interaction level is known as a significant feature in the development of Value Co-creation. Emphasizing the relationship between the organization and its active clients, this fact is in a close relationship with the communicative concepts, especially the goals and scopes of communication in communication processes (Vargo and Lusch, 2008).

According to SDL, Gummesson and Mele (2010) explain how Value Co-creation is achieved through interaction and integration of resources. They declare that actors in Value Co-creation process are integrated into the types of social networks in which they can exchange and shape their experiences (Vargo and Lusch, 2008). In these networks, each actor plays a different social role which sounds more appropriate as a source for exchanging experiences and reaching a higher social status. Network-based interactions stimulate the sources integration, thereby preparing the backgrounds for value creation (Gummesson and Mele, 2010). Confirming this, Eggens et al. (2008) stated that the achievement of academic goals is influenced by the quantity and quality of individual and social communicative networks of students. Interpersonal actions or communicative social capital affect the sharing of knowledge and experiences among students as one of the pillars of Value Co-creation (Tiwana and Mclean, 2003).

H15. The students' social capital is effective in their engagement in the Value Co-creation process.

H16. Perceived self-efficacy has an effect on the students' social capital.

H17. Trust in faculty members is effective in the students' engagement in Value Co-creation process.

Considering what has so far been said about the effective factors in the operators' engagement in Value Co-creation process and relationship between them, the theoretical model of study was developed in accordance with Fig. (1).

3. Methodology

3.1. Research plan

The qualitative method and content analysis of more than 75

papers published in the areas of co-creation, Value Co-creation, and sustainable higher education were applied to identify the factors affecting Value Co-creation in academic environments for sustainability institutionalization. To select the papers, the research group paid more attention to the ones which would most closely resemble the research title and were published in international valid journals. Subsequently, the collected articles were analyzed by NVivo10 software. The findings obtained from the content analysis of papers and coding processes suggested that factors affecting Value Co-creation in university environments for achieving sustainability could be known as eight factors (see Table 1).

A quantitative research method was applied to test the theoretical model of research and the hypotheses. For this purpose, a questionnaire was proposed based on the research records in the form of a ten-score scale for the latent variables of study. Subsequently, the questionnaires were sent electronically using email and telegram to the postgraduate students of the studied universities. Some part of the questionnaire contains the guidelines related to each sector for the respondents how to respond to questions. Respondents were asked to respond to the questions on the basis of their experiences related to sustainable development and Value Co-creation process in academic environments. The scores gained by each respondent were ranked as a benchmark for further analysis.

3.2. Measuring of study variables

The Yi and Gong's (2013) questionnaire was used to measure how much students are engaged in Value Co-creation process. In this questionnaire, Value Co-creation would consist of two dimensions of participatory behavior and citizenship behavior, each of which, in turn, has four sub-dimensions. Knowledge sharing, information seeking, accountability attitude, and interpersonal interactions are the four dimensions of participatory behavior; and feedback, support, help, and Tolerance constitute the four sub-dimensions of citizenship behavior. Xie et al. (2018) was used to measure the level of trust in faculty members. This questionnaire relies on the trust mechanism between leaders and subordinates. In order to measure the students' self-efficacy, the questionnaire by Müller and Golc (2003), Yilmaz et al. (2007), and Yesilyurt et al. (2016) was applied. It is constituted of dimensions of instructional self-efficacy, ability to create positive atmosphere in the classroom, ability to attract social participation, and ability to influence classroom decision-making. The studies performed by Tsai and Ghoshal (1998) and Liu (2013) were applied to measure the level of social capital. In order to determine the sustainability level of studied universities, a researcher-made questionnaire was developed in five sections: economic, social, environmental, educational, and research. Then, the questionnaire was provided to 120 managers of the studied university and they were asked to rate the implementation of each of the items explaining the university's sustainability by giving grades from 1 to 10. The sum of obtained scores was set as a criterion to assign the level of university sustainability. The indicators used to assess university sustainability are shown in Appendix (1). The variables of university management support, sustainability-oriented values, sustainable development education, ICT infrastructures, and teaching quality were measured by a researcher-made questionnaire as well. This questionnaire and its sections are shown in appendix (2).

3.3. Statistical population and sample

Population of the study consisted of the graduate students of Iranian Agriculture and Natural Resources Universities (N = 2407), of which 214 persons were selected using the Cochran's formula considering the standard deviation of Value Co-creation variable.

Stratified method with the probability proportional to size (number of students per university and gender) was used for sampling. It should be noted that the necessary condition for the selection of students as a statistical sample was the publication of at least two scientific papers related to sustainable development or related topics. Ten questionnaires were incomplete and were excluded from the analysis process. The mean age of respondents was 26.57 years. 47.5% was male and 52.5% female in terms of gender. The students of Agriculture and Natural Resources Universities of Khuzestan, Sari and Gorgan would constitute 21.98%, 36.44%, and41.58% of respondents, respectively. 82.1% were Master students and 17.9% PhD students.

3.4. Statistical analysis

In order to estimate the theoretical model of research (Fig. 1), Structural Equation Modeling (SEM) was applied empirically (Fig. 2) and LISREL8.8 software was used. SEM is a method used to represent, evaluate, and test hypotheses about the causal relationship between observed and latent variables (Zampetakis and Moustakis, 2006). This approach has two stages of measuring modeling and structural modeling (Maruyama, 1997; sited by Tsai and Cheng, 2010; Hair et al., 2011). In the first stage, the validity of used indicators for measuring latent variables is evaluated through Confirmatory Factor Analysis (CFA). At this stage, the items like Composite Reliability (CR), Average Variance Extracted (AVE), and Diagnostic Validity are evaluated. In the second stage, the causal relationships between the latent variables, hypothesis testing, and "whether the proposed model is empirically acceptable to Value Co-creation behavior" are tested.

4. Findings and discussion

4.1. Validity and reliability

In this study, composite reliability (CR) and Cronbach's alpha coefficient (α) were used to check out the reliability. Construct Validity (or AVE), Average Shared Variance (ASV), and diagnostic validity were used in order to determine validity. If the AVE, CR and Cronbach's alpha values are higher than 0.4, 0.6 and 0.7, respectively, then the validity and reliability of the research tool will be considered appropriate and acceptable (Monavvarifard et al., 2015). The results of evaluation of these indices in Table 2 express the high validity and reliability of the measurement tool.

The findings from the correlation coefficient in Table (2) explain that there is a positive and significant relationship between the students' social capital and their engagement in the Value Co-creation process (r = 0.589). That is, as the level of social capital increases, students will be more likely to get engaged in Value Co-creation process. Therefore, if universities act as a system in which individual expertise and social experience are considered as a tool for better service, then the social capital of this system's members will potentially be a valuable source to manage affairs and facilitate Value Co-creation process at the university to promote the sustainability level. As consistent with that part of the point of view, this finding is a dominant logic that considers the interactions between actors as the cornerstone of Co-creation process. Also, it is consistent with the findings from Alves et al. (2016); there is a positive and significant correlation between the level of social capital and operators' engagement in Value Co-creation process.

Findings indicate that there is a positive and significant relationship between the self-efficacy level of students with their engagement in Value Co-creation process (r = 0.520). This suggests that the self-efficacy level of students is a fundamental factor for their engagement in Value Co-creation process. In fact, students
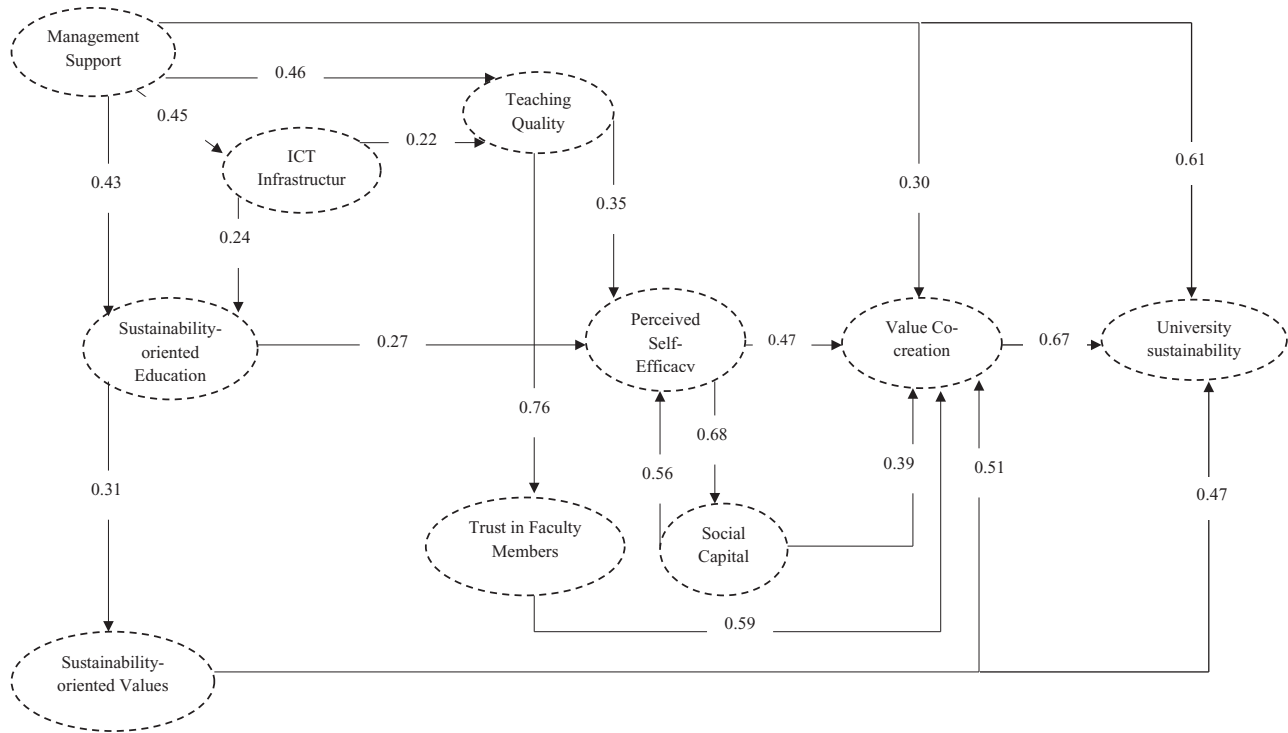
Fig. 2. Research's structural fit model.

Table 2
Correlation coefficient between latent variables of research, and validity and reliability of research tool.

Variable	AVE	CR	α	1	2	3	4	5	6	7	8	9	10
Social Capital (1)	0.46	0.88	0.87	0.678									
Self-Efficacy (2)	0.70	0.90	0.89	0.417**	0.836								
Sustainability-oriented Values (3)	0.43	0.83	0.82	0.573**	0.511**	0.665							
Trust in Faculty Members (4)	0.64	0.92	0.92	0.357**	0.226**	0.497**	0.800						
Teaching Quality (5)	0.62	0.92	0.94	0.443**	0.247**	0.503**	0.796**	0.787					
Management Support (6)	0.72	0.93	0.92	0.213**	0.182**	0.263**	0.451**	0.558**	0.868				
Technology (7)	0.47	0.65	0.69	0.252**	0.173*	0.189*	0.464**	0.397**	0.434**	0.685			
Education (8)	0.68	0.87	0.86	0.173*	0.192**	0.299**	0.604**	0.612**	0.512**	0.824			
Value Co-creation (9)	0.61	0.85	0.84	0.589**	0.520**	0.642**	0.505**	0.585**	0.455**	0.416**	0.444**	0.612	
University sustainability (10)	0.47	0.81	0.83	0.142*	0.156*	0.592**	0.151*	0.207*	0.410**	0.166*	0.202**	0.524**	0.675

Note: Bold items refer to the square root of shared variance between the structures and indices used to measure them (ASV). Pale ones indicate the correlation between the variables. For diagnostic validity, the value of bold items should be greater than the correlation values in each column.

with higher levels of self-efficacy feel confident in their capabilities to engage in sustainable development issues and present more commitment to university sustainability and get more engaged in related activities. Confirming this, Bandura (1997) points out that people are making an attempt to choose the jobs they are able to do and do away with what they are not able.

Sustainability-oriented values enjoy the highest correlation with the students' engagement in Value Co-creation processes (r = 0.642). This finding clearly shows that students' engagement in the Value Co-creation process linked with sustainable development is closely related to their sustainability values. Based on this, it can be concluded that students with values of natural resources use in comparison with students with internal values of natural resource conservation need stronger and more rational reasons to engage in the sustainability-oriented Value Co-creation process. This finding is compatible with the results obtained from Urien and Kilbourne (2011), on the role of a wide range of values on sustainability behaviors, and that individuals choose sustainable behaviors based on their values; Moore and Asay (2017), on the cognitive model of human behavior hierarchy and the Norm-Belief-Value Theory,

based on the indirect association between values and decisions for sustainability; and Brown and Reed (2012), on the fundamental role of values in engaging individuals in sustainability processes.

As it can be seen, there is a positive and significant relationship between the engagement level of students in Value Co-creation process and the sustainability level in the studied universities (r = 0.524). This finding is in accordance with the results from Disterheft et al. (2015), Song et al. (2011), and Jaakkola and Hakanen (2013), on the important role of operators' engagement in Value Co-creation process in promoting of university sustainability and access to a sustainable university.

4.2. Measuring model

CFA was applied to determine whether the indicators used to measure latent variables would be valid. The results obtained from of the study's measurement model (Table 3) and the reported value of fit indices for CFA (Chi-Square = 364.16, df = 190, P-value = 0.000, RMSEA = 0.046, IFI = 0.93, CFI = 0.93, NFI = 0.91, NNFI = 0.91, GFI = 0.94, AGFI = 0.89, PGFI = 0.57) indicate that data is statistically

compatible with the factor structure and latent variables of the study. Therefore, it can be said that the selective indicators are of sufficient accuracy to measure the latent variables of the study, and their validity and reliability are also confirmed.

These findings suggest that the two aspects of information seeking and knowledge sharing in respect with the participatory behavior and the two aspects of help and support for sustainability activities in respect with the citizenship behavior are of greater importance in explaining the students' behavior for engagement in Value Co-creation process.

4.3. Structural model and hypothesis testing

After evaluating the measurement model, the latent variables were entered into the structural equation. Representing a suitable adaptation of structural model, findings reveal that fit indices are acceptable to the structural model. Fit indices exhibit that there is no remarkable remnant in the data texture, while the causal relationships are well explained and the measurement error in the pattern is well controlled as well (x^2/df = 1.98), P-value = 0.000, RMSEA = 0.039, IFI = 0.91, CFI = 0.90, NFI = 0.89, NNFI = 0.88, GFI = 0.92, AGFI = 0.87, PGFI = 0.54). These findings suggest that the proposed model is well able to explain the Value Co-creation behavior in agriculture and natural Resources universities.

The structural model output in Fig. 2 implies that the variables of sustainability-oriented values (t = 6/35, β = 51/5), management support (t = 73/3, γ = 30/3), trust in faculty members (t = 7.34, β = 0.59), social capital (t = 3.69, β = 0.39) and perceived self-efficacy to engage in sustainable development issues (t = 5.85, β = 0.45)) have a direct and significant impact on the Value Co-creation process in the studied university. These findings are consistent with the results from the researches of Alas et al. (2006) and Caprara et al. (2006), on the effect of values on individuals' decision-makings and judgments in the environment and their role in explaining behavioral intentions and behavior; Hassan et al. (2015), Nuttavuthisit (2010), Payne et al. (2008) and Storbacka et al. (2016), on the effectiveness

of university management support for sustainable development issues and participation on the students' engagement in Value Co-creation process at the academic environments; and Tseng and Chiang (2016), on the impact of communication quality on the individuals' engagement in Value Co-creation process.

The structural model of study represents that the university's ICT infrastructures would influence the teaching quality in academic environments and the implementation of sustainable training. On the other hand, teaching quality and sustainability-oriented education are considered as the fundamental factors for students to engage in Value Co-creation process. Accordingly, it can be argued that developing the ICT infrastructures at the university, the conditions of students' engagement in Value Co-creation process will be provided and students will be more likely to engage in this process for institutionalization of sustainability. This finding is in accordance with the study by Frow et al. (2015).

According to the structural model, hypothesis H14 concerning the direct effect of teaching quality (t = 1.61, β = 0.13) on Value Co-creation process was rejected. The findings, However, show that (see Table 5) the quality of teaching (with value of 0.38) has the highest indirect effect on Value Co-creation process in the studied universities in order to improve the sustainability level. So, teaching quality in academic environments is considered a fundamental factor for students to engage in Value Co-creation process. After teaching quality (with a value of 0.38), university management, social capital, perceived self-efficacy, and sustainability-oriented education, with the values of 0.29, 0.26, 0.20 and 0.18, respectively, have the highest indirect impact on the students' engagement in Value Co-creation process.

The final output of structural model, along with the t-value, explained variance, factor loading, total effect, and hypotheses outcome, can be observed in Table 4. It should be noted that the research variables explained 71% of the variance of Value Co-creation behavior for sustainability institutionalization in the studied universities, where the perceived self-efficacy (with a value of 0.67) would have the highest effect on the Value Co-creation

Table 3
Outputs of the results obtained from the measurement model of latent variables of the study.

Latent Variable	Indicator	Scandalize Factor Loading	t-value	Latent Variable	Indicator	Scandalize Factor Loading	t-value
Social Capital	Soc1	0.62	9.71	Teaching Quality	Teach1	0.79	13.19
	Soc2	0.54	8.03		Teach2	0.85	14.63
	Soc3	0.61	9.45		Teach3	0.85	15.67
	Soc4	0.86	14.93		Teach4	0.81	14.20
	Soc5	0.79	13.18		Teach5	0.79	13.61
	Soc6	0.79	12.38		Teach6	0.78	13.69
	Soc7	0.67	10.56		Teach7	0.77	12.01
	Soc8	0.60	9.86		Teach8	0.78	12.74
	Soc9	0.57	8.39				
Self-Efficacy	Effi1	0.75	12.48	Management Support	Prot1	0.81	13.24
	Effi2	0.89	16.26		Prot2	0.91	16.03
	Effi3	0.94	17.83		Prot3	0.90	16.57
	Effi4	0.77	12.87		Prot4	0.88	15.16
					Prot5	0.76	13.08
Sustainability-oriented Values	Value1	0.72	10.80	Trust in Faculty Members	Trust1	0.76	12.31
	Value2	0.48	6.86		Trust2	0.88	15.59
	Value3	0.59	8.48		Trust3	0.91	16.39
	Value4	0.62	9.22		Trust4	0.82	13.83
	Value5	0.69	10.17		Trust5	0.81	13.45
	Value6	0.79	11.68		Trust6	0.79	14.27
					Trust7	0.59	9.81
Education	Educat1	0.73	11.61	ICT Infrastructures	Techno1	0.74	9.56
	Educat2	0.92	15.82		Techno2	0.63	8.47
	Educat3	0.83	13.82				
Participatory behavior	Search	0.78	8.65	Citizenship Behavior	Reflect	0.53	6.43
	Share	0.62	7.69		Advocacy	0.89	8.68
	Responsible	0.31	3.83		Help	0.90	8.29
	Interact	0.41	4.92		Tolerance	0.67	7.74

process. Moreover, the level of students' engagement in Value Co-creation process, sustainability values, and university management support for sustainability activities would totally explain 0.58% of the variance in the sustainability level of university.

5. Conclusion

It has been argued that Value Co-creation in academic environments can accelerate the movement of universities to achieve sustainability and overcome the challenges that university face in this regard. However, there is little information and empirical evidence in this area. Considering these limitations, this study attempts to answer the following three questions using a mixed method (within a sequential-exploratory design): 1) what is the relationship between the level of students' engagement in Value Co-creation process and the level of university sustainability? 2) What factors affect the students' engagement at the university environments? 3) What are the causal relationships between these factors?

Students' engagement in Value Co-creation process has been recognized as a fundamental factor for the movement of universities toward achieving sustainability and is influenced by two general factors: (1) university-related factors; and (2) student-related factors. University-related factors mostly concentrate on training activities and ICT infrastructures, and university management support for sustainability activities. On the other hand, student-related factors have focused more on the students' psychological issues and are influenced by academic factors. Actually, as the quality of teaching by the instructors improves sustainability trainings develop at the university environments, trust among the operators, perceived self-efficacy of students for engagement in interactive processes and their sustainability-oriented values will be improved. These findings will assist university managers in planning for the development of Value Co-creation process at the university and the institutionalization of sustainability in university structure. The proposed structural model provides an appropriate mechanism for managers to focus on the activities and subjects that have the greatest effectiveness in explaining the movement of university towards sustainability. For instance, university managers could make use of this model to explore a specific group of students with the highest ability and competence to engage in Value Co-creation process. Then choose the students who have higher sustainability values, social capital, trust, and self-efficacy than others for engagement. Managers are recommended to pay attention to the factors which directly affect the engagement of students in the process. It would be worth noting that paying attention to the all aspects of Value Co-creation process is essential to develop the university sustainability.

The proposed model provides a framework for promoting the level of Value Co-creation in order to institutionalize sustainability regarding the factors affecting it. Therefore, it tries to fill the research gap in this area. The identified individual factors seem to act as the pillars of students' engagement in Value Co-creation process. On this basis, it can be concluded that this study has achieved its goal to fill the existing research gap on the factors affecting Value Co-creation process in academic environments and to explain the relationship between Value Co-creation and sustainability at the university.

Theoretically, the present study contributes to the development of sustainable university literature, Value Co-creation, Norm-Belief-Value Theory, and the important role of collaboration and participation in achieving sustainable development goals in academic environments. The findings of this study can help the literature of sustainable development and Value Co-creation in several aspects:

1) Students' engagement in Value Co-creation process would be regarded as a key factor in explaining the university's movement towards sustainability. Students share their knowledge and information about sustainable development issues by engaging in the participative behavior. Searching and sharing of information, on the one hand, makes it possible for instructors to take advantage of appropriate teaching and learning methods to teach sustainable development subjects. Conversely, it assists students in developing their required capabilities or their perceived self-efficacy to overcome the problems associated with sustainable development. Engaging the students in citizenship behavior leads to responsibility, assistance, and support for sustainable activities. Based on this, in addition to developing ideas through searching and sharing of information, students' engagement in Value Co-creation process can also help them to take responsibility for sustainability activities;

2) University movement to sustainability requires the university management support for sustainability activities. University management can accelerate the movement of university towards sustainable development at least in four ways: 1. Supporting sustainability-oriented education which develops the

Table 4
Direct effects, total, t-value and explained variance of the study's latent variables.

Parameters	γ	t-value	total effect	R^2	Hypotheses	Result
University Management Support → ICT infrastructures	0.45	5.60	0.45	0.21	H2	Accepted
University Management Support → Teaching Quality	0.46	5.72	0.55	0.25	H3	Accepted
ICT infrastructures → Teaching Quality	0.22	2.98	0.22		H8	Accepted
University Management Support → Sustainability-oriented Educations	0.43	5.35	0.55	0.38	H4	Accepted
ICT infrastructures → Sustainability-oriented Educations	0.24	3.01	0.24		H7	Accepted
University Management Support → Value Co-creation	0.30	3.73	0.59	0.71	H5	Accepted
Trust in Faculty Members → Value Co-creation	0.59	7.34	0.59		H17	Accepted
Self-Efficacy → Value Co-creation	0.47	5.85	0.67		H11	Accepted
Sustainability-oriented Values → Value Co-creation	0.51	6.35	0.51		H10	Accepted
Social Capital → Value Co-creation	0.30	3.69	0.30		H15	Accepted
Teaching Quality → Value Co-creation	0.13	1.61	0.51		H14	Reject
Sustainability-oriented Educations → Self-Efficacy	0.27	3.36	0.27	0.38	H12	Accepted
Social Capital → Self-Efficacy	0.56	6.34	0.56		–	–
Teaching Quality → Self-Efficacy	0.35	4.35	0.35		H13	Accepted
Self-Efficacy → Social Capital	0.47	5.91	0.47	0.45	H16	Accepted
Teaching Quality → Trust in Faculty Members	0.76	9.46	0.76	0.58	H6	Accepted
Sustainability-oriented Educations → Sustainability-oriented Values	0.31	3.86	0.31	0.26	H9	Accepted
Value co-creation → University sustainability	0.67	8.34	0.67	0.58	H1	
Management Support → University sustainability	0.41	5.10	0.61		–	–
Sustainability-oriented Values → university Sustainability	0.47	5.83	0.62		–	–

Table 5
Standardized indirect effects of research variables.

Variables	Management Support	ICT	Education	Teaching Quality	Self-Efficacy	Trust	Social Capital	Values	Value Co-creation
ICT	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Education	0.126	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Teaching Quality	0.095	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Self-Efficacy	0.227	0.089	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Trust	0.375	0.089	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Social Capital	0.184	0.060	0.118	0.238	0.000	0.000	0.000	0.000	0.000
Values	0.171	0.083	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Value Co-creation	0.295	0.096	0.187	0.386	0.202	0.000	0.263	0.000	0.000
University sustainability	0.198	0.064	0.125	0.259	0.453	0.131	0.176	0.153	0.000

sustainability-oriented values of students, 2. Development of ICT infrastructures which promote the quality of teaching and develop sustainability training, 3. Supporting the students' engagement in Value Co-creation process that significantly affects the sustainability level at university, and 4. Direct support for the implementation of sustainability activities and their integration into the academic structure;

3) Sustainability-oriented values play a key role in the students' engagement in Value Co-creation process and sustainability activities at the university. Accordingly, it can be argued that students influenced by their sustainability-oriented values can be engaged through two aspects of participatory behavior and citizenship behavior. The sustainability-oriented values of students urges them to find and share information, take responsibility for sustainable development and support sustainability activities at the university. The sustainability -oriented values of students can accelerate the university movement towards achieving sustainability. This finding confirms the claim of Norm-Belief-Value Theory, on the essential role of values in explaining human behaviors in the environment; and

4) The interactions between social capital and students' perceived self-efficacy to engage in Value Co-creation process. Therefore, an increase in the level of self-efficacy and social capital of students through sustainability trainings and improving of teaching quality can help the university to achieve sustainability.

Like any other research, this study was also confronted with some limitations. The first was the limited library resources in academic environments on Value Co-creation process. Secondly, there was no clear mechanism on the area of Value Co-creation and students' engagement in this process at the universities. Thirdly, the identity of students who'd participated in Value Co-creation process at the university environments was not clear. Fourthly, the students' lack of familiarity with the term "Value Co-creation" prolonged the collection of questionnaires. We had to provide more explanations for them than the usual.

Finally, given the fact that Value Co-creation issues have just newly emerged in academic environments, further research in this area will help to develop the proposed model. Thus, further studies are recommended to be carried out in the area of Value Co-creation and sustainability of academic environments.

Acknowledgement

Appendix 1. Dear respondent

Please rate the implementation of each of the following items at the university from 1 (minimum) to 10 (maximum).

Item	Indicator	Rate from 10
Environmental	Separating drinking water from other uses (such as water for bathing)	
	Use of public transport services for commuting students	
	Use of office automation for student affairs	
	Use of double-glazed windows to prevent energy wasting	
	Use of pressurized irrigation systems at the university environment	
Social	Holding seminars	
	Holding sports competitions aimed at the students health	
	Naming of some days as open days at the university where the local communities can go and see how agricultural products are scientifically produced.	
	Transferring some university affairs to students	
	Holding a tree plantation ceremony at the University	
	Establishing environmental forums at the university	
	Including the marine meals (such as fish and shrimp) in the diet of students	
Economic	Paying attention to relation with industry	
	Processing and selling of agricultural products	
	Holding the exhibitions at the university for the sale of agricultural products	
	Establishing knowledge enterprises	
	Assignment of facilities to students to commercialize their scientific products	
	Construction of greenhouse, dairy, fish farming ponds and …	
Educational	Compatibility of educational content with the existing job opportunities	
	Compatibility of educational content with local community issues and problems, and helping them solve them	
	Attempt to attract the elite students at the university	
	Creating a flexible educational structure for teaching sustainable development subjects at the university	
	Use of creative teaching approaches	
	Enabling students to make informed decisions	
	Creating environmental responsibility through educational programs	
	Facilitation of social learning	
Research	Devoting some part of university's budget to the research related to sustainable development	
	Holding scientific conferences on Sustainable Development	
	Funding for theses and dissertations related to university sustainability	

Appendix 2

Component	Indicator	Rate from 10
Please rate your agreement from 1 to 10 (1 = least agreed, 10 = highly Agreed)		
Sustainability Values	I believe that doing sustainability activities will lead to social order	
	I use public transport services to commute to the university	
	I try to use less paper for educational purposes in order to protect the forests	
	I believe that doing sustainability activities is actually considered a respect for social values	
	I collect the waste in the environment while having fun and walking in natures	
	I take part in the tree-planting ceremony	
How much your teachers take care for the following items while teaching? (Rate from 1 = very low to 10 = very high)		
Quality of Teaching	Use of problem solving methods while teaching lessons	
	Having a teaching plan	
	Use of body language during teaching	
	Creating a link between theoretical and practical content	
	Using of various techniques (public passion, dialogue, discussion, storm of thought, etc.) in teaching	
	Mastering the educational content	
	Making a correlation between educational content with the students' real needs	
	Paying attention to the principle of individual differences among students	
How much the university management takes care for the following items? (Rate from 1 = very low to 10 = very high)		
University Management Support	Inviting the students who have ideas for lectures at scientific meetings	
	Providing the necessary financial resources to hold seminars and meetings at the university	
	Encouraging the students who attend the seminars and meetings	
	Facilitating the administrative processes for holding the seminars and meetings	
	Support for holding scientific conferences on sustainable development at the university	
Instructing the sustainability issues	Training the topics related to environmental conservation	
	Teaching the topics related to communication and participation techniques with others	
	Informing the students of the potential risks of natural resources degradation	
ICT Infrastructures	Establishing a formal university-specific social network	
	Speeding up the Internet of university	

References

Abbitt, J.T., Klett, M.D., 2007. Identifying influences on attitudes and self-efficacy beliefs towards technology integration among pre-service educators. Electron. J. Integrat. Technol. Educ. 6 (1), 28–42.

Alas, R., Ennulo, J., Türnpuu, L., 2006. Managerial values in the institutional context. J. Bus. Ethics 65 (3), 269–278.

Alves, H., Ferreira, J.J., Fernandes, C.I., 2016. Customer's operant resources effects on co-creation activities. J. Innov. Knowl. 1 (2), 69–80.

Aquilani, B., Silvestri, C., Ioppolo, G., Ruggieri, A., 2018. The challenging transition to bio-economies: towards a new framework integrating corporate sustainability and value co-creation. J. Clean. Prod. 172, 4001–4009.

Arnold, M., 2017. Fostering sustainability by linking co-creation and relationship management concepts. J. Clean. Prod. 140, 179–188.

Bandura, A., 1997. Self-efficacy: the Exercise of Control. Macmillan.

Blok, V., Wesselink, R., Studynka, O., Kemp, R., 2015. Encouraging sustainability in the workplace: a survey on the pro-environmental behaviour of university employees. J. Clean. Prod. 106, 55–67.

Bong, M., Skaalvik, E.M., 2003. Academic self-concept and self-efficacy: how different are they really? Educ. Psychol. Rev. 15 (1), 1–40.

Brown, G., Reed, P., 2012. Values compatibility analysis: using public participation geographic information systems (PPGIS) for decision support in national forest management. Appl. Spatial Anal. Policy 5 (4), 317–332.

Brownlee, J.L., Scholes, L., Walker, S., Johansson, E., 2016. Critical values education in the early years: alignment of teachers' personal epistemologies and practices for active citizenship. Teach. Teach. Educ. 59, 261–273.

Cantrell, P., Young, S., Moore, A., 2003. Factors affecting science teaching efficacy of preservice elementary teachers. J. Sci. Teach. Educ. 14 (3), 177–192.

Caprara, G.V., Schwartz, S., Capanna, C., Vecchione, M., Barbaranelli, C., 2006. Personality and politics: values, traits, and political choice. Polit. Psychol. 27 (1), 1–28.

Cossío-Silva, F.J., Revilla-Camacho, M.Á., Vega-Vázquez, M., Palacios-Florencio, B., 2016. Value co-creation and customer loyalty. J. Bus. Res. 69 (5), 1621–1625.

Dagiliūtė, R., Liobikienė, G., 2015. University contributions to environmental sustainability: challenges and opportunities from the Lithuanian case. J. Clean. Prod. 108, 891–899.

Deveci, H., 2015. Value education through distance learning: opinions of students who already completed value education. Turk. Online J. Dist. Educ. 16 (1).

Dietz, T., Fitzgerald, A., Shwom, R., 2005. Environmental values. Annu. Rev. Environ. Resour. 30, 335–372.

Disterheft, A., Caeiro, S., Azeiteiro, U.M., Leal Filho, W., 2015. Sustainable universities–a study of critical success factors for participatory approaches. J. Clean. Prod. 106, 11–21.

Eggens, L., Van der Werf, M.P.C., Bosker, R.J., 2008. The influence of personal networks and social support on study attainment of students in university education. High. Educ. 55 (5), 553–573.

Federici, R.A., Skaalvik, E.M., 2011. Principal self-efficacy and work engagement: assessing a Norwegian principal self-efficacy scale. Soc. Psychol. Educ. 14 (4), 575–600.

Ferrer-Balas, D., Buckland, H., de Mingo, M., 2009. Explorations on the University's role in society for sustainable development through a systems transition approach. Case-study of the Technical University of Catalonia (UPC). J. Clean. Prod. 17 (12), 1075–1085.

Fransson, N., Gärling, T., 1999. Environmental concern: conceptual definitions, measurement methods, and research findings. J. Environ. Psychol. 19 (4), 369–382.

Frow, P., Nenonen, S., Payne, A., Storbacka, K., 2015. Managing co-creation design: a strategic approach to innovation. Br. J. Manag. 26 (3), 463–483.

Green, T.L., 2013. Teaching (un) sustainability? University sustainability commitments and student experiences of introductory economics. Ecol. Econ. 94, 135–142.

Grissemann, U.S., Stokburger-Sauer, N.E., 2012. Customer co-creation of travel services: the role of company support and customer satisfaction with the co-creation performance. Tourism Manag. 33 (6), 1483–1492.

Grönroos, C., Helle, P., 2010. Adopting a service logic in manufacturing: conceptual foundation and metrics for mutual value creation. J. Serv. Manag. 21 (5), 564–590.

Grönroos, C., Voima, P., 2013. Critical service logic: making sense of value creation and co-creation. J. Acad. Mark. Sci. 41 (2), 133–150.

Gummesson, E., Mele, C., 2010. Marketing as value co-creation through network interaction and resource integration. J. Bus. Mark. Manag. 4 (4), 181–198.

Hair, J.F., Ringle, C.M., Sarstedt, M., 2011. PLS-SEM: indeed a silver bullet. J. Mark. Theory Pract. 19 (2), 139–152.

Halstead, M., Bacon, M., 2006. Citizenship and Moral Education: Values in Action. Routledge.

Hasan, N., Rahman, A.A., Saeed, F., 2015. Motivations for value Co-creation in higher education institutions using online platforms: case of idea bank. J. Teknol. 73 (2).

Hoffmann, E., 2007. Consumer integration in sustainable product development. Bus. Strateg. Environ. 16 (5), 322–338.

Hsiao, C., Lee, Y.H., Chen, W.J., 2015. The effect of servant leadership on customer value co-creation: a cross-level analysis of key mediating roles. Tourism Manag. 49, 45–57.

Jaakkola, E., Hakanen, T., 2013. Value co-creation in solution networks. Ind. Mark. Manag. 42 (1), 47–58.

Jones, T.M., 2009. Framing the framework: discourses in Australia's national values education policy. Educ. Res. Policy Pract. 8 (1), 35–57.

Karpen, I.O., Bove, L.L., Lukas, B.A., 2012. Linking service-dominant logic and strategic business practice: a conceptual model of a service-dominant orientation. J. Serv. Res. 15 (1), 21–38.

Kjellberg, H., Helgesson, C.F., 2007. On the nature of markets and their practices. Mark. Theory 7 (2), 137–162.

Kostina, E., Kretova, L., Teleshova, R., Tsepkova, A., Vezirov, T., 2015. Universal human values: cross-cultural comparative analysis. Procedia Soc. Behav. Sci. 214, 1019–1028.

Kruger, C., Caiado, R.G.G., França, S.L.B., Quelhas, O.L.G., 2018. A holistic model integrating value co-creation methodologies towards the sustainable development. J. Clean. Prod. 191, 400–416.

Lambert, D.M., Knemeyer, A.M., Gardner, J.T., 2004. Supply chain partnerships: model validation and implementation. J. Bus. Logist. 25 (2), 21–42.

Leal Filho, W., 2009. Sustainability at Universities-Opportunities, Challenges and Trends (No. G3005 378.101 L473s Ej. 1). Peter Lang.

Leal Filho, W., Manolas, E., Pace, P., 2015. The future we want: key issues on sustainable development in higher education after Rio and the UN decade of education for sustainable development. Int. J. Sustain. High. Educ. 16 (1), 112–129.

Leal Filho, W., Raath, S., Lazzarini, B., Vargas, V.R., de Souza, L, Anholon, R., et al., 2018. The role of transformation in learning and education for sustainability. J. Clean. Prod. 199, 286–295.

Lee, K.H., Barker, M., Mouasher, A., 2013. Is it even espoused? An exploratory study of commitment to sustainability as evidenced in vision, mission, and graduate attribute statements in Australian universities. J. Clean. Prod. 48, 20–28.

Liu, C.H., 2013. The processes of social capital and employee creativity: empirical evidence from intraorganizational networks. Int. J. Hum. Resour. Manag. 24 (20), 3886–3902.

Lovat, T., 2010. In: Toomey, R., Clement, N. (Eds.), International Research Handbook on Values Education and Student Wellbeing. Springer, Dordrecht, pp. 23–24.

Lozano, R., 2010. Diffusion of sustainable development in universities' curricula: an empirical example from Cardiff University. J. Clean. Prod. 18 (7), 637–644.

Lukman, R., Lozano, R., Vamberger, T., Krajnc, M., 2013. Addressing the attitudinal gap towards improving the environment: a case study from a primary school in Slovenia. J. Clean. Prod. 48, 93–100.

Lusch, R.F., Vargo, S.L., Tanniru, M., 2010. Service, value networks and learning. J. Acad. Mark. Sci. 38 (1), 19–31.

Maruyama, G., 1997. Basics of Structural Equation Modeling. Sage.

Mascia, M.B., Brosius, J.P., Dobson, T.A., Forbes, B.C., Horowitz, L., McKean, M.A., Turner, N.J., 2003. Conservation and the social sciences. Conserv. Biol. 17 (3), 649–650.

Mathur, V.N., Price, A.D., Austin, S., 2008. Conceptualizing stakeholder engagement in the context of sustainability and its assessment. Constr. Manag. Econ. 26 (6), 601–609.

Mauser, W., Klepper, G., Rice, M., Schmalzbauer, B.S., Hackmann, H., Leemans, R., Moore, H., 2013. Transdisciplinary global change research: the co-creation of knowledge for sustainability. Curr. Opin. Environ. Sustain. 5 (3–4), 420–431.

Milman, N.B., Molebash, P.E., 2008. A longitudinal assessment of teacher education students' confidence toward using technology. J. Educ. Comput. Res. 38 (2), 183–200.

Mintz, K., Tal, T., 2014. Sustainability in higher education courses: multiple learning outcomes. Stud. Educ. Eval. 41, 113–123.

Monavvarifard, F., Baradaran, M., Salehi, L., Rafe, M., 2015. Influencing mechanism of khouzestan ramin agricultural university students perception of educational services quality on their academic achievement. J. Agric. Educ. Adm. Res. 34, 65–77 (In Persian).

Montano, D.E., Kasprzyk, D., 2015. Theory of reasoned action, theory of planned behavior, and the integrated behavioral model. Health Behav.: Theor. Res. Pract. 95–124.

Moore, T.J., Asay, S.M., 2017. Family Resource Management. Sage Publications.

Mueller, S.L., Goic, S., 2003. East-west differences in entrepreneurial self-efficacy: implications for entrepreneurship education in transition economies. Int. J. Entrep. Educ. 1 (4), 613–632.

Nuttavuthisit, K., 2010. If you can't beat them, let them join: the development of strategies to foster consumers' co-creative practices. Bus. Horiz. 53 (3), 315–324.

Pajares, F., 1997. Current directions in self-efficacy research. Adv. Motivation Achiev. 10 (149), 1–49.

Palmer, D.H., 2006. Sources of self-efficacy in a science methods course for primary teacher education students. Res. Sci. Educ. 36 (4), 337–353.

Pattinson, C., 2017. ICT and green sustainability research and teaching. IFAC-PapersOnLine 50 (1), 12938–12943.

Payne, A.F., Storbacka, K., Frow, P., 2008. Managing the co-creation of value. J. Acad. Mark. Sci. 36 (1), 83–96.

Reed, M.S., Graves, A., Dandy, N., Posthumus, H., Hubacek, K., Morris, J.,, et al., 2009. Who's in and why? A typology of stakeholder analysis methods for natural resource management. J. Environ. Manag. 90 (5), 1933–1949.

Robertson, D.P., Hull, R.B., 2001. Beyond biology: toward a more public ecology for conservation. Conserv. Biol. 15 (4), 970–979.

Sallis, J.F., Owen, N., Fisher, E., 2015. Ecological models of health behavior. Health Behav.: Theor. Res. Pract. 5, 43–64.

Sammalisto, K., Sundström, A., Holm, T., 2015. Implementation of sustainability in universities as perceived by faculty and staff–a model from a Swedish university. J. Clean. Prod. 106, 45–54.

Sarmah, B., Islam, J.U., Rahman, Z., 2015. Sustainability, social responsibility and value co-creation: a case study based approach. Procedia Soc. Behav. Sci. 189, 314–319.

Schunk, D.H., 1987. Peer models and children's behavioral change. Rev. Educ. Res. 57 (2), 149–174.

Schwartz, S.H., 2012. An overview of the Schwartz theory of basic values. Online Read. Psychol. Cult. 2 (1), 11.

Scoulos, M., 2010. What makes a university sustainable. Sustain. Mediterr. Newsl. 63, 6–8.

See-To, E.W., Ho, K.K., 2014. Value co-creation and purchase intention in social network sites: the role of electronic Word-of-Mouth and trust–A theoretical analysis. Comput. Hum. Behav. 31, 182–189.

Sidiropoulos, E., 2014. Education for sustainability in business education programs: a question of value. J. Clean. Prod. 85, 472–487.

Sidrat, S., Frikha, M.A., 2018. Impact of the qualities of the manager and type of university on the development of the entrepreneurial university. J. High Technol. Manag. Res. 29 (1), 27–34.

Song, L.Z., Song, M., Di Benedetto, C.A., 2011. Resources, supplier investment, product launch advantages, and first product performance. J. Oper. Manag. 29 (1–2), 86–104.

Spohrer, J., Vargo, S.L., Caswell, N., Maglio, P.P., 2008. January). The service system is the basic abstraction of service science. In: Hawaii International Conference on System Sciences, Proceedings of the 41st Annual. IEEE, 104-104.

Sténs, A., Bjärstig, T., Nordström, E.M., Sandström, C., Fries, C., Johansson, J., 2016. In the eye of the stakeholder: the challenges of governing social forest values. Ambio 45 (2), 87–99.

Stern, P.C., 2000. New environmental theories: toward a coherent theory of environmentally significant behavior. J. Soc. Issues 56 (3), 407–424.

Storbacka, K., Brodie, R.J., Böhmann, T., Maglio, P.P., Nenonen, S., 2016. Actor engagement as a microfoundation for value co-creation. J. Bus. Res. 69 (8), 3008–3017.

Thabrew, L., Wiek, A., Ries, R., 2009. Environmental decision making in multi-stakeholder contexts: applicability of life cycle thinking in development planning and implementation. J. Clean. Prod. 17 (1), 67–76.

Thomas, I., 2009. Critical thinking, transformative learning, sustainable education, and problem-based learning in universities. J. Transformative Educ. 7 (3), 245–264.

Thornberg, R., Oğuz, E., 2016. Moral and citizenship educational goals in values education: a cross-cultural study of Swedish and Turkish student teachers' preferences. Teach. Teach. Educ. 55, 110–121.

Tilbury, D., 2011. Education for Sustainable Development: an Expert Review of Processes and Learning. UNESCO, Paris, France. http://unesdoc.unesco.org/images/0019/001914/191442e. pdf. Accessed May, 20, 2014.

Tiwana, A., Mclean, E.R., 2003. Expertise integration and creativity in information systems development. J. Manag. Inf. Syst. 22 (1), 13–43.

Trumbull, G., 2006. National varieties of consumerism. Jahrbuch für Wirtschaftsgeschichte/Econ. Hist. Yearb. 47 (1), 77–94.

Tsai, M.T., Cheng, N.C., 2010. Programmer perceptions of knowledge-sharing behavior under social cognitive theory. Expert Syst. Appl. 37 (12), 8479–8485.

Tsai, W., Ghoshal, S., 1998. Social capital and value creation: the role of intrafirm networks. Acad. Manag. J. 41 (4), 464–476.

Tseng, F.M., Chiang, L.L.L., 2016. Why does customer co-creation improve new travel product performance? J. Bus. Res. 69 (6), 2309–2317.

Tuli, K.R., Kohli, A.K., Bharadwaj, S.G., 2007. Rethinking customer solutions: from product bundles to relational processes. J. Mark. 71 (3), 1–17.

Unger, B.N., Kock, A., Gemünden, H.G., Jonas, D., 2012. Enforcing strategic fit of project portfolios by project termination: an empirical study on senior management involvement. Int. J. Proj. Manag. 30 (6), 675–685.

Urien, B., Kilbourne, W., 2011. Generativity and self-enhancement values in eco-friendly behavioral intentions and environmentally responsible consumption behavior. Psychol. Market. 28 (1), 69–90.

van Dinther, M., Dochy, F., Segers, M., 2011. Factors affecting students' self-efficacy in higher education. Educ. Res. Rev. 6 (2), 95–108.

Vargo, S.L., Lusch, R.F., 2004. Evolving to a new dominant logic for marketing. J. Mark. 68 (1), 1–17.

Vargo, S.L., Lusch, R.F., 2008. From goods to service (s): divergences and convergences of logics. Ind. Mark. Manag. 37 (3), 254–259.

Vicente-Molina, M.A., Fernández-Sáinz, A., Izagirre-Olaizola, J., 2013. Environmental knowledge and other variables affecting pro-environmental behaviour: comparison of university students from emerging and advanced countries. J. Clean. Prod. 61, 130–138.

Wingfield, M.E., Freeman, L., Ramsey, J., 2000. Science Teaching Self-Efficacy of First Year Elementary Teachers Trained in a Site Based Program.

Wong, T.Y., Peko, G., Sundaram, D., Piramuthu, S., 2016. Mobile environments and innovation co-creation processes & ecosystems. Inf. Manag. 53 (3), 336–344.

Wright, T., 2004. The evolution of sustainability declarations in higher education. In: Higher Education and the Challenge of Sustainability. Springer, Dordrecht, pp. 7–19.

Xie, K., Wu, Y., Xiao, J., Hu, Q., 2016. Value co-creation between firms and customers: the role of big data-based cooperative assets. Inf. Manag. 53 (8), 1034–1048.

Xie, Y., Xue, W., Li, L., Wang, A., Chen, Y., Zheng, Q., et al., 2018. Leadership style and innovation atmosphere in enterprises: an empirical study. Technol. Forecast. Soc. Change 135, 257–265.

Yeşilyurt, E., Ulaş, A.H., Akan, D., 2016. Teacher self-efficacy, academic self-efficacy,

and computer self-efficacy as predictors of attitude toward applying computer-supported education. Comput. Hum. Behav. 64, 591—601.

Yi, Y., Gong, T., 2013. Customer value co-creation behavior: scale development and validation. J. Bus. Res. 66 (9), 1279—1284.

Yilmaz, M., Gurcay, D., Ekici, G., 2007. Adaptation of the academic self-efficacy scale to Turkish. Hacettepe universitesi egitim fakultesi dergisi-Hacettepe Univ. J. Educ. (33), 253—259.

Zampetakis, L.A., Moustakis, V., 2006. Linking creativity with entrepreneurial intentions: a structural approach. Int. Entrep. Manag. J. 2 (3), 413—428.

Zsóka, Á., Szerényi, Z.M., Széchy, A., Kocsis, T., 2013. Greening due to environmental education? Environmental knowledge, attitudes, consumer behavior and everyday pro-environmental activities of Hungarian high school and university students. J. Clean. Prod. 48, 126—138.

Zwass, V., 2010. Co-creation: toward a taxonomy and an integrated research perspective. Int. J. Electron. Commer. 15 (1), 11—48.