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Transfer of sustainability training in land and conservation agriculture project: A behavioral study in Iran

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Introduction: The transfer of sustainability training means applying the skills, attitudes, and knowledge acquired from training to the workplace to help sustainability and environmental protection. This study aimed to conduct a behavioral analysis of sustainability training transfer among farmers that had attended extension-training courses on the Land and Conservation Agriculture Project (LCAP) in Iran.

Methods: This research is quantitative and applied research that was carried out via a standardized survey. The research population was composed of all farmers who attended LCAP extension training courses in the three provinces of Golestan, Fars, and Khouzestanin, Iran (N=1204). 291 farmers were selected through stratified random sampling. A panel of experts established the content and face validity of the questionnaire. A pilot study was conducted to check the reliability by calculating Cronbach's alpha.

Results and discussion: Findings indicated that most farmers had sustainability training transfer at a high level. The analysis with a structural equation model revealed that perceived content validity, transfer design, opportunity to use, supervisor support, trainer characteristics, peer support, motivation to transfer, transfer effort -performance expectations, performance coaching, and personal capacity for transfer influenced farmers' intention to transfer sustainability training significantly and positively. Furthermore, farmers' intentions had a significant effect on their transfer of sustainability training. It can be concluded that a sustainability training transfer system is applicable to a training context related to sustainable agriculture and can provide a useful instrument for agricultural education organizations when investing in farmers' training.

KEYWORDS

transfer of sustainability training, land and conservation agriculture project, sustainable agriculture, training transfer system, farmers' behavior

Introduction

Economic growth, population dynamic, and industrial development have made fundamental changes in the natural environment during the past 50 years. Agricultural systems are responsive to the emergence of many environmental problems in many developing countries such as Iran. This is despite the fact that agricultural activities overuse chemical fertilizers, pesticides, and other chemical inputs. These activities have

caused the degradation of natural resources and have had negative impacts on human health, ecosystems, and biodiversity (Settle and Garba, 2011; Yang et al., 2015; Ataei et al., 2019). Governments use different methods to change farmers' behavior toward sustainability. In general, these methods can be classified into three categories: laws and regulations, voluntary behaviors, and financial incentives. Incentives, as well as laws and regulations, will have short-term impacts. But, voluntary methods entail long-term and positive impacts on sustainable agriculture. It is, however, necessary to understand farmers' willingness and ability to take sustainability activities (Mills et al., 2017). Therefore, it is crucial to collect information on how people learn and apply sustainability principles (Singh et al., 2013; Ataei et al., 2021).

Sustainable agriculture relies on farmers' knowledge, attitude, skill, and management (Ahnstrom et al., 2009; Abu Samah et al., 2012; Sadeghi et al., 2020). Lambrechts et al. (2013) argue that to apply sustainability principles and tackle sustainability challenges, one needs sustainability knowledge, skills, values, and attitudes. Therefore, farmers' knowledge, skills, needs, and perceptions should provide an integrated part of the process of sustainable agricultural development (Onduru and Du Preez, 2008). With this integration, sustainability training will also be transferred among farmers. The transfer of sustainability training means applying the skills, attitudes, and knowledge acquired from training to the workplace to help sustainability and environmental protection. Therefore, sustainability training is said to be transferred when farmers apply sustainability knowledge, attitude, and skills learned from training programs to the farms. Considering the importance of sustainable agriculture and the essential role of farmers in achieving this goal, the study aimed to conduct a behavioral analysis of sustainability training transfer among farmers participating in extension training courses on the land and conservation agriculture project.

A lot of studies have been carried out on training transfer. However, the applications of the training transfer system (TTS) to signal training transfer are still limited. Even those who have tried to apply the system have gained some results. Applying TTS to recognize the components that can predict training transfer indicates that even the dependent variables applied so far have differed. Nonetheless, some dependent variables have been applied in the procedure. Hutchins et al. (2013) utilized the intention to transfer as the dependent variable in their theoretical framework of the research, while Bates et al. (2007), Devos et al. (2007), Velada et al. (2009), and Miiro et al. (2012) addressed real transfer following training. Bates and Khasawneh (2005) measured training transfer in the field of perceived organization innovativeness.

Minja et al. (2022) advanced andragogy by showing the contextual nature of the applicability of its principles, as well as the dependence of training transfer on contextual factors surrounding trainees. Santana-Domínguez et al. (2022) proposed the training transfer system as the basis for future empirical studies to maximize the utility of training programs for various fields. Twase et al. (2022) explained motivation and perceived content validity to strongly influence training transfer. Perceived content validity mediated the relationship between motivations to implement acquired knowledge and training transfer. Gemmano et al. (2022) found that training transfer was positively related to each dimension of work performance: proficiency, adaptivity, and proactivity. Kuo and Tien (2022) illustrated that motivation to learn and transfer design positively influenced motivation to transfer, while it positively impacted overall individual performance. Dixit and Sinha (2022) showed that the effectiveness and efficiency of training transfer tools were strongly correlated and enabled the workplace application of skills and knowledge. Creon and Schermuly (2022) revealed that the training individuals' psychological empowerment mediated the positive relationship between transformational trainer behavior and training transfer. Kalule et al. (2019) stated that perceived value of content mediated extension agents' supervision support in predicting farmers' intention to apply what they had learned during extension training programs.

According to these studies, it is clear that there is a reasonable and logical relationship between the transfer of sustainability training and farmers' behavior, which needs the integration of behavioral issues with the training transfer system. In this way, farmers will gain sustainability knowledge, attitude, and skills through teamwork with extension agents and researchers and apply them to their farms. Farmers have presented a type of behavior, generally referred to as the transfer of sustainability training by applying knowledge and skills that they have learned during training. However, several factors and variables can affect the transfer of sustainability training. On the other hand, it can be inferred that the training transfer system follows, to a large extent, the components of the educational system. There are four pillars in the educational system, including educational content, trainee, trainer, and educational environment. With a glance at the training transfer system, it can be assumed that the variables of trainee characteristics and motivational factors are regarded as the trainee element, the variables of ability are related to the educational content, and the environmental elements of the training transfer system are regarded as the educational environment (Newcomb et al., 2004; Fallah Haghighi et al., 2018, 2020). But, the status of the trainer element is absent in this system whereas trainers have an important role to play in a learning and training system that aims to empower trainees to apply training on the job. Therefore, trainee characteristics can be incorporated into the theoretical framework of TTS to supplement the framework in terms of the components of the training system. Accordingly, the conceptual framework of the research was designed as depicted in Figure 1. Successful training transfer is necessary

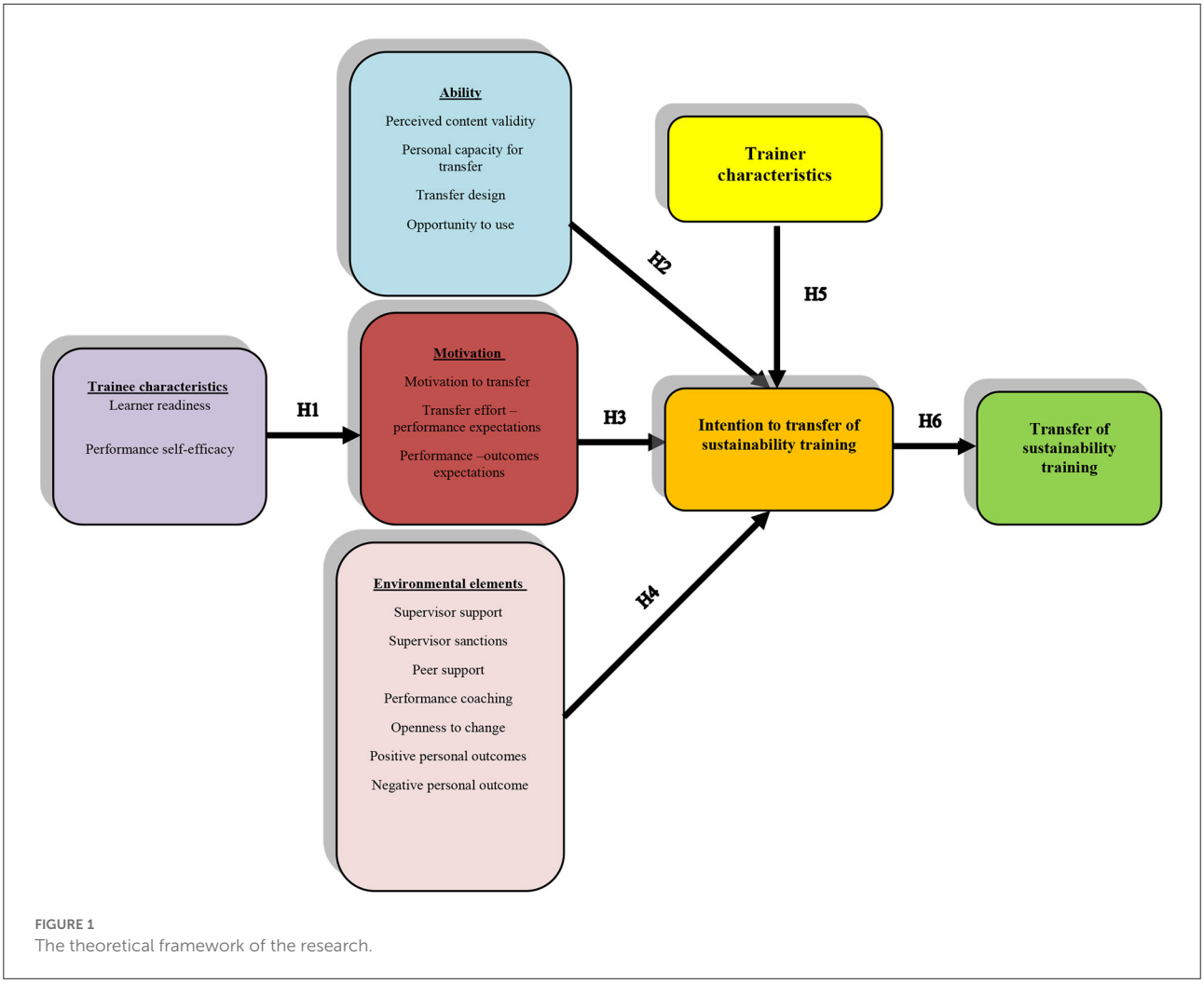

FIGURE 1
The theoretical framework of the research.

for farmers to adapt to a fast-changing climate. Organizations of Agriculture expect farmer training and development to lead to a return on investment. Thus, they want farmers to improve their productivity by using the skills and knowledge that they learn during extension training courses. However, this return on investment can be reduced by the lack of training transfer (i.e., the on-the-farm application of knowledge and skills acquired in an extension training program). This study contributes to the literature in several ways. First, it is one of the recent studies to investigate the transfer of sustainability training in the land and conservation agriculture project. Second, the study extends the training transfer literature by estimating how the land and conservation agriculture project can generate knowledge and skills spillovers associated with sustainable agriculture. Third, the results add to the discourse on the importance of trainer characteristics for farmers' training transfer and offer a new perspective on training as changing the farmers' self-concept. Finally, the study focuses on implications for the transfer of sustainability training and thus contributes to the growing literature on extension training programs. Given the theoretical framework of the study, the following hypotheses are considered to accomplish the research goals:

- Hypothesis 1: trainee characteristics influence components of motivation positively and significantly.
- Hypothesis 2: ability factors influence farmers' intention to transfer sustainability training positively and significantly.
- Hypothesis 3: motivational factors influence farmers' intention to transfer sustainability training positively and significantly.
- Hypothesis 4: environmental elements influence farmers' intention to transfer sustainability training positively and significantly.
- Hypothesis 5: trainer characteristics influence farmers' intention to transfer sustainability training positively and significantly.
- Hypothesis 6: farmers' intention influences their transfer of sustainability training positively and significantly.

Methods

The present research was a quantitative study, which used a survey to accomplish its objectives. It was also a causal-relational study in terms of data analysis. Data were collected with a questionnaire whose face and content validity was confirmed by a panel of experts and its reliability was established by calculating Cronbach's alpha in a pilot study, which was estimated at a range of 0.68–0.94. A five-point Likert scale (from very low = 1 to very high = 5) was utilized to estimate the variables. Definitions and reliabilities of the variables and sample items are presented in Table 1.

The research focused on conservation agriculture (CA) training courses in three Iranian provinces of Fars, Khouzestan, and Golestan. These provinces have the highest CA cultivation area. Fourteen CA principles and indicators were employed to measure the transfer of sustainability training. They were presented to the farmers in CA training courses. These indicators included burning the straw, grazing crop residues by livestock, no/low tillage, using improved seeds, cultivating cover crops, crop rotation, maintaining crop residues on the soil surface, land leveling, applying no-tillage seeders and compound tillage, using wide ridges, integrated pest management, using modern irrigation methods, and integrated planting. All farmers who attended CA extension training courses in these provinces constituted the research population (N = 1,204). In Iran, CA was first begun to practice in four provinces of Khuzestan, Fars, Golestan, and Khorasan on an area of 150 hectares in 2007. It was, then, disseminated to the other provinces. A comprehensive organization was founded with the formation of the Supreme CA Headquarters in the Ministry of Agriculture and Technical Committee at the ministerial level, provincial agricultural organization, and management of the townships in 2014. In a land and conservation agriculture project, a team of researchers, farmers, and extension agents cooperated to train farmers on how to apply the CA principles in their farms. The degree to which farmers apply the CA principles learned in the training course at their farms is considered the transfer of sustainability training. A sample was taken by stratified random sampling from farmers who attended CA extension training courses. The provinces/counties were used as strata. Stratified random sampling is used when a population is divided into several strata based on the variance of a feature (here, CA cultivation area). In this case, the variance of the target feature is within the low strata and between the high strata. The strata in this research included the counties where the CA project was undergoing (The criterion to choose the counties was the highest CA cultivation area in the province). After the strata were formed, the samples were taken from them randomly. The sample size was 291 according to Krejcie and Morgan's (1970) table: 94 farmers from Fars province, 82 from Khouzestan province, and 115 from Golestan province. The SPSS23 and AMOS23 software suites were used for data analysis. Structural equation modeling (SEM) was also utilized for analyzing the structural relationship between the measured and the latent constructs.

Findings

Extent of sustainability training transfer

Fourteen indicators were used to measure the transfer of sustainability training among farmers who attended CA extension training courses. These indicators were trained for farmers during different periods. The findings showed that 67.7% of the farmers never burnt crop residues and 38.8% rarely had their crop residues grazed. Also, 58.8%, 71.8%, 34%, 67%, and 56.7% always used no/low tillage, improved seeds, cover crops, crop rotation, and land leveling, respectively.

Another main principle of CA is to keep crop residue on the soil surface. Farmers participating in extension training programs should apply it to their farms. The findings showed that 64.9% of the farmers always maintained crop residues on the soil surface. Using CA machinery is another issue that was trained to farmers. In this regard, 70.4% and 63.6% of the farmers always used no-tillage seeders and compound tillage, respectively. Also, 57.7% and 40.2% always used wide ridges and modern irrigation methods, respectively. Finally, 52.6% and 41.9% of the farmers mostly used integrated planting and integrated pest management, respectively. Other findings are presented in Table 2.

In general, the ISDM criteria (Davis, 1971) were used to extend the status of farmers' sustainability training transfer (Formula 1). Based on the results, 24.40% of the farmers had a weak sustainability training transfer. In other words, 24.40% of the farmers used the skills, knowledge, and attitude of sustainability that they had learned in the CA extension training courses at a low level. Also, 33.68% and 41.92% had moderate and high sustainability training transfers, respectively. Accordingly, the majority of farmers had a high sustainability training transfer. This means that most of them used the skills and knowledge they gained at the training courses at a high level.

$$\begin{aligned} D \lessdot M - 1/2SD &= \text{at a weak level} \\ M - 1/2SD \leq D \leq M + 1/2SD &= \text{at a moderate level} \\ D \gtrdot M + 1/2SD &= \text{at a high level} \end{aligned} \quad (1)$$

Measurement model estimation

The validity, reliability, and fit of the model were measured by estimating the measurement model through confirmatory factor analysis. Based on the results, after deleting two observed variables, most of the standardized loadings of other observed

TABLE 1 TTS variables definitions, item number, and Cronbach's alphas.

Variables	Definition	Number of items	α
Farmer readiness	The degree to which farmers are provided to enter and engage in training of CA.	5	0.77
Performance self-efficacy	Farmers' general faith that he/she is capable to change the farm's performance when he/she wants to.	5	0.84
Perceived content validity	The degree to which a farmer advises training content to correctly reverberate farm obligations.	5	0.81
Personal capacity for transfer	The degree to which farmers have the energy, time, and intellectual space in their work to make changes required to sustainability training transfer to the farms.	5	0.86
Transfer design	The extent to which training of CA has been worked out and delivered to give farmers the capability to sustainability training transfer to the farm and training instructions fit farm requirements.	4	0.78
Opportunity to use	The degree to which farmers are supplied with or get resources and tasks on the farm empowering them to apply training of CA on the farm.	4	0.87
Motivation to transfer	Direction, intensity, and durability of effort toward applying sustainability skills, attitudes, and knowledge learned on the farm.	6	0.94
Transfer effort–performance expectations	Farmers' anticipation that an attempt devoted to transferring training will improve farm performance.	6	0.83
Performance–outcomes expectations	Farmers' anticipation that changes in farm performance will bring about precious outcomes.	4	0.93
Supervisor support	The degree to which supervisors reinforce the use of new skills, attitudes, and knowledge in training on the farm.	4	0.84
Supervisor sanctions	The degree to which farmers receive negative feedback from supervisors when using sustainability skills, attitudes, and knowledge learned in the training of CA.	4	0.88
Peer support	The extent to which peers (other farmers) encourage applying training on the farm.	4	0.86
Performance coaching	Formal and informal scales from an institution or others about farmers' work performance.	5	0.82
Openness to change	The degree to which social norms are realized by farmers to oppose or estrange the use of sustainability skills, attitudes, and knowledge gained in CA training.	5	0.81
Positive personal outcomes	The extent to which using training on the farm leads to positive results for the farmers.	5	0.72
Negative personal outcome	The degree to which farmers daresay that not using sustainability skills, attitudes, and knowledge learned in the training of CA will lead to negative personal results.	4	0.68
Trainer characteristics	The degree to which trainers of CA have sufficient knowledge and skill about CA and they have the ability to transfer knowledge to farmers and communicate with them.	6	0.76
Intention to transfer sustainability training	The degree to which farmers intend to apply sustainability attitude, knowledge, and skills gained from training to farms.	8	0.73
Transfer of sustainability training	Transfer of sustainability training has taken place when farmers apply sustainability attitude, knowledge, and skills gained from training to farms.	14	0.72

variables were significant. In addition, AVE and CR estimated for all latent variables were larger than 0.5 and 0.7, respectively (Table 3). According to Hair et al. (2010), AVE and CR values for each latent variable should be larger than 0.5 and 0.7, respectively. Thus, convergent validity and composite reliability of the questionnaire were evident.

Structural model estimation

The goodness of fit indicates the extent to which the model fits the data and the paths in the analysis. AMOS was used to estimate the model fit indicators including relative chi-square or normal chi-square (CMIN/DF), root mean square error of

TABLE 2 The status of sustainability training transfer among farmers.

Items	Never (%)	Rarely (%)	Most years (%)	Always (%)
Burning the straw	67.7	6.2	13.4	12.7
Grazing crop residues by livestock	26.8	38.8	21.6	12.7
No-tillage/low tillage	4.5	8.9	27.8	58.8
Using breeding seed	0	0	28.2	71.8
Using the cover crops	17.2	22.3	26.5	34
Crop rotation	0	11.7	21.3	67
Maintain crop residue on the soil surface	6.9	5.5	22.7	64.9
Land leveling	12.7	15.1	15.5	56.7
Using no-tillage seeder	5.2	11.3	13.1	70.4
Using compound tillage	4.8	6.2	25.4	63.6
Using wide ridges	7.2	8.6	26.5	57.7
The use of modern irrigation methods	11	22	26.8	40.2
Integrated pest management	8.6	18.6	41.9	30.9
Integrated planting	7.2	17.5	52.6	22.7

approximation (RMSEA), root mean square residual (RMR), the goodness of fit index (GFI), incremental fit index (IFI), and comparative fit index (CFI). The model generally exhibited adequate GFI (Table 4). Its ratio of chi-square to degrees of freedom was 3.35, reflecting a good fit of the model (less than 5; Byrne, 2016). The value of RMSEA was estimated at 0.076, which meets the requirement of <0.08 (Byrne, 2016). The values of GFI and CFI were >0.9, indicating a good model fit (Byrne, 2016).

According to the structural model, trainee characteristics had a direct effect on motivational factors and an indirect effect on the intention to transfer sustainability training. As a structural model (Figure 2), it could be noticed that "learner readiness" influenced "motivation to transfer" positively and significantly ($\beta = 0.33$, $P < 0.01$). Another path was from learner readiness to "transfer effort–performance expectations" and "performance–outcomes expectations", which had a positive and significant influence on them ($\beta = 0.25$, $P < 0.01$; $\beta = 0.36$, $P < 0.01$, respectively).

The model recommends that "performance self-efficacy" had a positive and significant effect on the three latent variables of "performance–outcomes expectations," "motivation to transfer," and "transfer effort–performance expectations" ($\beta = 0.30$, $P < 0.01$, $\beta = 0.32$, $P < 0.01$; $\beta = 0.15$, $P < 0.05$, respectively). This supports hypothesis 1 regarding the positive and significant effect of trainee characteristics on the components of motivation. According to Holton et al. (2000), Holton (2005), Bates et al. (2012), Ataei and Zamani (2015), and Muthoni and Miiro (2017), trainee attributes (learner readiness and performance self-efficacy) are influential components in the training transfer system. They especially argue that trainee characteristics have a significant effect on motivational factors.

According to the structural model, motivational factors, ability factors, trainer characteristics, and environmental elements had a direct effect on the intention to transfer sustainability training and an indirect effect on the transfer of sustainability training. Among ability factors, perceived content validity ($\beta = 0.30$, $P < 0.01$), transfer design ($\beta = 0.53$, $P < 0.05$), personal capacity for transfer ($\beta = 0.45$, $P < 0.05$), and opportunity to use ($\beta = 0.47$, $P < 0.05$) had direct, significant, and positive effects on intention to transfer sustainability training. This supports hypothesis 2 (ability factors influence farmers' intention to transfer sustainability training positively and significantly).

Motivational factors were included in three variables. According to findings, "motivation to transfer" and "transfer effort-performance expectations" had a direct, significant, and positive effect on farmers' intention to transfer sustainability training ($\beta = 0.19$, $P < 0.01$ and $\beta = 0.18$, $P < 0.01$, respectively). However, the effect of performance-outcomes expectations on farmers' intention to transfer sustainability training was not significant, which refutes hypothesis 3. These findings imply that farmers with higher performance-outcome expectations about CA have more intention to apply sustainability skills, knowledge, and attitude to the farm. The results agreed with the results of numerous empirical studies such as Bates et al. (2007), Devos et al. (2007), Velada et al. (2009), Daffron and North (2011), Miiro et al. (2012), Ataei and Zamani Miandashti (2014a), and Zamani et al. (2016). But, performance–outcome expectations did not have a significant effect on farmers' intentions.

As shown in Figure 2, the effect of performance coaching, supervisor, and peer support ($\beta = 0.39$, $P < 0.05$; $\beta = 0.5$, $P < 0.05$; $\beta = 0.66$, $P < 0.01$, respectively) was direct, significant, and positive on farmers' intention. However, openness to

TABLE 3 Measurement items and reliability and validity tests.

Latent variables	Observed variables	Standardized loading	AVE	CR	*t*-value
Learner readiness	L.R1	0.539	0.508	0.832	Fixed
	L.R2	0.771			5.879
	L.R3	0.927			10.89
	L.R4	0.704			10.195
	L.R5	0.552			5.318
Performance self-efficacy	P.Se1	0.294	0.502	0.822	Fixed
	P.Se2	0.837			5.158
	P.Se3	0.637			5.364
	P.Se4	0.867			5.587
	P.Se5	0.754			5.522
Perceived content validity	P.C.V1	0.779	0.508	0.828	Fixed
	P.C.V2	0.846			3.839
	P.C.V3	0.826			3.873
	P.C.V4	0.644			7.028
	P.C.V5	0.354			0.453
Personal capacity for transfer	P.C.T1	0.681	0.514	0.840	Fixed
	P.C.T2	0.753			6.986
	P.C.T3	0.64			7.906
	P.C.T4	0.726			8.272
	P.C.T5	0.779			3.184
Transfer design	T.D1	0.688	0.546	0.827	Fixed
	T.D2	0.661			2.443
	T.D3	0.799			4.823
	T.D4	0.798			5.486
Opportunity to use	O.U1	0.783	0.504	0.798	Fixed
	O.U2	0.752			3.548
	O.U3	0.499			8.706
	O.U4	0.769			5.285
Motivation to transfer	M.T1	Dropped	0.522	0.809	-
	M.T2	Dropped			-
	M.T3	0.883			8.052
	M.T4	0.781			7.822
	M.T5	0.613			8.464
	M.T6	0.571			Fixed
Transfer effort–performance expectations	T.P.E1	0.667	0.528	0.847	Fixed
	T.P.E2	0.728			7.588
	T.P.E3	Dropped			-
	T.P.E4	0.778			4.246
	T.P.E5	0.806			5.024
	T.P.E6	0.643			7.324
Performance–outcomes expectations	P.O.E1	0.669	0.509	0.804	Fixed
	P.O.E2	0.602			9.567
	P.O.E3	0.753			11.086
	P.O.E4	0.814			11.524
Trainer characteristics	T.C1	0.761	0.511	0.855	Fixed
	T.C2	0.522			9.543
	T.C3	0.703			12.657
	T.C4	0.886			6.905
	T.C5	0.403			7.384
	T.C6	0.882			10.015
Supervisor support	S.S1	0.707	0.503	0.801	Fixed
	S.S2	0.781			3.839
	S.S3	0.682			3.873
	S.S4	0.662			7.028
Supervisor sanctions	S.Sa1	0.888	0.503	0.743	Fixed
	S.Sa2	0.68			6.527
	S.Sa3	Dropped			-
	S.Sa4	0.509			0.961
Peer support	P.S1	0.755	0.505	0.789	Fixed
	P.S2	0.732			12.027
	P.S3	0.889			6.147
	P.S4	0.352			6.283
Performance coaching	P.C1	Dropped	0.590	0.852	-
	P.C2	0.723			1.166
	P.C3	0.826			2.167
	P.C4	0.751			1.081
	P.C5	0.771			Fixed
Openness to change	O.C1	0.879	0.538	0.839	0.369
	O.C2	0.785			0.369
	O.C3	0.671			0.369
	O.C4	0.253			0.368
	O.C5	0.888			Fixed
Positive personal outcomes	P.P.O1	0.845	0.505	0.716	−7.799
	P.P.O2	0.694			8.647
	P.P.O3	0.563			9.813
	P.P.O4	−0.485			10.758
	P.P.O5	0.882			Fixed
Negative personal outcome	N.P.O1	0.814	0.521	0.811	6.942
	N.P.O2	0.753			3.016
	N.P.O3	0.602			5.911
	N.P.O4	0.703			Fixed
Intention to transfer sustainability training	Int1	0.661	0.504	0.874	Fixed
	Int2	0.792			4.604
	Int3	Dropped			-
	Int4	0.539			6.892
	Int5	0.662			5.186
	Int6	0.594			7.214
	Int7	0.779			6.043
	Int8	0.882			7.168
Transfer of sustainability training	SLT1	0.882	0.508	0.900	2.805
	SLT2	0.753			0.154
	SLT3	0.667			0.657

(Continued)

TABLE 3 (Continued)

Latent variables	Observed variables	Standardized loading	AVE	CR	*t*-value
	SLT4	Dropped			-
	SLT5	0.761			−2.144
	SLT6	0.778			2.047
	SLT7	−0.605			4.459
	SLT8	Dropped			-
	SLT9	0.684			6.522
	SLT10	0.667			6.437
	SLT11	0.741			6.289
	SLT12	0.609			4.774
	SLT13	0.664			5.023
	SLT14	0.698			Fixed

TABLE 4 Goodness-of-fit indices of the structural model.

Test	Recommended value	Proposed model
Likelihood ratio Chi-square (x^2)	Insignificant x^2 ($p > 0.05$)	0.000
Normed chi-square (x^2/df)	x^2/df < 5	3.02
Root Mean Square Residual	RMR < 0.05	0.06
Root Mean Squared Error	RMSEA < 0.08	0.06
Goodness-of-Fit Index	GFI > 0.90	0.94
Incremental Fit Index	IFI = Values close to 1	0.90
Comparative Fit Index	CFI > 0.90	0.93

change, supervisor sanctions, positive personal outcomes, and negative personal outcomes had no significant effect on the farmers' intention to transfer sustainability training. This refutes hypothesis 4, i.e., ability factors affect the intention to transfer sustainability training positively and significantly. Thus, the comprehensive support of supervisors and other farmers will expand farmers' intention to transfer sustainability training. Also, formal and informal indicators from the Organization of Agriculture Jahad or others about farmers' work performance can promote their intention to apply sustainability skills, knowledge, and attitude at their farms. The findings are consistent with the results of Ingram et al. (2009), Oreszczyn et al. (2010), Quinn and Burbach (2010), Ataei and Zamani Miandashti (2014b), and Lee et al. (2014) who suggest that performance coaching, supervisor, and peer support increase farmers' intentions.

Also, trainer characteristics, with a path coefficient of 0.20 ($P < 0.05$), had a direct and significant effect on farmers' intention to transfer sustainability training. So, hypothesis 5 (trainer characteristics influence farmers' intention to transfer sustainability training positively and significantly) is confirmed. Finally, farmers' intention influenced the transfer of sustainability training directly and significantly ($\beta = 0.45$, $P < 0.01$), confirming hypothesis 6 (farmers' intention influences their transfer of sustainability training positively and significantly). This finding was supported by several studies (Daffron and North, 2011; Hutchins et al., 2013; Pineda-Herrero et al., 2014; Turab and Casimir, 2015). So, intention can play the main role in the transfer of sustainability training. Other findings are provided in Table 5.

Conclusion

In the context of agricultural organizations, a positive transfer of sustainability training by farmers is generally regarded as the premier goal of training efforts, which is yet a massive challenge. Thus, this research was conducted to determine the components of TTS that influence the training transfer of sustainability skills, attitudes, and knowledge to the farms among farmers who had attended the CA extension training courses. This research contributes to training transfer studies by combining sustainability issues with the learning transfer system inventory. Also, levels of sustainability training transfer were evaluated among farmers. Based on the level of transfer of sustainability training, most farmers applied the sustainability skills and knowledge gained from CA training at a high level. It is concluded that the training programs of CA were an efficient and valuable plan. Therefore, the efficient training programs of CA will facilitate and accelerate the development of CA.

Based on the analysis of the structural equation model, most variables influenced farmers' intention to apply sustainability skills on the farm significantly. For example, supervisor support was found to be one of the main factors for the successful transfer of sustainability training back to the farm. Therefore, comprehensive support by supervisors and other farmers (peers) will maximize sustainability training transfer. Extension agents and researchers should facilitate training and support of farmers not only during CA training but also before and after the courses. Personal capacity was a main predictive variable to effectively transfer the skills gained during training to the workplace (farms). In other words, the extent of sustainability training transfer will improve if farmers have the time, energy, and mental space in their workplace. Also, performance coaching was recognized to be necessary for the process of training transfer. Formal and informal scales from an organization about farmers' work performance can affect farmers' sustainability training transfer.

The results illustrate that motivational factors play an important role in sustainability training transfer among farmers. Scholars have suggested motivational factors as the mediating function between components in the training transfer system and training transfer. One factor that had a significant impact on farmers' intention was the transfer design. If CA instructions are

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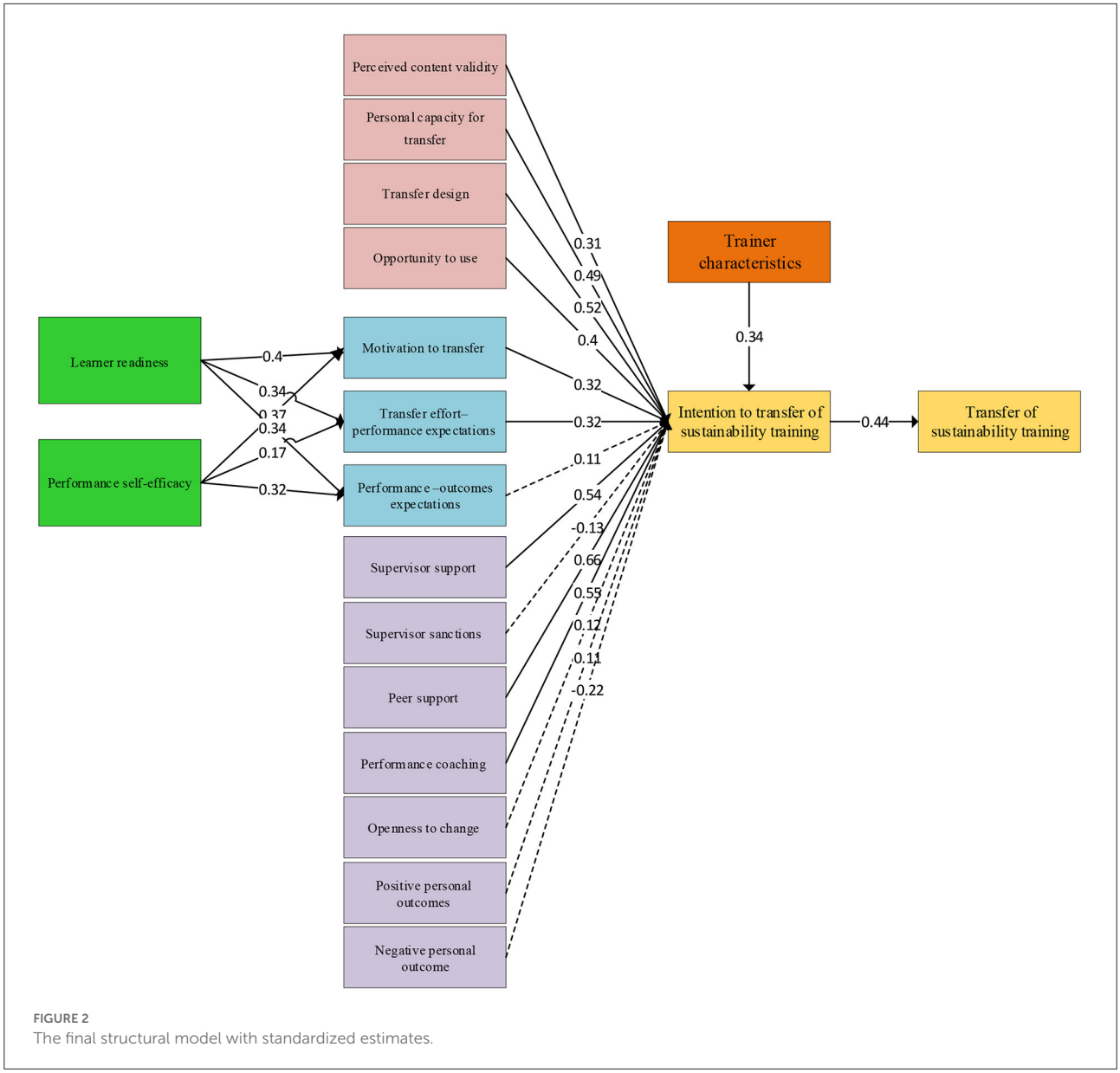

FIGURE 2
The final structural model with standardized estimates.

relevant and similar to the ones given on the farmers' work, the transfer will occur more easily. One of the influential factors in the farmers' intention was the trainers' characteristics. Trainers should have diverse characteristics to facilitate the transfer of CA knowledge, attitude, and skills to farmers. Therefore, farmers' intention to transfer sustainability training will increase if trainers have sufficient knowledge and skill about CA, environmental attitude, and the ability to communicate with farmers and transfer knowledge to them. Also, the opportunity to use, personal capacity for transfer, and performance coaching, as well as giving off positive response, emerged as additional main components associated with improving farmers' intention. Accordingly, it is crucial to ensure that farmers have the time and personal capacity to apply new skills and are keen to attend training courses through more objective negotiations with the farmers and the Organization of Agriculture Jahad or private training institutes, and supervisors before, during, and after the training program.

Farmers' intention to apply the principles of CA was an effective factor in the sustainability training transfer. This means that if the transfer behavior is novel, farmers will probably produce beliefs on the transfer behavior by the time they return to the farm and try to transfer their learned knowledge, attitudes, and skills related to CA. This implies that by the end of the CA training course, farmers will usually have decided on the degree to which they will use their

TABLE 5 Path estimates for the structural model.

Path	Standardized coefficient	*t*-value	*p*-value
PSe → MT	0.378	3.936	0.01
LR → MT	0.401	5.006	0.01
LR → TPE	0.342	3.787	0.01
PSe → TPE	0.178	2.233	0.05
LR → POE	0.343	5.77	0.01
PSe → POE	0.323	3.989	0.01
SS → Int	0.546	2.453	0.05
PPO → Int	0.11	0.23	0.741
NPO → Int	−0.22	−0.543	0.675
TC → Int	0.343	3.456	0.05
PC → Int	0.554	5.33	0.01
OC → Int	0.121	0.123	0.76
MT → Int	0.324	4.201	0.01
TPE → Int	0.327	3.897	0.01
PCV → Int	0.314	2.786	0.01
OU → Int	0.406	2.328	0.05
TD → Int	0.522	2.321	0.05
POE → Int	0.112	0.345	0.678
SSa → Int	−0.132	−0.652	0.451
PS → Int	0.663	2.26	0.01
PCT → Int	0.491	2.034	0.05
Int → SLT	0.447	3.74	0.01

learned skills to farms. This intention is then reinforced by their dispositional attributes and tendency about the training content of CA, performance outcomes, and expected outputs, and the comprehensive support the farmers will obtain when coming back to the farm, thus tapping components that are captured in the main measures of the sustainability training transfer system.

According to the findings, it is recommended to consider all dimensions of the extent of sustainability training transfer by farmers. First, authorities of the CA project should conduct the CA training system (training content and transfer design) based on the agricultural sector and farmers' problems. Then, farmers' abilities (subjective, technical, and knowledge readiness) to apply the principles of CA should be investigated. Also, the organizational environment should be aligned with reinforcing and supporting farmers and CA development. Finally, it can be concluded that the sustainability training transfer system is applicable to a training context related to the sustainable agriculture sector and thus can be a useful instrument for agriculture organizations when investing in farmers' training. Also, the research further opens up the sustainable agriculture sector as the main context of the sustainability training transfer system and relevant research. Furthermore, this study opens the case for combining social-psychological theories with the components of training transfer as mediation variables within training transfer studies.

One of the most important limitations of this study was the extent to which farmers' intentions to use acquired knowledge and skill became training transfer. It is not possible to argue exactly that all farmers who have a strong intention implement new knowledge and skill on the farm.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

Written informed consent from the participants was not required to participate in this study in accordance with the national legislation and the institutional requirements.

Author contributions

Conceptualization: PA, HS, and EA. Methodology and writing: PA and EA. Software: PA. Validation: PA, HS, MC, and EA. All authors contributed to the article and approved the submitted version.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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