Drivers of Holistic Agricultural Risk Management Training Transfer

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Abstract
Assessing the level of transfer in both public and private organizations is increasingly becoming necessary as a means of determining employee productivity and efficiency. In 2000 Holton and others came up with training transfer system inventory as a tool to predict transfer. He asserted that the success or failure of training transfer in an organization depends on the learning transfer system which are: trainee characteristics, training design and work environment (Burke & Baldwin, 2016). However, it is important to note that these factors are viewed differently according demographic characteristics, context and time span taken after the training. (Kim, Park, & Kang, 2019). The purpose of this study was to analyze the drivers that lead to the transfer of agricultural risk management practices among agricultural extension staff in Uganda who were trained by the Ugandan ministry of Agriculture Animal Industry and Fisheries (MAAIF) so as to build their capacity to train smallholder farmers to manage the agricultural risks that have for long affected productivity. There was need to determine the extent to which the trainees were able to transfer the skill gained in agriculture risk management (ARM) training back to their work environment. A total number of 281 were interviewed on their last day of training.
***Results*;** showed that perceived content validity, opportunity to use, readiness to learn, transfer effort performance expectation, and training design**,** had a significant impact on agricultural risk management transfer. Extension worker trainers, decision-makers/facilitators, and other actors in the extension system should pay particular attention to the factors reported here as important to agricultural risk management training transfer. Furthermore, the LTSI has been proved to be effective in evaluating agricultural risk management training.

Key terms: Agriculture, risk management, extension services, training transfer, LTSI, Uganda. Paper type: original

Introduction.

Agricultural extension plays a critical role by bringing the farming community information on new technologies, which they can adopt to increase productivity, incomes, and standards of living (Msuya et al., 2017) . However, according to Uganda's agriculture sector work plan 2019/2020, there are still bottlenecks in terms of extension officers' lack of capacity, insufficient knowledge, and low take-up of innovation persist in the area of agricultural risk training, which is important for their job performance.

Training refers to the teaching and learning activities carried out for the primary purpose of helping members of an organization acquire and apply the knowledge, skills, abilities, and attitudes needed by a particular job and organization (Futris, Schramm, Richardson, & Lee, 2015).Relatedly,training transfer is the application of learned knowledge, skills and attitudes to the job and their subsequent maintenance over time (Cowman & Mccarthy, 2016) . Training in itself has no intrinsic value, rather its value lies in the extent to which trainees can transfer and retain the new knowledge, skills, and attitudes in the workplace leading to improved employee and organizational performance, such as higher productivity (Rahman & Bockarie, 2021). Training is of little use to organizations if the knowledge and skills learned are not transferred to improve job performance (Burke & Hutchins, 2007). Several scholars have defined

training transfer as the degree to which trainees can apply the knowledge, skills and abilities gained in training to their job (Antunes, Nascimento, & Bates, 2018; Yaghi & Bates, 2020).

According to Chandra, Bhattacharjee, & Bhowmick, (2018) and Sultan & Abidin, (2020); transfer of training is seen to be vital for the effectiveness of training, thus training transfer is deemed to have occurred when the learned behavior is generalized to the job context and maintained over some time on the job (Futris et al., 2015; Mielniczuk & Laguna, 2017; Suleiman & Adamu, 2020).

While many organizations invest heavily in training, research shows that training transfer is often less than ideal (Soderhjelm, Nordling, Sandahl, Larsson, & Palm, 2020). There are a plethora of studies regarding why the transfer problem has persisted to date, for example, Holton *et al*., (2000) showed that trainee characteristics, training design, and work environment drivers affect the level of transfer of any training. These drivers work in a system which is known as the training transfer system. However, several studies have alluded to the fact these drivers differ based on; content, context, training type, and time (Ataei & Zamani, 2015; Kiwanuka, Miiro, Matsiko, & Nkalubo, 2020; Muthoni & Miiro, 2017; Velada, Caetano, Michel, Lyons, & Kavanagh, 2007b). Yaghi, Abdulfattah, Bates et al. (2020) who focused on leadership transfer by academic managers in public universities found that work environment (motivation to transfer and peer support) was more significant in predicting training transfer factors as compared with trainee characteristics and training design. Relatedly, Celestin &Yunfei (2018) revealed that a teacher's characteristics (learning readiness, personal transfer efficacy, motivation to transfer, personal capacity, and perceived content validity) at the pre-training stage are significant predictors of transfer effort performance expectancy at the post-training stage.

In the field of agriculture, drivers of training transfer have also differed, notably, Ataei & Zamani (2015) focused on farmers who were trained in Diffusion-Push Plans in Fars Province, Iran found that work environment factors (performance-outcomes expectations, opportunity to use, supervisor support), training design (perceived content validity and transfer design) as significant factors. Kiwanuka *et al.* (2020) focused on small-scale farmers who were trained in agronomic practices of bean production and found trainee characteristics (motivation for transfer and 'performance self-efficacy) as significant factors that influenced transfer. Muthoni & Miiro (2017) focused on what influences the transfer of training in an African agricultural research network and found that trainee characteristics ('Personal capacity') significantly predicted transfer. Since the factors mentioned above have differed, it is not clear whether the same factors will influence the transfer of training in the context of agricultural risk. Therefore, the purpose of this study is to determine the training system factors that drive the transfer of agricultural risk management training among extension workers.

The Case under Study

To better support its farming population, the Government of Uganda through the Ministry of Agriculture, Animal Industries, and Fisheries (MAAIF) has undertaken efforts to better understand and analyse risk and to develop an agricultural risk management strategy aimed at reducing the risk exposure of farmers (Risk & Study, 2015). In 2018 it trained 300 agricultural extension officers (trainees) across the country in holistic agricultural risk management approaches specifically; risk assessment and prioritization, market risk management, institutional and personal risk management, gender issues in agricultural risk management, and agricultural risk policy.

The main aim of this training was to transfer the agricultural risk management trained skills to their life or work. Since this is training like any other training, it is also affected by training transfer factors. Although there are several studies in the field of agriculture on the transfer of training like Kiwanuka et al. (2020); Miiro et al (2021); Muthoni et al. (2017) have not addressed the issues regarding extension workers whose transfer competencies directly translate into life changes of smallholder farmers.

Materials and methods

Instrumentation (Learning Transfer System Inventory)

Holton *et al*. (2000) developed an instrument called the Learning Transfer System Inventory (LTSI), to help inspect the system of variables that influence learning transfer. The LTSI has three sets of factors: trainee characteristics training design and work environment factors. Holton believed that training transfer is more of a social process that takes place when humans as social beings find meaning and motivation to learn and apply what they have learned to their work environment. In the early stages of developing the learning transfer system factors, nine constructs of the transfer climate were factor analyzed and these were mainly related to environmental factors (Holton et al. 1997). These Learning transfer system inventory factors were later expanded by fitting them to an evaluation and included factors such as ; **Learner readiness which is how the trainee feels prepared to enter and participate in the training; Motivation to transfer refers to the intensity and persistence towards utilizing the learned skills; Positive personal outcomes** which is how the trainee feels that applying training on the job leads to positive outcomes; **Negative personal outcomes** this refers to the extent to which participants believe that not applying skills and knowledge learned in training will lead to outcomes that are negative; **Personal capacity for transfer, this is the** extent to which trainees feel they have time, energy and mental space in their work lives to make changes required to transfer learning on the job; **Peer support** this is how peers offer reinforcement of new training and support their colleagues to use new learning on the job; **Supervisor support** this is the extent to which respondents feel their supervisors offer support and reinforcement of training on the job; **Supervisor sanctions which is the** extent to which supervisors are perceived to impose sanctions when respondents apply newly learned skills on the job; **Perceived content validity, this is referred to the** extent to which trainees feel their training content matches their job requirements accurately; **Transfer design is the** degree to which respondents feel the training has been designed and delivered to foster learning transfer on the job; **Opportunity to use** this refers to the extent to which respondents feel they were given resources that enabled them to use their newly learned skills on the job; **Transfer effort performance expectations which is** the respondent's expectation that learning will result in on-the-job changes. **Performance outcomes expectations** this is the trainees' expectation that on-the-job changes will result in valued outcomes; **Openness to change** is the extent to which the respondent believes that implementing new skills and knowledge is encouraged or discouraged by their organization or people in their group. **Performance self-efficacy** is the trainees' belief that they are able to change their performance; **Performance coaching** measures both formal and informal indicators from an organization about an employee's job performance (Holton et al., 2000).

The LTSI instrument used in this study has been validated in various cultural contexts (Bates, Kauffeld, & Holton, 2007; Kim, Bates, & Song, 2019; Yamhill & Mclean, 2005) and found to be a reliable instrument to predict training transfer. The tool was pre-tested with 31 extension workers who were both women and men outside the study population, the reliability estimates of Cronbach's alpha coefficient ranged between 0.65- 0.8

This study addresses the question "***What are the LTSI factors influencing learning transfer among extension workers participating in agricultural risk management training in Uganda***. The research framework for this study is an adaptation of the LTSI model (Holton *et al*., 2000). The following hypotheses were generated to help investigate the impact of work environment, trainee characteristics, and training design factors on the transfer of agricultural risk management practices.

H1 ***There will be no influence of LTSI factors on agricultural risk management training transfer.***

The framework of the hypothesis is reflected in the conceptual framework.

Sampling

A quantitative cross-sectional survey design was employed. The LTSI questionnaire (Bates, Holton, & Hatala, 2012) was completed by 281 trainees. Data were collected in paper form, in an anonymous way from participants on the last day of their training. They represented five categories of trainees (extension workers, environmental offices, veterinary officers, entomologists, and fisheries officers). These attended a range of different training skill areas and programs that varied in duration, content, skill area facilitator, and knowledge.

Data analysis

We analyzed the structural equation model using Analysis of Moment Structures (AMOS), which simultaneously estimates the model, including latent and observed variables, exogenous and endogenous variables, and the paths to these variables. The goodness of fit measures indicated how well the model fitted the data and the paths in the analysis. Non-significant chi-square statistics indicated a good fit; however, chi-square statistics are sensitive to sample size (Hair et al., 2017), thus other goodness of fit were also used. This goodness of fit indices such as Normed Fit Index (NFI), Relative Fit Index (RFI), and Comparative Fit Index (CFI) The root mean square error of approximation (RMSEA) was considered for any value below 0 .08 to help approximate the error variance between the predicted and observed model.

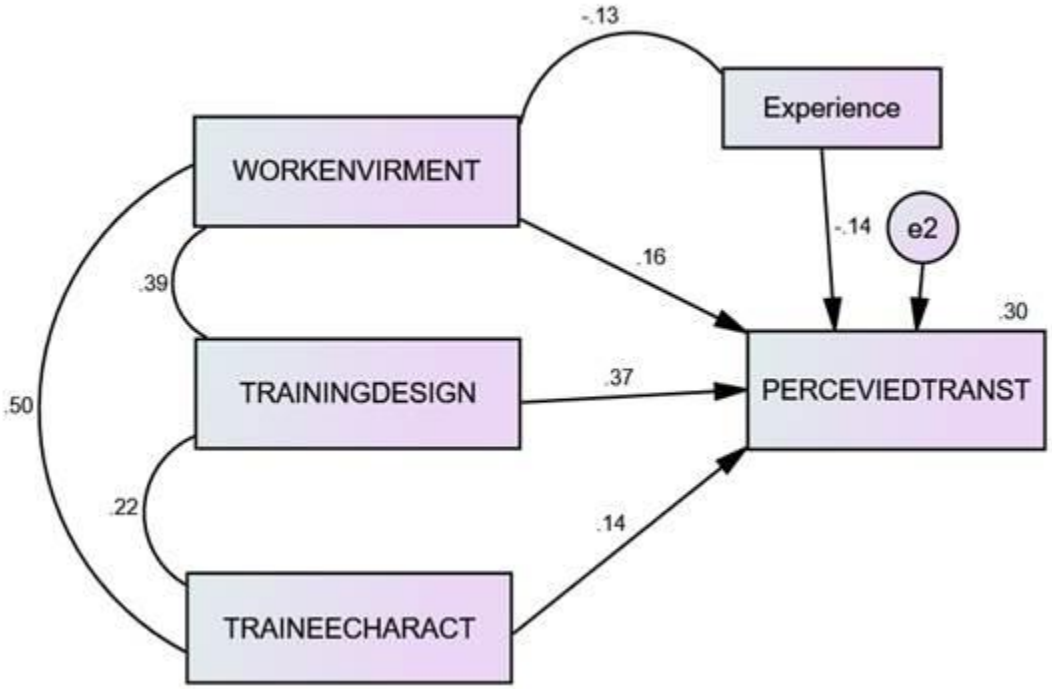
Results

Table 1: Summary of fit indices for the study variables' measurement model

Absolute, incremental, and GOF Indices	Rule of Thumb Hair et al. (2010)	Work environment	Train Characteristics	Training Design
Chi-Square (χ2)				
Chi-Square (χ2)	> 0.50	7.179	6.260	1.488
Degree of Freedom (DF)	> 1.00	11	11	3
Probability Value (P)	> 0.05	.784	.855	.685
Absolute Measures				
Min Discrepancy/DF(CMIN)/DF	< 3.00	.653	.569	.496
Goodness of fit Index (GFI)	> 0.95	.993	.995	.998
Root Mean Sq. Error of Approx. (RMSEA)	< 0.08	.000	.000	.000
Incremental Fit Measures (Baseline Comparisons)				
Incremental Fit Index (IFI)	> 0.95	1.016	1.020	1.008
Tucker-Lewis Index (TLI)	> 0.95	1.031	1.054	1.027
Comparative Fit Index (CFI)	> 0.95	1.000	1.000	1.000
Parsimony Measures				
Normed Fit Index (NFI)	> 0.95	.972	.975	.992
Adjusted Goodness of fit Index (AGFI)	> 0.90	.982	.982	.989
Relative Fit Index (RFI)	> 0.90	.946	.936	.975

AVE

Source: Primary data



Direct hypothesized relationship

Hypothesed Path			B	SE	CR	P-value	Bca
Perceived transfer	<---	Train design	0.37	0.05	6.88	.000	.27-.46
Perceived transfer	<--	Work environment	0.16	0.06	4.18	.011	.04 - .28
Perceived transfer	<---	Trainee characteristics	0.14	0.05	2.77	.010	.04 - .24
Perceived transfer	<---	Experience	-0.14	0.05	-3.79	.002	-.23 - -.05

The results indicate that all training design factors, trainee characteristics, and work environment factors were added to the model at once. As a group they all contributed to the significant model **Squared Multiple Correlations** R^2=78, P <0.001). Explaining78% of the variance in the transfer of holistic agricultural risk management training on the farm (Table 2). *Content validity, readiness to learn, transfer effort performance expectation, training design, and opportunity to use the agricultural risk management skills significantly* contributed to the model. Among the significant factors; transfer effort performance expectation was considered the most important factor and reediness to learn, the least in helping to transfer agricultural risk management practices. Further analysis indicated that training design factors took lead in predicting perceived transfer and the trainee characteristics were the worst in predicting perceived transfer.

Discussion

Results revealed that LTSI factors significantly contributed to the transfer of training. **Content validity** maximized training transfer. This is in agreement with the findings of Ataei et. l (2015); Kiwanuka et. l (2020); Liu, (2018); Mansour et. l (2017) but contrary to Zamani *et al*. (2016) who noted that motivation to transfer and individual self-efficacy are the greatest predictors of training transfer. Sseguya *et al*. (2018), motivation to learn as a key influencing factor in determining the transfer of sustainable agricultural intensification practices among farmers in Tanzania, while Muthoni *etal* (2016), found out that personal capacity influenced the transfer of training in an African agricultural research network more significantly than other factors. Therefore, much effort should be put to improve extension workers' perceived Content validity to ensure better training outcomes. This high level of content validity is likely to be a result of the fact that what was taught closely matched what the trainees needed to improve their performance at their workplace. Furthermore, the examples that the facilitators give must be very similar to what is happening in their areas of jurisdiction. These should have contributed to the high level of perceived content validity.

Readiness to learn also positively influenced training transfer. The finding is consistent with what Zamani et al. (2016), Tonhäuser et al. (2016), Velada et al. (2007), and Testers et al (2019) noted that readiness to learn predicted learning transfer. The results of the study suggest that when trainees feel that they are ready to engage in training more so on a voluntary basis, they tend to attach more interest and self-efficacy that become very critical in predicting the level of training transfer. It is imperative that before embarking on any training, trainees should be well prepared to ensure that they feel that they are ready to engage in the training and are aware of how the training will benefit them.

Our results revealed that Transfer effort performance expectation positively influenced the transfer of training which means that farmers with higher performance-outcome expectations have a larger extent of learning transfer. Our finding is consistent with the results of Holton et al. (2007,) and Celestin & Yunfei, (2018). Transfer effort performance expectation refers to the expectation that effort devoted to transferring learning will lead to changes in job performance. In other words, trainees will use their new skills and knowledge if they expect that transfer will lead to valued outcomes (e.g. the rewarding of high performance, salary enhancement, and promotions).

We found that transfer design positively relates to learning transfer. The findings are in agreement with *Yamnill and McLean (2005)* (Miiro etMuduli & Raval, (2018). According to Zamani et al. (2016), it may not be adequate for the learner to learn the skills and knowledge; It is essential to learn how to transfer the learned skills and knowledge to the workplace. Thus training programs ought to be designed to link learning with on-the-job performance. This can be achieved through the use of clear examples, methods that are similar to the work environment, and activities and exercises that demonstrate how to apply new knowledge and skills. Interactive training design such as giving feedback during training, practical work, teamwork, and role play, could augment learning transfer. Zamani et al. (2016) proposed that trainee-centered training approaches play an important role in learning transfer.

Opportunity to use was in this research also verified to have a positive relationship between with learning transfer. Access to resources is considered the key component of opportunity to use. According to Swanson et al. (1984), the main resources which should be given special attention in ensuring the transfer of training by extension workers are logistics, like books, financial support, transport to the field, and time this will enable the extension workers to transfer the acquired skills to the farmers. This means that when trainees (extension workers) have access to the required resources to implement the training they perceive to have transferred the training to their life or work

However, the following Learning transfer system (LTSI) factors that could perhaps be useful in different contexts were found not to have a significant contribution to the model; Performance expectation negative-outcome, Motivation to transfer, Personal Capacity to transfer, Performance outcome Expectation, Peer support, openness to change, Performance expectation positive outcome, Supervisor Suction, Performance coaching, Perceived Self efficacy, and Supervisor Support. This could be attributed to the context and the nature of the training as indicated by Park, & Kang, (2019) who observed that training transfer system factors are viewed differently by people depending on their demographic characteristics, context, type of training and time.

Conclusion

The objective of the study was to determine which of the LTSI factors had predictive power on the perceived transfer of training by the extension workers. The finding indicated that training design factors accounted for a more significant portion of the total variance this was followed by work environment factors and lastly, it was the trainee characteristics scales of the LTSI in the perceived training transfer scores of the agricultural extension workers, during the agricultural risk management training program. The results suggest that the transfer *design construct of the LTSI, together with the perceived content validity construct should be considered very much* to build effective training transfer systems in organizations, in this case, the agricultural extension workers. Other factors that also need to be taken care of, are work environment factors and trainee characteristics.

Future Research Directions

Designers of training programs ought to pay extra attention to the fact that the more trainees' training content as valid to the work environment, the more motivated they would be to transfer, and the higher transfer level they would have. Thus extra attention should be focused on training design.

Study limitation

Self-reporting by the extension workers was one of the main limitations of this study. The feedback from the questionnaire was subject to recall bias. And this depends mainly on memory, which can be very correct as some respondents tend to put themselves in better positions than the right status. Some people also usually find it difficult to remember incidents that happened in the past (Hassan, 2006).

Creativity

The applicability of LTSI among extension workers has been verified, the attention to LTSI that area significant is critical, as it recognizes the need to be mindful of them in training and transfer design

Recommendations

Designers of training programs ought to pay extra attention on the training design by critically examining the validity of the content in response to their targeted audience. Similarly, a clear understanding of the trainee's work environment is very critical before any training is organised since the trainees will only take seriously and thus transfer those skills that are applicable to their work environment.

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