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Report on scientifically underpinned training evaluation

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Table of Content

1. INTRODUCTION AND OBJECTIVE	2
2. MATERIALS AND METHODS.....	2
TRAINING EVALUATION	2
EXPERIMENTAL DESIGN	3
RECRUITMENT AND SAMPLE	3
CHAIN MANAGEMENT TRAINING PROGRAMME.....	5
MEASUREMENT METHODS	7
IDENTIFICATION OF CONGRESS PARTICIPANTS' EXISTING KNOWLEDGE, ATTITUDES AND BEHAVIORAL INTENTION TOWARDS SUPPLY CHAIN MANAGEMENT (PRETEST)	7
ASSESSMENT OF CONGRESS PARTICIPANTS' END-OF-TRAINING KNOWLEDGE, ATTITUDES AND BEHAVIORAL INTENTION (POSTTEST)	8
ANALYSIS	8
3. RESULTS	8
INTRODUCTION TO CHAIN MANAGEMENT	10
CHAIN PERFORMANCE	12
CHAIN STRATEGY	13
4. CONCLUSIONS	15
LITERATURE CITED	17

1. Introduction and objective

Training programs are one of the most common ways of exploiting research results. As a result, researchers agree that a critical issue in training programmes in the agri-business sector in general and in the traditional food sector in particular is the ability to confirm the success of the training programmes (Goldstein, 1993).

Evaluating training programmes helps to track the growth of trainees' knowledge, to recognize training gaps and potential training needs, to show if the investment was useful and to make sure that the training programme continuously improve. Therefore, many authors stress the need for systematic evaluation research to monitor the effectiveness of training programmes.

Still, the assessment of training programmes poses several difficulties (Carnevale and Schulz, 1990) because of following: 1) The benefits of the training programmes are hard to be described in concrete terms, 2) There is no consistent definition of what training programme assessment is or 3) Most training providers are not able to describe starting points, methods and aims of training programmes. As a result, rigorous evaluation of training programmes is the exception rather than the rule and even among the relatively small group of training programmes that have been evaluated, there were nearly always significant weaknesses in terms of scientific underpinning. Therefore, the objective of this paper is to develop a scientifically underpinned training evaluation model and to test it in the traditional food sector. This is in line with the need formulated by Work Package 8 regarding training evaluation and sound reporting about the success of trainings towards the European Commission.

2. Materials and methods

Training evaluation

Training evaluation can be addressed via a ten-stage process: 1) Training needs assessment, 2) Planning, design and preparation of the training programmes, 3) Pre-course identification training participants, 4) Provision of the agreed training programme, 5) Pre-course briefing meeting, 6) Identification of trainees' existing knowledge, attitudes and behavior (pretest), 7) Training, 8) Assessment of trainees' end-of-training knowledge, attitudes and behavioral intention (posttest), 9) Post-course debriefing meeting 10) Review meeting to discuss progress of implementation. For the sake of the scientific underpinning, experimental design is proposed to carry out steps 6-8.

Experimental design

The aim of experimental research is to discover causal relationships between two issues. In our case it means that with the help of experimental research we can discover and scientifically prove the relationship between the chain management training programme and the increased understanding of SMEs about the chain management. In other words, the aim of the experiment is to determine that our trainings on chain management result in an “increased understanding of SMEs about chain management”. Therefore, the research problem is the following: We want to increase the understanding of SMEs about chain management. We hypothesize that when compared with SMEs who did not receive the training; SMEs who received the training (1) have greater knowledge (both objective and subjective) about chain management; (2) hold more favorable attitudes toward chain management and (3) exhibit more behavioral intention towards chain management. Our experiment try to determine if it is true or not with the help of steps 6-8 of the above described process.

It is important to note that there are a number of things that could affect the understanding of the SMEs about chain management (such as the type of training, the materials used etc). These variables can affect an experiment's results. An experimenter who wants to show that giving training on SCM will increase the understanding of SMEs about chain management, must ensure that it is the training and nothing else, affecting the understanding of SMEs about chain management. To do this, as many of these variables as possible must be controlled, which was the case in our experiment (- the SMEs are selected randomly; - the pairs are matched from experimental and control groups; - homogeneous groups or subgroups are compared etc).

Therefore, Solomon Four-Group research design was used for evaluation of the Chain management training programme (Table 1) (Dignan *et al.*, 1996). This design was selected because it allows for controlled estimation of the effect of the training, and assessment of possible training-like effects associated with pretesting (Campbell and Stanely, 1963). Effects of pretesting may be confused with effects associated with training in pretest-post-test evaluation designs. The attention to chain management that arises from administration of interviews during pretesting may increase awareness and stimulate changes not easily distinguished from those anticipated from the training itself (Green, 1977). The Solomon Four-Group design addresses this concern. Differences in outcomes with and without the pretest can then be determined.

Recruitment and sample

Via several different forums, the possibility to participate in the experiment was announced towards the different food federations and research partners being involved in the Truefood project. At the first phase, three food federations agreed to participate (representing SMEs from Belgium, Hungary and Portugal). During the chain management training programmes in these countries, the

participants were randomly assigned to the two experimental groups (A and B). On top of that, during the other training programmes of the above three food federations and research partners (other than chain management), the participants were randomly assigned to the two control groups (B and C).

Table 1: Solomon Four-Group design

Group identification	Pretest	Training	Posttest
Solomon Four-Group design			
A	X	✓	X
B		✓	X
C	X	∅	X
D		∅	X

The allocation of the sample to the groups in the Solomon Four-Group design is shown in Table 2, 3, and 4 (for the three different training module in the frame of the chain management training programme).

Table 2: Demographic characteristics of the experimental and control groups (Module Introduction)

Module Introduction	Experimental group n=25	Control group n=10
Country		
Belgium	14 (56.00)	10 (41)
Hungary	11 (44.00)	0 (0.00)
Portugal	0 (0.00)	0 (0.00)
Age		
<35	12 (48.00)	7 (70.00)
35-55	12 (48.00)	2 (20.00)
>56	1 (4.00)	1 (10.00)
Gender		
Male	14 (56.00)	6 (60.00)
Female	11 (44.00)	4 (40)
Education		
≤Secondary education	2 (8.00)	3 (30.00)
≥Higher education	23 (92.00)	7 (70.00)
Living environment		
City	15 (62.50)	3 (30.00)
Countryside	9 (37.50)	7 (70.00)
Size of company (nr of employees)		
≤10	7 (28.00)	2 (20.00)
>10 and ≤50	7 (28.00)	3 (30.00)
>50 and ≤250	8 (32.00)	4 (40.00)
>250	3 (12.00)	1 (10.00)
Type of company		
Private company owner/employee	15 (60.00)	8 (80.00)
Other	10 (40.00)	2 (20.00)

As mentioned before, it is required, that homogeneous groups or subgroups are compared. It means that the experimental groups and the control groups should be homogenous regarding their socio-demographic characteristics. The experimental and control groups were equivalent in terms of age, gender, education, living environment, size of company (nr of employees) and type of com-

pany in all the three training modules. However there were no statistically significant differences between the experimental and control groups for any of the variables shown in Table 2, 3, 4 providing strong statistical evidence is not possible, because at the Crosstabs, more than one cell have expected count less than 5.

Table 3: Demographic characteristics of the experimental and control groups (Module Performance)

Module Introduction	Experimental group n=36	Control group n=42
Country		
Belgium	11 (30.56)	11 (26.19)
Hungary	12 (33.33)	5 (11.90)
Portugal	13 (36.11)	26 (61.90)
Age		
<35	16 (44.44)	24 (57.14)
35-55	17 (47.22)	15 (35.71)
>56	3 (8.33)	3 (7.14)
Gender		
Male	18 (50.00)	21 (51.22)
Female	18 (50.00)	20 (48.78)
Education		
≤Secondary education	4 (11.11)	9 (21.43)
≥Higher education	32 (88.89)	33 (78.57)
Living environment		
City	28 (77.78)	27 (64.29)
Countryside	8 (22.22)	15 (35.71)
Size of company (nr of employees)		
≤10	7 (20.59)	6 (14.63)
>10 and ≤50	12 (35.29)	10 (24.39)
>50 and ≤250	10 (29.41)	11 (26.83)
>250	5 (14.71)	14 (34.15)
Type of company		
Private company owner/employee	27 (77.14)	30 (75.00)
Other	8 (22.86)	10 (25.00)

Further, the experimental and control groups were not equivalent in terms of their country of origin in the Introduction to chain management training module and Chain performance training module. Still, in order to have as many participants as possible in the experiment, no participants were excluded from the analysis. However, this also means that the results of the experiment should be carefully interpreted and used as a pilot case for the development of this scientifically underpinned training evaluation.

Chain management training programme

The training programme on chain management contained three training modules and was carried out in three countries.

The three modules are the following: 1) Introduction to chain management, 2) Chain performance and 3) Chain strategies. The training materials were developed by UGENT and CCH in the frame of the Truefood Work Package 5 and 8 activities.

Table 4: Demographic characteristics of the experimental and control groups (Module Strategy)

Module Introduction	Experimental groups n=21	Control groups n=20
Country		
Belgium	11 (52.40)	15 (75.00)
Hungary	10 (47.6)	5 (25.00)
Portugal	0 (0.00)	0 (0.00)
Age		
<35	6 (30.00)	13 (65.00)
35-55	12 (60.00)	6 (33.30)
>56	2 (10.00)	1 (5.00)
Gender		
Male	9 (45.00)	10 (50.00)
Female	11 (55.00)	10 (50.00)
Education		
≤Secondary education	1 (5.00)	1 (5.30)
≥Higher education	19 (95.00)	18 (94.70)
Living environment		
City	16 (80.00)	13 (65.00)
Countryside	4 (20.00)	7 (35.00)
Size of company (nr of employees)		
≤10	1 (5.60)	2 (11.80)
>10 and ≤50	3 (16.70)	2 (11.80)
>50 and ≤250	7 (38.90)	6 (35.30)
>250	7 (38.90)	7 (41.20)
Type of company		
Private company owner/employee	15 (83.30)	11 (55.00)
Other	3 (16.70)	9 (45.00)

The three participating countries were Belgium, Hungary and Portugal.

Belgium: In Belgium, UGENT ensured the core activity: lectures and practical exercises. TDU FEVIA ensured the logistics of the courses. In Belgium, all the three modules took place at HolidayInn in Diegem, to allow participants to come easily from Belgium and Europe (the hotel is located nearby the airport). Facilities included a free shuttle from the airport, free WIFI connection, and special fares for the accommodation of abroad participants. At the first module (1) Introduction to chain management), 16 participant took part. At the second module (2) Chain performance), 11 participant took part. At the third module (3) Chain strategy), 11 participant were present. All the three modules were given by Prof. Dr. Xavier GELLYNCK and MSc. Adrienn MOLNAR from UGENT.

Hungary: In Hungary, CCH ensured the core activity: lectures and practical exercises. TDU FHFH ensured the logistics of the courses. In Hungary, at the first module (1) Introduction to chain management), 26 participant took part. At the second module (2) Chain performance), 20 participant took part. At the third module (3) Chain strategy), 16 participant were present. The first and the third modules were given by Dr András Sebők (CCH) and the second module was given by Dr András Sebők and MSc. Adrienn Molnár (UGENT).

Portugal: In Portugal, UGENT ensured the core activity: lectures and practical exercises. TDU FIPA ensured the logistics of the courses. In Portugal, the three modules were organized at once, and around 80 participants took place at the session. All the modules were given by Prof. Dr. Xavier GELLYNCK and MSc. Adrienn MOLNAR from UGENT.

The modules in all the three countries were organized in theoretical lectures separated by practical exercises. Lectures pinpointed the major information in a short time. Exercises involved the participants at an individual level or in small groups (3-4 participants). Some of the participants had the opportunity to present their case orally. Discussions and questions were raised to the trainers but also between participants of different food sectors. They were very dynamic sessions, practically-orientated and offering real life-case studies (for further information related to the trainings in Belgium, Hungary and Portugal, we kindly refer to the training report prepared by TDU FEVIA, TDU FHFII and TDU FIPA).

Measurement methods

Identification of Congress Participants' Existing Knowledge, Attitudes and Behavior towards Supply Chain Management (Pretest)

For the identification of SMEs existing knowledge, attitudes and behavior, a questionnaire is compiled. Knowledge, attitude and behavior are measured by separate questions or statements concerning chain management. Objective knowledge is measured by indicating true or false against several items and by indicating the certainty of the answers (Khan et al., 2001). Subjective knowledge is measured by items such as: "I know the difference between a chain vision and a chain mission" or "I know how to measure chain performance" with response categories ranging from *strongly disagree* to *strongly agree* on a 7 point Likert scale. Attitude is measured by statements such as: "It is crucial for being successful in the food business to understand the basics of chain performance management" or "It is crucial for being successful as an SME to tailor the chain in order to fully meet the need of the final consumer". Responses categories are ranging from *strongly disagree* to *strongly agree* on a 7 point Likert scale. Behavior was assessed by statements such as "My company exchange knowledge with its supplier and customer", or "My company sets common chain goals with my supplier and customer" with response categories ranging from *strongly disagree* to *strongly agree* on a 7 point Likert scale. Subjective knowledge, attitude and behavior were measured by several items. The developed questionnaire is administered to half of the training participants at each training (Group A) for the identification of existing knowledge, attitudes and behavior before the training session on chain management.

Assessment of Congress Participants' End-of-training Knowledge, Attitudes and Behavioral intention (Posttest)

For the assessment of end-of-training knowledge, attitudes and behavioral intention a questionnaire is compiled similarly to the previous one. Knowledge, attitude and behavioral intention are measured by separate questions or statements concerning chain management. Objective knowledge, subjective knowledge and attitude have been asked with the same questions as in the pretest questionnaire. Instead of behavior, behavioral intention was measured in the posttest questionnaire by several items, such as “My company intends to set common chain goals with my supplier and customer” or “My company intends to participate in a strategic management process at chain level”. The developed questionnaire is administered to the same group of participants (Group A) for the assessment of congress participants' end-of-training knowledge, attitudes and behavioral intention after the training sessions on chain management. Further, the posttest questionnaire has been administered to another group of participants (Group B), who hasn't been asked before the trainings, but similarly to Group A participated at the training. Group B serves as a control group to eliminate the effect of interviewing the respondents twice related to the same topic. The used questionnaires can be find in Annex 4, 5, and 6.

Analysis

First, significant difference between group A and C, as well as between group B and D has been investigated for all the three modules. Mann-Whitney test is carried out for knowledge, attitude and behavioral intention. If no significant difference were found between A and C, and between B and D, then the results of A and B were aggregated (experimental group), and the results of C and D were also aggregated (control groups). Afterwards, the analysis continued looking for significant differences (Mann-Whitney) between the experimental (A and B), and the control groups (C and D).

3. Results

No significant differences were found between SMEs in group A and B and SMEs in the group C and D (Table 5) regarding knowledge, attitude and behavioral intention at the module 1 and module 2 suggesting that there were no effects of pretesting on posttest results (means that asking the SMEs twice about the same subject didn't improve their results, therefore no bias of pretesting). However, the analysis were significant for pretesting effect at module 3 between group A and B for subjective knowledge, indicating that pretesting with the subjective knowledge construct has biasing effect on posttest responses. (During module 1, SMEs that participated at the training and were

interviewed before the training and after the training showed better results after the training (mean 6,10) than SMEs that were only interviewed after the training (mean 5,50, $p=0,043$).

Table 5: Posttest knowledge, attitude and behavioral intention towards chain management by receipt of the pretest in experimental and control groups at the different training modules; mean scores and standard deviations

Module Introduction	Experimental groups	
	Pretest and posttest (A)	Only posttest (B)
	Mean (SD)	Mean (SD)
Objective knowledge1	20,00 (1,00)	16,00 (4,00)
Subjective knowledge2	6,00 (0,74)	5,81 (1,07)
Attitude2	6,46 (0,63)	6,66 (0,39)
Behavior(al intention)2	6,25 (0,91)	4,92 (1,53)
	Control groups	
	Pretest and posttest (C)	Only posttest (D)
	Mean (SD)	Mean (SD)
Objective knowledge1	7,33 (6,43)	5,67 (3,06)
Subjective knowledge2	4,38 (1,49)	4,17 (1,67)
Attitude2	5,54 (2,31)	4,55 (1,93)
Behavior(al intention)2	5,71 (2,47)	4,47 (2,12)
Module Performance	Experimental groups	
	Pretest and posttest (A)	Only posttest (B)
	Mean (SD)	Mean (SD)
Objective knowledge1	16,87 (6,61)	17,14 (5,63)
Subjective knowledge2	5,49 (0,79)	5,34 (0,95)
Attitude2	5,64 (1,21)	5,57 (1,04)
Behavior(al intention)2	5,37 (1,01)	4,97 (0,98)
	Control groups	
	Pretest and posttest (C)	Only posttest (D)
	Mean (SD)	Mean (SD)
Objective knowledge1	12,00 (4,57)	8,92 (4,20)
Subjective knowledge2	4,18 (1,95)	4,53 (1,22)
Attitude2	5,60 (1,41)	5,52 (1,04)
Behavior(al intention)2	5,11 (1,00)	5,08 (1,12)
Module Strategy	Experimental groups	
	Pretest and posttest (A)	Only posttest (B)
	Mean (SD)	Mean (SD)
Objective knowledge1	26,57 (4,47)	23,38 (6,05)
Subjective knowledge2	6,10 ^b (0,60)	5,50 ^a (0,59)
Attitude2	6,13 (0,85)	5,54 (0,80)
Behavior(al intention)2	4,83 (2,02)	5,17 (0,97)
	Control groups	
	Pretest and posttest (C)	Only posttest (D)
	Mean (SD)	Mean (SD)
Objective knowledge1	10,00 (5,23)	13,60 (5,72)
Subjective knowledge2	3,39 (1,69)	4,31 (1,15)
Attitude2	4,65 (0,91)	4,71 (0,73)
Behavior(al intention)2	4,25 (0,79)	4,13 (0,58)

1 True/False statements, every correct answer receives one point, combined with Seven-point interval scale, ranging from "totally unsure" (1) to "totally sure" (7)

2 Seven-point interval scale, ranging from 'totally unimportant' (1) over 'neutral' (4) to 'extremely important' (7)

Different letters (a-b-c) indicate significantly different average scores using Mann-Whitney U test

Since the pretesting bias only occurred at module 3 and only for the experimental group, we tested the training effect using combined post training assessments (groups A and B vs group C and D). However, in experimental design such pretesting effect has to be taken into account, therefore we will also pay special attention to it during the further analysis.

Introduction to chain management

We tested for the effects of the training module 1 (Introduction to chain management) on SMEs knowledge, attitude and behavioral intention. The training module significantly affected the SMEs' objective knowledge and subjective knowledge (Table 6).

Concerning objective knowledge, SMEs, that followed the training module 1 had more correct answers overall on questions related to chain management, therefore their overall objective knowledge score is higher (19,20) than the score of the SMEs that didn't follow the training module (6,50, $p=0,001$). In particular, the trained SMEs score three out of four times significantly higher for the individual statements. The most difficult question was if all resources and capabilities are core competences, whereas the answer is no. At this statement most of the SMEs failed to answer correctly, however still received better scores than the ones not following the training module (The correct answer is that not all resources and capabilities are core competences, only those resources and capabilities that are innovatively bundled and leveraged can be core competences).

Concerning subjective knowledge, the experimental groups (SMEs following the training module 1) score significantly higher (5,47) than the ones not following the training module (4,25, $p=0,018$). As such, after following the training module 1 SMEs for example learned the difference between supply chain, demand chain and value chain and could identify what the main chain flows are.

Still, training module 1 didn't result in any significant difference in the attitude and the behavioral intention of SMEs. However, the SMEs show improvement, after participating at the training module 1, they more likely felt that it is crucial for being successful as an SME to e.g. plan, implement and control the efficient flow and storage of products via the chain or to e.g. tailor the chain in order to meet the needs of the final consumer.

Similarly, SMEs participating at the training module 1 intends to devote time in the future to develop chain competences with their suppliers and customer and intends to exchange knowledge with their suppliers and customers, even if the result were not significant as compared to SMEs not participating at the training module 1.

Table 6: Posttest knowledge, attitude and behavioral intention towards chain management in experimental and control groups at module 1 (Introduction to chain management); mean scores and standard deviations

Module Introduction	Experimental groups Mean (SD)	Control groups Mean (SD)
Objective knowledge1	19,20b (4,47)	6,50a (4,59)
A demand chain focuses on the efficient physical supply of goods	4,29b (2,59)	1,00a (2,65)
A direct chain includes a company, a supplier and a customer involved in the upstream and/or downstream flows of products, services, finances, information and/or knowledge	6,48b (0,75)	3,14a (2,41)
A product flow can be upstream and downstream	5,00b (2,72)	3,00a (2,58)
All resources and capabilities are core competences	1,46 (2,57)	0,17 (0,41)
Subjective knowledge2	5,47b (1,15)	4,25a (1,52)
I know the difference between, supply chain, demand chain and value chain	5,88b (1,51)	3,90a (1,45)
I know what are the main chain flows are	5,96b (1,46)	4,30a (1,83)
I know how to manage a chain	4,88 (1,36)	4,40 (1,71)
I know how to identify core competences along the chain	5,25 (1,15)	4,40 (1,71)
Attitude2	5,77 (1,14)	4,94 (2,03)
It is crucial for being successful as an SME to understand the basic differences between supply chain, demand chain and value chain.	5,56 (1,61)	5,10 (2,28)
It is crucial for being successful as an SME to plan, implement and control the efficient flow and storage of products via the chain	5,76 (1,71)	5,20 (2,15)
It is crucial for being successful as an SME to tailor the chain in order to fully meet the needs of the final consumer	5,92 (1,53)	5,00 (2,36)
It is crucial for being successful as an SME to deliver commonly with your supplier and customer superior added value	5,58 (1,56)	4,70 (2,16)
It is crucial for being successful as an SME to exchange knowledge with your supplier and customer	5,56 (1,36)	5,10 (2,13)
It is crucial for being successful as an SME to look for complementarities in the use of resources and capabilities along the chain	5,96 (1,33)	4,60 (2,17)
It is crucial for being successful as an SME to develop chain competences with your supplier and customer	6,04 (1,10)	4,90 (2,13)
Behavioral intention2	5,32 (1,12)	5,02 (2,23)
My company intends to plan, implement and control the efficient flow and storage of products via the chain	5,71 (1,54)	5,00 (2,12))
My company intends to tailor its chain in order to fully meet the needs of the final consumer	5,21 (1,97)	5,22 (2,28)
My company intends to make an effort to collaborate with its supplier and customer to deliver commonly superior added value	4,50 (1,91)	5,22 (2,22)
My company intends to exchange knowledge with its supplier and customer	5,29 (1,73)	4,89 (2,32)
My company intends to make an effort to look for complementarities in the use of resources and capabilities along the chain	6,00 (1,11)	4,89 (2,32)
My company intends to devote time to develop chain competences with supplier and customer	5,21 (1,67)	4,89 (2,32)

1 True/False statements, every correct answer receives one point, combined with Seven-point interval scale, ranging from "totally unsure" (1) to "totally sure" (7)

2 Seven-point interval scale, ranging from 'totally unimportant' (1) over 'neutral' (4) to 'extremely important' (7)

Different letters (a-b) indicate significantly different average scores using Mann-Whitney U test

As such, we can conclude that following training module 1 on the Introduction to chain management result in direct improvement of SMEs knowledge, however is not sufficient to change significantly their attitude or their behavioral intention towards chain management, therefore after following a training module on the Introduction to chain performance

Chain performance

We tested for the effects of the training module 2 (Chain performance) on SMEs knowledge, attitude and behavioral intention. Similarly to the training module 1, training module 2 also significantly affected the SMEs' objective knowledge and subjective knowledge (Table 7).

Concerning objective knowledge, SMEs, that followed the training module 2 had more correct answers overall on questions related to chain performance, therefore their overall objective knowledge score is higher (17,00) than the score of the SMEs that didn't follow the training module (9,78, $p=0,000$). In particular, the trained SMEs score three out of five times significantly higher for the individual statements. The most difficult question was if chain performance management is putting in place the right performance indicators to assess the healthiness of your chain. At this statement most of the SMEs failed to answer correct, however still received better scores than the ones not following the training module. (The correct answer is that chain performance measurement is putting in place the right performance indicators to assess the healthiness of your chain. Chain performance management is using the performance indicators to support process/organizational/chain goals).

Concerning subjective knowledge, the experimental groups (SMEs following the training module 2) score significantly higher (5,42) than the ones not following the training module (4,43 $p=0,000$). As such, after following the training module 2 SMEs for instance learned how to set chain goals, how to select performance indicators to verify the realization of chain goals or how to measure chain performance.

Still, training module 2 didn't result in any significant difference in the attitude and the behavioral intention of SMEs. However, the SMEs show improvement, after participating at the training module 2, they more likely felt that it is crucial for being successful as an SME to e.g. understand the basics of chain performance management, or create a chain performance measurement tool together with their supplier and customer.

Similarly, SMEs participating at the training module 2 intends to set common chain goals with their supplier and customers, intends to regularly verify the realization of chain goals with their suppliers and customers.

Table 7: Posttest knowledge, attitude and behavioral intention towards chain management in experimental and control groups at module 2 (Chain performance); mean scores and standard deviations

Module Performance	Experimental groups Mean (SD)	Control groups Mean (SD)
Objective knowledge1	17,00b (6,05)	9,78a (4,47)
Chain performance management is putting in place the right performance indicators to assess the healthiness of your chain	0,90 (2,23)	0,38 (1,37)
A sound chain performance measurement tool contains as many relevant performance indicators as possible	3,56b (3,11)	0,68a (1,71)
Chain performance measurement starts with the identification of chain partners being involved in the measurement process	5,70b (1,64)	4,57a (2,33)
Performance measurement can only be realized through objective data gathering	1,68 (2,61)	0,64 (1,73)
Goals being approved by several chain partners are chain goals	4,65b (2,74)	3,22a (2,91)
Subjective knowledge2	5,42b (0,86)	4,43a (1,43)
I know the difference between performance measurement and performance management	5,71b (1,00)	4,83a (1,68)
I know how to set chain goals	5,53b (1,02)	4,31a (1,52)
I know how to select performance indicators to verify the realization of chain goals	5,32b (1,15)	4,44a (1,55)
I know how to measure chain performance	5,12b (1,15)	4,19a (1,44)
Attitude2	5,61 (1,12)	5,54 (1,12)
It is crucial for being successful in the food business to understand the basics of chain performance management	5,48 (1,39)	5,60 (1,28)
It is crucial for being successful in the food business to set common chain goals with my supplier and customer	5,85 (1,10)	5,74 (1,25)
It is crucial for being successful in the food business to link performance measurement to chain goals	5,79 (1,01)	5,43 (1,36)
It is crucial for being successful in the food business to create a chain performance measurement tool together with my supplier and customer	5,29 (1,55)	5,33 (1,24)
It is crucial for being successful in the food business to regularly verify the realization of chain goals with my supplier and customer	5,65 (1,28)	5,45 (1,19)
Behavioral intention2	5,21 (0,99)	5,09 (1,07)
My company intends to set common chain goals with my supplier and customer	5,45 (1,10)	5,26 (1,24)
My company intends to link performance measurement to chain goals	5,14 (1,06)	5,21 (1,24)
My company intends to create a chain performance measurement tool together with my supplier and customer	5,00 (1,30)	4,75 (1,24)
My company intends to regularly verify the realization of chain goals with my supplier and customer	5,29 (1,35)	5,16 (1,30)

1 True/False statements, every correct answer receives one point, combined with Seven-point interval scale, ranging from "totally unsure" (1) to "totally sure" (7)

2 Seven-point interval scale, ranging from 'totally unimportant' (1) over 'neutral' (4) to 'extremely important' (7)

Different letters (a-b) indicate significantly different average scores using Mann-Whitney U test

Chain strategy

We tested for the effects of the training module 3 (Chain strategy) on SMEs knowledge, attitude and behavioral intention. Training module 3 was an outstanding module in the frame of the training programme, because it significantly affected the SMEs' objective knowledge, subjective knowledge, attitude as well as behavioral intention (Table 8).

Concerning objective knowledge, SMEs, that followed the training module 3 had more correct answers overall on questions related to chain strategies, therefore their overall objective knowledge score is higher (24,87) than the score of the SMEs that didn't follow the training module (12,57,

$p=0,0059$). In particular, the trained SMEs score four out of five times significantly higher for the individual statements. The most difficult question was if chain mission tells what the future of the chain looks like. At this statement a number of SMEs failed to answer correct, however still received significantly better scores than the ones not following the training module. (The correct answer is that chain mission is a precise description of what the chain does. Chain vision tells what the future of the chain looks like.

Concerning subjective knowledge, the experimental groups (SMEs following the training module 3) score significantly higher (5,80) than the ones not following the training module (3,91 $p=0,000$). As such, after following the training module 3 SMEs for instance learned how to lead a strategic management process for their chain, how to build a SWOT table, how to evaluate the need of resources for their chain strategy. Still, caution is needed at interpreting this result, since the analysis were significant for pretesting effect at module 3 between group A and B for subjective knowledge, indicating that pretesting with the subjective knowledge construct has biasing effect on posttest responses (Table 6).

Training module 3 significantly improved the attitude of SMEs towards chain strategies (5,85 vs 4,68, $p=0,000$). SMEs show improvement, after participating at the training module 3, they found it more crucial after the training module for being successful as an SME to e.g. develop common chain strategy with their suppliers and customer, to build the chain strategy on the harmonization of resources and capabilities or to make a detailed action plan as part of the strategic management process together with their suppliers and customers.

Similarly, SMEs participating at the training module 3 significantly improved regarding their behavioral intention. While without following the training module 3, SMEs score 4,16, after following the training module 3, SMEs score 4,97 ($p=0,009$). It means that before the training, SMEs didn't participate in a strategic management process at chain level, and didn't align their individual vision with their chain's vision, but after the training, they intend to do that.

Table 8: Posttest knowledge, attitude and behavioral intention towards chain management in experimental and control groups at module 3 (Chain strategy); mean scores and standard deviations

Module Strategy	Experimental groups Mean (SD)	Control groups Mean (SD)
Objective knowledge^{1,2}	24,87b (5,44)	12,57a (5,64)
Strategic competitiveness is when a chain successfully formulates a strategy	4,63b (2,53)	3,18a (1,88)
Chain advantage is a competitive advantage developed via a chain strategy	5,71b (0,77)	2,94a (2,05)
Chain vision is a precise description of what the chain does	6,00b (1,14)	1,88a (2,36)
Chain mission tells what the future of the chain looks like	3,00 (3,16)	1,31 (1,82)
Action plan list action steps in alphabetical order	5,94b (1,39)	3,93a (2,58)
Subjective knowledge²	5,80b (0,66)	3,91a (1,44)
I know the difference between a chain vision and the chain mission	6,48b (0,68)	3,60a (1,57)
I know how to lead a strategic management process for my chain	5,35b (1,14)	3,58a (1,54)
I know how to build a SWOT table	6,00b (1,05)	3,95a (2,15)
I know how to evaluate the need of resources for my chain strategy (action plan)	5,33b (1,11)	4,39a (1,82)
Attitude²	5,85b (0,86)	4,68a (0,78)
It is crucial for being successful in the food business to understand the basics of chain strategy development	6,14b (1,11)	4,65a (1,39)
It is crucial for being successful in the food business to develop common chain strategy with my supplier and customer	6,33b (0,73)	4,65a (1,35)
It is crucial for being successful in the food business to build the chain strategy on the harmonization of resources and capabilities.	6,00b (1,05)	4,80a (1,20)
It is crucial for being successful in the food business to make a detailed action plan as part of the strategic management process together with my supplier and customer.	5,24b (1,67)	4,32a (1,34)
It is crucial for being successful in the food business to align the chain vision with my individual company's vision.	5,52 (1,60)	4,89 (0,99)
Behavioral intention²	4,97b (1,64)	4,16a (0,62)
My company intends to participate in a strategic management process at chain level	5,40b (1,50)	3,86a (0,95)
My company intends to commonly develop chain strategies with my supplier and customer.	4,60 (1,92)	4,57 (1,34)
My company intends to participates in the preparation of a detailed action plan to realize chain strategy	4,80 (2,01)	4,07 (0,83)
My company intends to aligns its vision with the chain vision	5,07b (1,62)	4,14b (0,66)

¹True/False statements, every correct answer receives one point, combined with Seven-point interval scale, ranging from "totally unsure" (1) to "totally sure" (7)

² Seven-point interval scale, ranging from 'totally unimportant' (1) over 'neutral' (4) to 'extremely important' (7)

Different letters (a-b) indicate significantly different average scores using Mann-Whitney U test

4. Conclusions

In the frame of this report, we developed and tested an innovative training programme evaluation tool among stakeholders of the traditional food sector.

This has been done with the help of Solomon Four-Group experimental research design (Four group, Group A (pretest, training, posttest), Group B (training, posttest), Group C (pretest, posttest), Group D (posttest)). We hypothesized that when compared with SMEs who did not receive the training; SMEs who received the training (1) have greater knowledge (both objective and subjective) about chain management; (2) hold more favorable attitudes toward chain management and (3) exhibit more behavioral intention towards chain management. The training programme consisted of three modules: 1) Introduction to chain management, 2 Chain performance and 3) Chain strategies. The training materials were developed by UGENT and CCH in the frame of the Truefood Work Package 5 and 8 activities. The experiments were carried out in Belgium, Hungary and Portugal. The modules in all the three countries were organized in theoretical lectures separated by practical exercises.

The results indicate that SMEs showed improvement in their objective and subjective knowledge after the training modules 1 and 2 (Introduction to chain management and Chain performance) and they improved on objective knowledge, subjective knowledge, attitude and behavioral intention after the training module 3 (Chain strategy). Therefore, the chain management training programme was highly successful at teaching SMEs about chain management. It improved SMEs knowledge but it also created attitudes and behavioral intentions supporting chain management practices.

This study has some limitations. First, we tested attitudes and behavioral intentions immediately after the training modules, however attitude and behavioral intention change process takes time. We assume that this is the reason why SMEs during module 1 and 2 didn't show improvement on their attitude and behavioral intention. This conclusion, however, is speculative. Secondly, we interviewed the SME participants, which were sometimes not the ones being responsible for the decision to be made (e.g. we asked a quality manager of an SME about if he/she wants to introduce chain management practices). The ideal respondents for this survey would be CEOs, who can facilitate or hinder SCM practices at the SME.

In general, the developed training programme evaluation tool is promising measure of the success of training programmes. It can assist practitioners in their efforts to assess training programmes. Further, it can help establishing a structured link between science and industry through scientifically underpinned evaluation of training programmes. Besides, it can help to track the development of the knowledge, skills and attitudes and to identify deficiencies in the training programmes. In particular, when used, the tool can inform e.g. food federations about the behavioral intention of SMEs in an indirect way, and as such, food federations can make tailor made efforts to initiate, to support this behavioral intention. Besides, the approach gives an exact answer on which parts of the training module were not understand correctly (check the single items on objective

knowledge for example). Further, it can help to compare training modules with each other (such as we did with module 1, 2, and 3).

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