

Training evaluation: a configurational analysis of success and failure of trainers and trainees

Training
evaluation

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Abstract

Purpose – This study aims to investigate the formative evaluations of the training programmes of a Portuguese national railway public company for an entire calendar year. The aim is to uncover alternative configurations for the design of training programmes to create better levels of evaluation. This study is based on the following research question: What are the configurations that lead to the success and or failure of trainers and trainees? Among those, are there any common designs that generate the success and or failure of both trainers and trainees?

Design/methodology/approach – This study used matched data from an entire calendar year to examine the trainers and trainees' evaluations of 429 training events. This study also used a fuzzy-set qualitative comparative analysis (fsQCA) to provide configurations that generate the success or failure of trainers and trainees. This methodology offers alternative pathways to the same outcomes and thus gives managers different options to reach similar results.

Findings – The results show that there are more configurations that lead to trainers' success (five) than to its absence (four). However, the configurations that lead to trainees' success (three) are less than those that lead to its absence (six). The findings indicate that a single common configuration exists that leads to high evaluations.

Research limitations/implications – This study does not address summative evaluations. Regarding data, the study acknowledges the use of self-evaluations for trainees, although they serve as a proxy for a learning evaluation. The generalisation of the results outside the Portuguese railway company's context is not possible.

Practical implications – The proposed analysis is applicable to other settings without restrictions. Managers may replicate this study's approach in their organisations to uncover the alternative configurations that lead to the success or failure of trainers and trainees. They may adopt the ones that lead to successful outcomes and avoid the ones that lead to undesired ones.

Originality/value – This study is innovative because it addresses concurrently the success or failure of trainers and trainees that is only possible by using the fsQCA method. This study opted to use this method to provide alternative pathways to extreme outcomes: the most successful or the most unsuccessful. These multiple pathways are better results compared to traditional quantitative statistical methods that only provide a single estimated solution to the presence of the dependent variable; for example, a regression analysis or structural equation modelling.

Keywords Training evaluation, Railway company, Fuzzy-set qualitative comparative analysis, Trainees, Trainers, Training programmes

Paper type Research paper



1. Introduction

Training programmes aim to prepare trainees to succeed in organisations with continuous improvement values that are devoted to achieving and to maintaining advanced levels of competitiveness (Tomkinson, 2004, p. 73). Given their importance, there is great pressure to evaluate training programmes and ensure that they have the highest possible degree of success (Ritzmann *et al.*, 2014; Curado and Bernardino, 2018). Training affects motivation (Florea *et al.*, 2016), creativity (Somsing and Belbaly, 2017) and positive job attitudes. However, a gap exists in the research as it focuses on the validity of training programmes instead of on the evaluations of their designs (Goldstein and Ford, 2002), although the literature does discuss the effect of design on training outcomes (Ritzmann *et al.*, 2014). The training managers should evaluate the design of the training programme to establish what leads to the best results (Goldstein and Ford, 2002). However, little research has addressed the effectiveness of the programmes in terms of reaching the maximum performance for both trainers and trainees, specifically in the public sector (Schumaker, 2004).

Because training results from complex interactions among many factors, our research aims to uncover alternative configurations of designs for training programmes that create better evaluations (Salas and Cannon-Bowers, 2001). Therefore, we state our following research questions:

- RQ1. What are the configurations that lead to the success or failure of trainers and trainees?
- RQ2. Among those, are there any common designs that generate the success or failure of both trainers and trainees?

Accordingly, we establish the study's objectives as follows:

- to identify the configurations that lead to higher or lower evaluations for trainers and trainees; and
- to identify the common designs that generate the finest or poorest results for the evaluations of both trainers and trainees.

We adopt a set-theoretic method – fuzzy-set qualitative comparative analysis (fsQCA) – to provide alternative pathways to extreme outcomes for both trainers and trainees: success or failure. The fsQCA allows multiple solutions to emerge that results in alternative configurations that lead to “success” that differ from the configurations that lead to “failure” (Fiss, 2007, 2011). The fsQCA has three criteria: “causal conditions”, “causal configurations” and the “outcomes” (Fiss, 2007). In this study, the causal conditions are as follows: cost – the training programme's total cost in euros; participants – the number of participants in the training programme; duration – length of the training programme in hours; topic – the subject content of the training; and origin – who provides the training programme. The causal configurations are the combinations of causal conditions that the fsQCA provides that lead to the outcomes of interest. In this case, the outcomes are the success or failure of trainers and trainees. The trainers' and trainees' success are the highest scores on the evaluation questions in the questionnaires applied after the programme, whereas failure regards the lowest scores.

The paper is structured as follows. Section 2 offers a review of the literature on formative and summative evaluations, Kirkpatrick's training evaluation model with four levels, specific factors in training evaluation, followed by a debate on trainers versus trainees' evaluations. Section 3 presents and describes the methodological procedures adopted in the study and reports the results. In Section 4, we present the results; in Section 5, we analyse and discuss them and present the study's limitations and future research directions. Section 6 provides the conclusion.

2. Literature review

2.1 Formative and summative evaluations

A firm evaluates the effectiveness of training by the degree to which the programme meets its objectives (Noe, 2010; Wankhede and Gujarathi, 2014). Thus, firms need to cautiously plan and organise training programmes for them to be effective (Cheng *et al.*, 2019). The appraisal of training's efficacy is puzzling because it results from the influence of different contributions, such as the managers' choices, trainees' persistence, the organisations' characteristics and environmental factors. All these factors create complexity (Endres and Kleiner, 1990). Training evaluation involves two dimensions: the formative and the summative (Bates, 2004; Noe, 2010). The formative regards how well the training programme is organised and the degree to which trainees learn and are satisfied with the programme. The formative evaluation gives feedback to improve the training programme by showing how the firm could modified it to increase its effectiveness. The evaluation of the programme's design is a formative evaluation (Ritzmann *et al.*, 2014). The summative evaluation focuses on the effectiveness of completed interventions (Goldstein and Ford, 2002) and assesses the extent to which trainees' behaviours change as a result of the programmes and its effect on performance (Bates, 2004; Sitzmann and Weinhardt, 2019). Trainers and trainees together contribute to the result of the training programmes (Pine and Tingley, 1993). Thus, trainers' and trainees' evaluations can improve the programme's effectiveness (Giangreco *et al.*, 2010). Further, their evaluations reflect their degree of satisfaction that has three dimensions (Zahra *et al.*, 2014):

- (1) the perceived effectiveness of the training programme in terms of planning, organisation, support materials and facilities;
- (2) the perceived utility of the training programme's content regarding current and future professional challenges; and
- (3) the perceived knowledge transferred during the training programme in relation to the use of time and involvement.

There are evaluation models that address both the formative and the summative dimensions, such as Kirkpatrick's model (Kirkpatrick, 1959) that proposes four levels of training evaluation. Each level progresses with the complexity involved (Moldovan, 2015). In spite of much criticism (Sitzmann *et al.*, 2008; Ritzmann *et al.*, 2014; Sitzmann and Weinhardt, 2019), the model by Kirkpatrick is highly cited in the most relevant studies on training evaluation (Steele *et al.*, 2016; Rohmann *et al.*, 2017) and is the most generally accepted by academics (Phillips, 1996; Hung, 2010; Sitzmann and Weinhardt, 2019). Further, it is also the most commonly found in practice and the most widely used in organisations (Bates, 2004; Ho *et al.*, 2016; Hung, 2010; Sitzmann and Weinhardt, 2019).

2.2 Kirkpatrick's training evaluation model

Level 1 (reaction) of Kirkpatrick's model addresses the evaluation of trainees' answers and reactions to the programme (Florea *et al.*, 2016). At this level, trainers can measure the degree to which participants react favourably to the learning event (Kirkpatrick and Kirkpatrick, 2005), that is, they can measure the participants' satisfaction with the programme (Phillips and Phillips, 2016). Therefore, Level 1 usually measures participants' affective reactions to training and their related aspects, such as the difficulty of training materials (Steele *et al.*, 2016), that result in recommendations for future programmes or their willingness to continue the training (Florea *et al.*, 2016). Armstrong and Landers (2017) offer an instructive example of Level 1 evaluation.

At Level 2 (cognitive), trainers evaluate the progress in knowledge and skills that results from attending the training programme (Florea *et al.*, 2016). They measure the degree to which participants acquire the intended knowledge, skills and attitudes from the learning event (Kirkpatrick and Kirkpatrick, 2005). At this level, trainers measure the cognitive consequences of the programme as an outcome of training than the changes in attitudes. They assess the degree of behavioural change in the workplace by evaluating the programme's effect. This level covers the job-related behavioural changes that indicate the transfer of training to the job (Ritzmann *et al.*, 2014). Armstrong and Landers (2017), Filmer (2020) and Perez-Soltero *et al.* (2019) provide examples of Level 2 evaluation.

At Level 3 (behaviour), the trainer evaluates the degree to which the trainees apply what they learned during the programme to their job (Kirkpatrick and Kirkpatrick, 2005). At this level, they measure the change that occurs because employees attended the training programme (Kirkpatrick and Kirkpatrick, 2005). This evaluation level is difficult to implement because:

- employees cannot change their behaviour until they have an opportunity to do so; and
- it is impossible to predict when a change in behaviour will occur.

It may not happen immediately, or it may never happen. An illuminating example of Level 3 evaluation is offered by Filmer (2020).

At Level 4 (results), the firm evaluates the training programme's effect on the employees' performance, its performance and the environmental consequences (Florea *et al.*, 2016). It measures the degree to which the targeted outcomes occur as a result of the learning event(s) and subsequent reinforcement (Kirkpatrick and Kirkpatrick, 2005). The firm measures changes in variables that affect business (Phillips and Phillips, 2016) by checking if the desired end results occur, such as improved quality, higher productivity, more safety, greater profits, increased job satisfaction or fewer mistakes (Kirkpatrick and Kirkpatrick, 2005). Illustrative examples of evaluation studies covering this level are Yousefian *et al.* (2017) (results and innovation) and Shabbir (2019) (on the effect of training on organisational performance).

Levels 1 and 2 address the formative evaluation and Levels 3 and 4 address the summative evaluation of training programmes. However, most firms only evaluate the reaction to training and the cognitive level, while they often neglect the assessment of the effect of training on their results (Saks and Burke, 2012; Srimannarayana, 2010; Kennedy *et al.*, 2014; Curado and Teixeira, 2014; Lien *et al.*, 2007).

2.3 Factors in programme design and training evaluation

There are three factors that are important for the transfer of training: the work settings, the training programme's design and individual characteristics of the trainees (Baldwin and Ford, 1988). Because the design can impact the training's effectiveness (Blume *et al.*, 2010), there are design-related factors that influence the results of training evaluations. First, the number of participants in the training programmes can influence their evaluations (Chochard and Davoine, 2011; Curado and Bernardino, 2018; Giangreco *et al.*, 2010). Second, the duration of the training programmes can also affect the evaluation (Asadullah *et al.*, 2015; Chochard and Davoine, 2011; Chochard and Davoine, 2017; Dmitry and Manokhina, 2017; Curado and Bernardino, 2018; Grohmann and Kauffeld, 2013; Giangreco *et al.*, 2010). Third, the training programmes' costs have consequences for the evaluation's effectiveness (Asadullah *et al.*, 2015; Curado and Bernardino, 2018; Dmitry and Manokhina, 2017). Fourth, the training programme's topic and the expertise that is developed during the event can influence the training

evaluation (Chochard and Davoine, 2011; Curado and Bernardino, 2018; Fregonese *et al.*, 2018; Grohmann and Kauffeld, 2013; Giangreco *et al.*, 2010). Further, the training programme's origin (internal vs external) can affect its results (Asadullah *et al.*, 2015). However, companies seem to prefer to use pre-set external training programmes rather than to develop their own company-specific internal programmes (Wickramasinghe, 2006). The comparison of the results of internal and external training programmes is worth pursuing and differentiating (Nikandroua *et al.*, 2008).

2.4 Trainers' evaluation vs trainees' evaluation

After a training programme takes place, the evaluation should gather feedback from both trainers and trainees (Zahra *et al.*, 2014) to refine the process (Huquea and Vyasb, 2008). Such training evaluations constitute Kirkpatrick's Levels 1 and 2 (Kirkpatrick and Kirkpatrick, 2005). According to Zahra *et al.* (2014), companies should check the trainees' reactions to training and trainers should also give their feedback on the programme's aspects and the trainees' performance. The two sets of data should be collected by the companies (Blanchard *et al.*, 2000; Twitchell *et al.*, 2000; Ritzmann *et al.*, 2014; Srimannarayana, 2017). A meta-analysis by Sitzmann *et al.* (2010) shows that self-evaluations of knowledge correlate moderately with cognitive learning. A gain in self-reported knowledge can thus serve as a proxy for evaluating learning. Self-evaluations of knowledge are defined as learners' estimates of how much they know (current knowledge level) or have learned (increase in knowledge level) about a domain (Sitzmann *et al.*, 2010). The use of questionnaires to gather feedback from both trainers and trainees can provide data on the effectiveness of the training programmes in terms of their reactions and acquired knowledge (Hayes *et al.*, 2016). Huquea and Vyasb (2008) provide one rare example of this approach by reporting on the evaluation of the training programmes developed at the Civil Service Training and Development Institute in Hong Kong.

3. Methodology

3.1 Data collection and analysis

The data are for an entire calendar year from the Portuguese railway public company. This company follows an institutional model in which a complete separation exists between the infrastructure and the train operations (Finger, 2014). The company has an autonomous department that provides training both on business and technical issues and develops the associated evaluation mechanisms. The training for the railway company especially addresses key areas of sustainability: railway engineering and technology and leadership and management. For business training, the company focuses on leadership and management, such as project management; advanced programmes of management and leadership; and quality and personal development. Such examples involve training on adopting strategic practices for management control, developing internal skills for project management and increasing strategic leadership skills through the company's development programme on culture that is designed to support team management. For technical training, the programme covers production including training in principles of signalling, control of rail traffic and energy efficiency. Such examples involve training in technical safety that is associated with the railway specialties to encourage benchmarking practices and promote technical innovation.

The study uses a 2017 database of the 171 different training programmes (83 – business; 88 – non-business/technical) that involve 264 trainers (23.8% female; 76.2% male) and 429 training events (each training event involves a trainer and a group of trainees). The trainers are on average 45 years old and have been at the company for about 18 years. A total of

2,264 trainees (21.5% female; 78.5% male) received training over the year (totalising 6,025 participations in all the training events) with costs totalling over €1,171,000 (direct plus indirect costs). On average, trainees are 47 years old and have been at the company for 20 years. The majority of employees were trained during the year (2,264 out of a total 2,513 – 90.1%), and the average time spent in training per employee was 28 h and 54 min. All training programmes were conducted during working hours and took place within the company's buildings, and the programmes were dispersed across the country, although mostly in the cities of Lisbon and Oporto. The database matches trainees' and trainers' reactions to and cognitive evaluations of the training programmes. We use fsQCA to detect the training programme's characteristics that are associated with the highest evaluations as well as the aspects of training programmes that present the minimum evaluations.

3.2 Measures

We use data from questionnaires and tests that assess the trainers' and trainees' performances in the programmes. This procedure is consistent with [Kraiger et al. \(1993\)](#) and [Holladay and Quiñones \(2008\)](#). The data exclusively reflect the first two levels of Kirkpatrick's model. We use a five-item scale (from 1 – poor to 4 – very good) to evaluate the training programmes at both the reaction and cognitive levels. Not having a neutral category (no midpoint) forces respondents to take a side and avoids a centre tendency in the answers. Immediately after the programmes, trainees must evaluate the programmes and self-assess themselves in terms of:

- training programme organisation (five questions);
- training programme topic (four questions);
- training programme pedagogical support (three questions);
- trainee's self-evaluation (four questions); and
- trainer evaluation (seven questions).

Similarly, the trainers also evaluated the training programmes and the trainees' cognitive component of learning in terms of:

- training programme organisation (four questions);
- training programme topic (four questions);
- training programme pedagogical support (three questions); and
- trainees' performance (three questions).

A sample of items regarding the programme's topics are as follows: "The training topics are adjusted to the levels of knowledge and expectations of the trainees" (trainers' questionnaires); "The training topics are adjusted to the defined objectives" (trainees' questionnaires). A sample of items regarding trainees' performance include: "Trainees' participation in the programme demonstrated interest and collaboration in the training activities dynamics" (trainers' questionnaires); and "Perceived utility of the training to my professional development" (trainees' questionnaires).

3.3 Fuzzy-set qualitative comparative analysis

The QCA evolved from addressing configurations of crispy sets (simple Boolean datasets) that were composed of binary variables that used one for "presence" and zero for "absence" in a given set. The fuzzy-set variant of the QCA (fsQCA) accepts variables that range from full membership (1) to full non-membership (0). The fsQCA is an entirely accepted technique

(Kraus *et al.*, 2018) that several domains have applied, from sociology to political science, from environmental science to medicine and from business and economics to governmental administration (Roig-Tierno *et al.*, 2017). Although human resource management studies have used fsQCA (Curado, 2018; Meijerink and Bondarouk, 2018), there are no studies that simultaneously apply the fsQCA to trainers' and trainees' success or failure regarding their training evaluations.

The fsQCA technique relies on Boolean algebra principles that provide alternative logical configurations of the causal conditions for the objective analysis of selected cases (Freitas and Neto, 2014). The fsQCA provides the ability to identify complex structures (Basedau and Richter, 2014) and to deal with the ambiguity in nonlinear relations (Curado, 2018). Configurational approaches admit that conditions may be causally related in a certain configuration, but they may be unrelated or oppositely related in others (Meyer *et al.*, 1993). The set of conditions that lead to each outcome may differ from those that lead to its absence (Fiss, 2011). Thus, we use the fsQCA set-theoretic technique to uncover the combinations of conditions (causal configurations) that lead to a desired outcome or its absence (represented by the use of \sim before the outcome) (Schneider and Wagemann, 2010; Mas-Verdú *et al.*, 2015). The fsQCA accepts purposeful samples (Rihoux and Ragin, 2008) to show the functioning of a concrete and specific complex reality (Ragin, 2009) that means the results cannot be generalised and are valid only for the sample under study.

3.4 Calibration

The calibration of the data demands the attribution of fuzzy membership scores to address the varying degrees of membership between full inclusion (1) and full exclusion (0). The calibration procedure uses theoretical and empirical knowledge that is necessary to define the three qualitative breakpoints: full non-membership, a point of maximum ambiguity regarding membership and full membership (Ragin, 2005). We calibrated all the conditions as well as the outcomes (regarding trainers and trainees) that were based on theoretical rules, the empirical interpretation of data and the conditions and outcomes' statistics (Table 1).

Outcomes and causal conditions	Descriptive statistics	Calibration cuts
Trainers ($n = 429$)	$\mu = 3.41, \sigma = 0.42, \text{min} = 2.00, \text{max} = 4.00$	(3.90;3.45;2.80)*
Trainees ($n = 6,025$)	$\mu = 3.46, \sigma = 0.25, \text{min} = 2.68, \text{max} = 4.00$	(3.80;3.45;3.12)*
Total cost (€)	$\mu = 4,624.91, \sigma = 10,801.07,$ $\text{min} = 121.73, \text{max} = 143,663.65$	(20,000;2,000;400)*
Duration (h)	$\mu = 13.89, \sigma = 12.26, \text{min} = 0.3, \text{max} = 80$	(35;16;3.5)*
Participants (number per training programme)	$\mu = 22.91, \sigma = 56.36, \text{min} = 1, \text{max} = 584$	(100;8;4)*
Topic	Business (48.5%); non-business (51.5%)	Binary variable: business = 1; non-business = 0
Origin	Internal corporate provider (70.1%); External provider (29.9%)	Binary variable: internal corporate provider = 1; external provider = 0

Table 1.
Descriptive statistics
and calibrations of
outcomes and causal
conditions

Notes: μ = average; σ = standard deviation; min = minimum; max = maximum; *= (0.95;0.50;0.05)

In this study, there are several conditions that assume multiple values (various degrees of a characteristic) and thus have to be calibrated: the number of participants in the training programme (participants), duration of the training programme in hours (duration) and the training programme's total cost in euros (€) (cost). Regarding training evaluation, the trainers' and trainees' success also assumes multiple values and has to be calibrated as well: the trainers' evaluation (trainers) (measured by the average of the scores given to the trainer by the trainees on seven evaluation questions from the questionnaire applied after the programme), and the trainees' evaluation (trainees) (measured by the average scores given to the trainee by the trainer on the three questions to assess cognitive learning from the questionnaire applied after the programme). Regarding the variables that are binary, the calibration procedure is not necessary, because the variables only reflect two possible situations (presence or absence of a certain characteristic) and therefore are considered to belong or not to belong to the given set. In this study, there are two binary conditions: the training programme's topic (topic) and the training programme's origin (origin). The topic is either business or non-business. The origin is internal when delivered by the training department in the company, and external when brought from an external provider. These conditions assume only two possible realities: the training topic either is business related or not (1 or 0), and the training origin is either internal or external (1 or 0).

3.5 Sufficiency analysis of conditions

The causal configurations reflect the nonlinear relations of conditions that lead to an outcome. The configurations with cut-off consistency scores above the thresholds from the literature are categorised as sufficient; on the other hand, causal configurations above the cut-off value are not considered sufficient (Schneider and Wagemann, 2010). To address the sufficiency of the causal configurations, we use the analysis of the truth table with the thresholds for raw consistency (0.80) (Ragin, 2006). This study considers two outcomes: trainers' success and trainees' success. The sufficient condition sets are combinations, or configurations, of conditions that generate a certain outcome. Best practices suggest reporting the configurations that lead to the outcome as well as its absence (Fiss, 2011; Fiss *et al.*, 2013; Ragin, 2000, 2008). Accordingly, we provide the configurations that lead to the trainers' success and the trainees' success and also offer the pathways that lead to their absences, in this case the trainers' failure and trainees' failure. Although fsQCA provides three solutions for each test of the model, the results are in a single table (Fiss, 2011; Ragin, 2008) for each outcome and its absence. The conditions present in intermediate and parsimonious solutions are core conditions, whereas the ones that are only part of the intermediate solution are the peripheral conditions (Fiss *et al.*, 2013; Ragin, 2000, 2008). The parsimonious solution contains only core conditions that are extremely related to the outcome, whereas the intermediate solution only assumes the most plausible and simplifying assumptions (Ragin, 2008).

Each configuration of conditions and the overall solutions are assessed for consistency and coverage. According to Wang *et al.* (2016), consistency means significance, and coverage means strength. Consistency regards the extent to which the cases that share a certain configuration of conditions show the outcome in question (Ragin, 2008). Coverage regards the amount of variation in the outcome that is originated in a certain condition or configuration (Ragin, 2006) compared to the R-squared in regressions (Fiss *et al.*, 2013), whereas unique coverage regards the contribution of a particular configuration (Fiss, 2011). Woodside (2013) stresses the importance of achieving high consistency as opposed to high coverage. The consistency level of the configurations and the overall solutions (parsimonious and intermediate) should be above the 0.75 level suggested by Ragin (2008),

Crilly (2011) and Fiss (2011). Overall, the coverage values of the solutions are within the suggested limits of 0.25–0.90 (Ragin, 2008; Woodside and Zhang, 2013).

4. Results

4.1 Causal configurations

The fsQCA’s solutions provide the configurations that generate the outcomes (success – trainers’ highest evaluations and trainees’ highest evaluations) and their absences (failure – trainers’ lowest evaluations and trainees’ lowest evaluations). Such results constitute an improvement compared to traditional quantitative statistical methods that only provide a single estimated solution to the presence of the dependent variable; for example, a regression analysis or structural equation modelling (Rihoux and Ragin, 2009). Thus, fsQCA is not subjected to the limitations of regression-based techniques, such as collinearity and power issues, and also in terms of interpretation. On the contrary, fsQCA generates alternative configurations of conditions and allows equifinality and asymmetry (Fiss, 2011) that means alternative configurations can generate the same outcome, and the number of configurations that generate the outcome or its absence can be different.

In our case, it means that there is more than one combination (or configuration) of causal conditions that lead to trainers’ success (or failure) as well as to the trainees’ success (or failure). The conditions in this study are related to the organisational structure and managerial options on the training programmes: cost, duration, participants, topic and origin. The outcomes are trainers’ and trainees’ evaluation levels. Each configuration of conditions and the associated outcome is designated as a case (Fiss, 2007). The configurations in Tables 2-5 present the core and peripheral conditions for both the outcome variables and their absences. Because fsQCA allows asymmetry, the conditions for the outcomes differ from the ones for their absence (Fiss, 2011). For all

Table 2.

Causal configurations leading to trainers’ success

Model: Trainers = $f(\text{cost, duration, participants, topic, origin})$								
Configurations	Causal conditions					Coverage		
	Cost	Duration	Participants	Topic	Origin	Raw	Unique	Consistency
1	●		●	○		0.301421	0.106314	0.794656
2	●	○		○	○	0.114599	0.022614	0.872629
3	●	●		○	●	0.071160	0.000000	0.782144
4	○	○	○	○	○	0.230499	0.137496	0.802241
5	○	○	●	●	○	0.016344	0.016344	0.899959

Notes: Overall solution coverage: 0.478901; overall solution consistency: 0.776522

Table 3.

Causal configurations leading to the absence of trainers’ success

Model: ~Trainers = $f(\text{cost, duration, participants, topic, origin})$								
Configurations	Causal Conditions					Coverage		
	Cost	Duration	Participants	Topic	Origin	Raw	Unique	Consistency
1		○	●	●		0.179289	0.052754	0.875048
2	○		○	●	○	0.044981	0.021185	0.879059
3	●		○	●	●	0.211773	0.105233	0.828464
4	●	●		●	○	0.042296	0.015952	0.942994

Notes: Overall solution coverage: 0.329990; overall solution consistency: 0.835056

tables, cost = training programme's total cost; duration = duration of the training programme; participants = number of participants in the training programme; topic = training programmes' topic; origin = training programme's origin; ~trainees = the absence of trainees' success; full black circles (●) indicate the presence of a condition; and white centre circles (◦) indicate its absence. Large circles indicate core conditions, and small ones indicate peripheral conditions. Blank spaces indicate the condition does not contribute to the configuration.

5. Discussion

Trainers may reach high training evaluation levels when the firm uses one of the five designs of training programmes that involve expensive training programmes on non-business topics. On the other hand, the trainers' lack of success results from four designs of training programmes on business topics. Redesigning the training programmes to follow the successful guidelines would improve the trainers' evaluations. Overall, there are more ways to achieve good evaluations (5) than there are to achieve worse results (4), which should motivate training managers.

Trainees can achieve success when participating in three training programmes with designs that are expensive and address non-business topics. Oppositely, trainees' lack of success comes from six training programmes designs on business topics. Therefore, managers should develop new training programmes on business topics. There are less configurations that lead to trainees' success than to its absence. Such findings constitute a challenge for training managers as there are twice as many configurations that lead to low results (6) as there are that lead to higher results (3) for trainees.

Analysing the configurations that lead to success or failure for both trainers and trainees, we find common paths: one configuration that leads to success and two configurations that

Table 4.
Causal
configurations
leading to trainees'
success

Configurations	Model: Trainees = $f(\text{cost, duration, participants, topic, origin})$								
	Causal conditions					Coverage			Consistency
	Cost	Duration	Participants	Topic	Origin	Raw	Unique		
1	●	•		◦	●	0.071378	0.001303	0.796673	
2	●	◦		•	●	0.157107	0.047986	0.855235	
3	●	◦	◦	◦	◦	0.069324	0.069324	0.877339	

Notes: Overall solution coverage: 0.435197; overall solution consistency: 0.811181

Table 5.
Causal
configurations
leading to the
absence of trainees'
success

Configurations	Model: ~ Trainees = $f(\text{cost, duration, participants, topic, origin})$								
	Causal conditions					Coverage			Consistency
	Cost	Duration	Participants	Topic	Origin	Raw	Unique		
1	◦		◦	●	◦	0.044110	0.012469	0.847860	
2	◦	◦	●	●		0.148990	0.130749	0.824205	
3	•	●		◦	●	0.085297	0.085297	0.867142	
4	•		●	●	◦	0.026972	0.004786	0.882839	
5		●	◦	●	◦	0.045298	0.003066	0.956401	
6	•	●		●	◦	0.042086	0.000000	0.922885	

Notes: Overall solution coverage: 0.288481; overall solution consistency: 0.839154

lead to failure. Thus, these are important paths. Because the number of alternatives that lead to failure is double those that lead to success, the latter is harder to achieve, and thus training managers should be cautious and consider such configurations when choosing the designs for training programmes.

Our findings contribute to the literature in several ways. First, we address trainers and trainees evaluation in a single study, which is not usual and uncovers the two sides of the phenomenon. Second, we provide alternative options to achieve trainers' and trainees' highest evaluations. This does not suggest a mandatory way to reach training success, typical of a commonly used traditional statistical approaches in the literature such as a regression or a structural equation modelling. Third, we address the solution regarding the absence of the outcome disclosing the alternative possibilities that generate the most undesired evaluations. By doing this, we are warning against such damaging pathways. Such contributions are only possible because of the use of the fsQCA. Our choice of the method allowed us to generate alternative solutions for both high and low training results.

By providing alternative options to achieve trainers' higher evaluation levels, we add the academy on Kirkpatrick's model Level 1 addressing the evaluation of the training programmes. Our findings extend previous related literature such as [Florea et al. \(2016\)](#), [Phillips and Phillips \(2016\)](#) and [Armstrong and Landers \(2017\)](#). By providing alternative options to achieve trainees' higher evaluation levels, we add the academy on Kirkpatrick's model Levels 2 and 3 addressing the cognitive and behavioural consequences of the programmes. Our contribution complements prior studies such as [Armstrong and Landers \(2017\)](#), [Filmer \(2020\)](#), [Perez-Soltero et al. \(2019\)](#) and [Ritzmann et al. \(2014\)](#).

Our results raise questions among academics and practitioners. On the one hand, several research questions emerge that may guide future studies to explore alternative ways to reach the highest training programmes' effect on organisational performance, and thus extending former work such as [Shabbir's study \(2019\)](#) on the effect of training on organisational performance, or the work by [Yousefian et al. \(2017\)](#) addressing the mentioned effect on innovation. Other emerging questions relate to the adequacy of the programmes' design to deliver training in soft vs hard skills. One may question what are the alternative ways that lead to the best results in training regarding the two kinds of skills?

On the other hand, practitioners may want to know the contribution of organisational dimensions to training results, complementing the effect of the programmes' design. Answering to such questions is important because managers have the power to act over organisational dimensions that could influence the training efficacy. Practitioners may also wonder about the effects of the programmes' design over the associated return on investment. Replying to such requests will provide better support to decision-making on resource allocation, pursuing higher impact on business performance ([Shenge, 2014](#); [Asadullah et al., 2015](#)).

5.1 Limitations and future work

We must acknowledge the limitations of this study. First, the study lacks summative evaluations that future studies could develop by implementing Kirkpatrick's Levels 3 and 4, namely, behavioural changes and their effects on results. Regarding data, we use measures for trainees' self-evaluations, although they were complemented with the trainers' evaluation of trainees. We also have no data on the work environments that are related to issues such as the technological supports involved in the programmes, nor do we have data on specific individual characteristics such as the gender of the programme's trainer or the prevailing gender among trainees for each programme alone because of a restriction on the

access to such data. Having more complete data could expand the conditions in the study that could have generated additional analyses and discussions.

Even though the generalisation of the results outside the Portuguese railway company's context is not possible because of the qualitative approach of the study, the analysis is replicable to other formative training evaluations without restrictions. As a result, we invite scholars to reproduce this study in other settings. Regarding future research, we suggest that addressing the differences between physical attendance programmes and remote ones should be addressed because digital programmes bring flexibility and adaptation to training. Bearing in mind that trainers and trainees' good performances should be rewarded and recognised, it would be interesting to study influence of such rewards on training transference and future participation in training.

6. Conclusions

In this study, we provide a better understanding of the configurations that lead to training outcomes for both trainers and trainees. We propose an innovative approach to evaluate trainers and trainees' success by exploring conditions related to the programmes' design. We found the configurations that lead to high and low evaluations of formative training that are based on the results from the trainers' and trainees' assessments. The originality of the study regards the double-faced approach to formative training evaluation in which we address trainers' and trainees' evaluations simultaneously. Our findings bring theoretical and empirical contributions to the literature.

Theoretically, this study contributes to the literature on effective training (Schumaker, 2004; Curado *et al.*, 2015) by offering alternative designs that lead to higher results for both the trainers' and the trainees' evaluations. It also provides alternative designs that lead to lower results in both cases. We found that there is no single pathway to success or failure in formative training evaluation, mostly because training involves complex interactions among many factors (Salas and Cannon-Bowers, 2001). Empirically, this study makes a practical contribution to training managers regarding the designs of programmes. Managers may, therefore, adopt the configurations we found that lead to better results and avoid the ones that lead to less successful results.

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Further reading

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