Putting the *System* back into Training and Firm Performance Research: A Review and Research Agenda

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Abstract

Research examining training and firm performance is currently at an inflection point; capable of recognizing its previous achievements but also having a focus on the future. Based on our review of the past 40 years of 208 quantitative studies investigating the training-firm performance relationship we find that the focus of research studies has not changes significantly. Whereas early research focused mainly on investigating direct relationships the research emphasis has shifted to understanding the role of mediators and moderators influencing the relationship. Although this recent research has contributed to understanding how and when training impacts form performance there is evidence that much of this research adopts a linear and static view of the relationship. We propose open systems theory to provide an more integrated and dynamic view of the relationship and encourage researchers to investigate temporal dynamics in both training and form performance, the investigation of reverse causality and a broadening of conceptualisations of firm performance. We offer specific directions for future training-firm performance research and identify the methodological implications of our open-systems framework.

Keywords

Training, firm performance, open systems theory, organizational performance, future research directions.

INTRODUCTION

In the past four decades, the main focus of training and organisational performance research has been to provide practitioners with evidence that training pays (Cifalino & Lisi, 2019). This strategic turn in HRM research (Jackson et al 2011) or what has become known as the " business case" (Garavan et al, 2020) has prompted significant growth in training-performance performance research and resulted in as mixed bag of research findings. To date studies highlight positive direct and indirect relationships (eg. Kim & Ployhart, 2014; Riley, Michael & Mahoney, 2017; Morley, Szlavicz, Poor, & Berber, 2016; Choi & Yoon, 2015).), negative relationships (eg. Xxxxx) and studies finding no significant relationship (eg. Xxxxx). While the pursuit of the "business case agenda" has led to significant growth in research outputs it also has had a number of negative outcomes that are not beneficial to the robustness of findings generated for practitioner (Gubbins, Harney, Van der Werff, & Rousseau, 2018)).

In particular, the strategic turn framed as the "business case" while contributing to the prevalence of training as an important HR practice in organisations (ATD, 2018; CIPD, 2017) has led to theoretical, conceptual and methodological convergence. Researchers have in the main been motivated to uncover positive direct relationships between training and frim performance and they have only recently focused on the moderator and mediators of that relationship (Garavan et al 2020). The strategic turn has resulted in researchers making use of a narrow set of theories that they consider are best suited to explaining the relationship (eg. human capital theory and the RBV). There has been an over focus on financial performance and the focal outcome with the result that significantly less attention has been given to non-financial outcomes of training.

Perhaps most fundamental of all is that we have significant gaps in in what we know about the relationship because theory to data has been used to conceptualise the relationship as linear and static with ;little attention given to how the relationship changes over time. Specifically , the research base does not adequately explain how the relationship may change over time and how

different combinations of external and intern al factors combine to impact firm performance. From a practitioner perspective there are a number of important and as yet unanswered questions such as (a) How do changes in the levels of investment in training impact firm performance over time? (b) How does the performance of the firm impact future investments in training? (c) What are the levers that training practitioner should focus on to that represent the pieces "in the middle" to link training to firm performance? These represent important questions for both researchers and training practitioners.

To better understand these complex dimensions of the relationship we propose open systems theory as a what for researchers to conceptualise and understand how the relationship occurs a apart of a larger system (Post et al 2019). We argue that open systems theory (Katz and Kahn. 1978) can be used to revitalise a well-established steam of research and it can provide the field with a parsimonious model to address the types of questions just highlighted. Schleichter et al (20180) proposed that systems theory can help researchers to organise the key interrelated components of a HR system and surface novel research directions. Additionally open systems theory is useful in helping researchers to shift away from the characteristics of specific element of the system ro understanding the dynamics of connectivity (Kauffmqn , 1993). A fundamental principle underpinning open systems theory is the notion that " the whole is more than the sum of the parts" (Post et al 2019, p 18). Within systems theory the system is conceptualised as the unit of analysis and in this paper we propose that training in organisations can be conceptualised as an open system (Katz and Kahn, 1978).

In this paper we have as an over-arching objective the evaluation of the utility of adopting an open systems model to integrate the disparate findings on the training-firm performance literature and identify avenues for theoretical and practice-based research. We propose three questions as follows: (1)To what extent can open systems theory offer a useful means for integrating disparate research findings? (2) To what extent is is possible to to integrate the

training-firm performance literature using open systems theory? and (3) What insights does open systems theory offer for training researchers and practitioners ? We therefore build significantly on the Garavan et al (2020) meta-analysis that used open systems theory to develop hypotheses on moderators of the training- firm performance relationship. The meta-analysis paper is significantly narrower in focus in that it utilised four principles of open system theory to understand important contingencies of the training-firm performance relationship. This paper focuses on the development of an open systems theory informed conceptual model to theorise the significance of six principles of open systems theory for researching the training- firm performance relationship. We propose a research agenda build around these six principles (Adaptation, Congruence, Internal Interdependence. Emergence. Equifinality and Capacity for Feedback) and highlight some of the most promising areas of future research. In addition we engage with the methodological challenges that arise in operationalising these principles in research projects.

Our review is structured as follows. First we explain the methodology we used to select, categorise and review the existing quantitative studies on the training-firm performance relationship. Second, we outline the key dimensions of open systems theory that provides the conceptual foundation for our review, we describe how we developed our model and we summarise the key findings to emerge from the review. Third, we develop insights on the six principles of open systems theory that ate the focus of our model, we discuss their implications for researching the training – firm performance relationship and we propose research agenda in respect of each principle. Finally, we highlight the methodological challenges that this research agenda presents for researchers in the field.

LITERATURE SEARCH AND CODING OF EMPIRICAL PAPERS

There are several important issues related to the scope of this review. First, our review focuses on training and firm performance. We use a relatively broad conceptualization of training to include that which focuses on current skill (Tharenou *et al.*, 2007) and future skill development

(Sitzmann & Weinhardt, 2018). The review spans the last 41 years of work on training-firm performance (1979-2020).

We began our review of the research area with a systematic database search using Business Source Complete, Emerald, Google Scholar, TSTOR, Psychhinfo and Web of Science. We used 1979 as our starting point because Tharenou *et al.* (2007) in their seminal meta-analysis of training and organizational performance reported that the first study on the link was published by Miron and McClelland in 1979. We did, however, check to find out whether earlier studies had been published, given the more restrictive nature of the inclusion criteria in meta-analyses.

To identify the core body of research on training-firm performance we conducted six keyword searches. The first search combined the term "training" with " firm performance". To avoid overlooking papers that may have used alternative conceptualisations of training we use the term "development" and "firm performance" "learning and development" and " firm performance" " human resource development" and "firm performance" and " ability/skill enhancing HR practices " and "firm performance". These keyword searches produced a total of 2510 articles. Next two of the authors read the abstracts of all 2510 articles rating them on a five-point scale to determine whether they focused on training and firm performance. The interrater reliability of this assessment was 0.716. Where our ratings diverged we analysed the more carefully to assess whether they dealt with training and firm performance. This process resulted in a significant reduction of articles. We found that many of the papers that emerged through our search did not investigate the training-firm performance relationship statistically. This reduced our list of papers to 1506.

We then stared the process of reducing our list of articles further to determine whether the article should be included in our review. We utilised three inclusion criteria. First, we only included articles that reported quantitative empirical findings on the training-firm performance relationship are included. This reduced the sample to 1165 papers. Second, only articles based on workplace settings were included, which reduced the sample to 796 papers. Third, the article

needed to report a correlation for one or more firm performance outcome which we defined following Tharneau *et al*. (2007) as consisting of collective human resource, operational and financial performance outcomes. This reduced our sample to 248 papers. We then reviewed each paper to access the quality of the methodology. Methodological screening focused on the quality and rigour of publications that survived these initial review stages. To conduct this component of the review process, the research team screened the publications independently to establish their relevance and quality (Petticrew and Roberts 2006). We eliminated papers where (a) there was no/inadequate description of the sample included in the study; (b) where the measures of training and /or from performance were not described; and (c) the paper did not contain table of statistics to support the description of results. This reduced the sample of empirical studies to 207. The interrater reliability for this component of the process was 0.796.

After identifying the 207 core articles, we read and coded them according to our open systems informed model which we describe in the next section (Figure 1). The final step focused on the extraction of the data from the selected publications using our theoretical model. We used content analysis which is appropriate make reliable and valid inferences from text (Krippendorff 2013) Content analysis focuses on the interpretation of data based on a systematic codification process where data is organised around themes or categories (Duriau *et al*. 2007).

To complete the process of data analysis we started out with a broad description of each component of the framework and the types of issues that are typically included within that component. As we reviewed each source we started to refine what should be included in each category. Second, where points of disagreement arose, we resolved them through frequent discussion between the lead researcher and other members of the research team. On a number of occasions, these discussions resulted in the addition of new dimensions to the component of the model under review. At the end of the data analysis process we calculated the level of inter-rater agreement using Cohen's kappa coefficient on a sample of 60% of the analysed papers. We achieved a kappa coefficient of 0.842,

which indicates a high level of inter-rater agreement. Table 1 summarises the descriptive information on coded papers.

INSERT TABLE 1 ABOUT HERE

AN OPEN SYSTEMS BASED FRAMEWORK OF TRAINING-FIRM PERFORMANCE

Open Systems Theory and the Training-Firm Performance Link

Open systems theory provides both a vocabulary and a framework for describing the structure and operation of any system by placing them into an appropriate framework (Barabasi, 2016). Applying these parameters to the training-firm performance relationship can lead to new insights into how multiple components of the system are interrelated and the dynamic operation of these components over time. A systems perspective emphasises that interrelated parts of the training system cannot be understood or investigated by focusing on those parts in isolation (von Bertalanffy, 1968). Open systems theory can be applied to any system and it principles can help illuminate how a particular system operates. As an approach to understanding the link between training and firm performance, it is best viewed following Harney (2018) as a conceptual construct or framework.

The idea of applying open systems theory to training is not new however many of the applications occurred earlier in the development of training and an area of academic study. Scholars such as Hinrichs (1976) proposed the idea that training was a system and emphasized instructional design, trainee characteristics and organizational conditions or the work environment. Baldwin & Ford (1988) made use of open systems theory to bring coherence to the training transfer literature and highlighted specific organizational inputs and processes leading to effective training transfer outcomes. We argue that open systems theory articulates six important principles that can enhance our understanding of the training-firm performance link.

The first principle relates to **congruence** or the fit between the components of the system and the congruence hypothesis which is about understanding the fit between characteristics of the external and internal context and training processes (Nadler & Tushman, 1980). Second, open systems theory emphasizes the concept of **adaptation,** suggesting that scholars should investigate the extent to which training adapts to changes in external inputs (Schleicher *et al.*, 2018). The adaptation principle suggests, for example, possibilities to investigate in a dynamic way both levels of training investments and the timing of these investments in response to external factors.

Third, open systems theory proposes the concept of **internal interdependence** (Kast & Rozenzweig, 1972) or the interconnectedness or interdependence of system components. This principle raises important questions for how interactions between different system components impact training investments, the types of investments undertaken and how and why they link to firm performance. Fourth, open systems theory emphasizes the concept of **emergence** or the notion that higher level outcomes arise due to interactions between system components. Within the training-firm performance body of research, there are few attempts to link macro and micro perspectives and study the emergent processes that link them. Ployhart & Moliterno (2011) highlighted the need to engage with the concept of emergence or more specifically the cognitive, affective, behavioural processes that enable individual KSAs to be linked to unit or organizational level human capital.

The concept of **equifinality** holds that firms can achieve the same end state 'from differing initial conditions and through different means' (Harvey 2018:114). Garavan *et al.* (2020) recently explored this principle in the context of moderators of the training-firm performance link. It was specifically used to help resolve some of the inconsistencies in the relationship between specific or general training and firm performance. Equifinality envisages that organizations can achieve the same or similar set of outcomes utilizing different paths or strategies. Harney (2018) suggests that it may have value in accounting for the variety and diversity of training practices implemented in organizations. The principle of equifinality therefore suggests a need to move away from a

universalistic perspective that pervades training-firm performance research and it highlights the value of configurational thinking (Harney, 2018). Finally, the concept of **feedback loops** within open systems theory emphasizes that the firm performance outcomes of training will influence future training investments and firm performance. Investigation of the capacity for feedback is nascent in both the HRM, training and firm performance studies. One exception is Shin & Konrad (2017) who utilized open systems theory and in particular the feedback principle to investigate reverse causality between financial performance and the future use of high performance work practices.

Developing Our Open Systems Informed Model

To understand the relationship between training and firm performance within an open systems theory perspective we conducted our review of studies using an inputs-processes-outcomes framework. This framework , presented in Figure 1 draws on ideas derived from three open systems based models: Nadler & Tushman (1980), Baldwin & Ford (1988) and Schleicher *et al.* (2018). We selected these three models for a number of reasons, First they provide on organised way in which we can consider the inputs, processes and outputs and the relationships between them. Second two of the models (Baldwin & Ford 1988; Schleicher *et al.* 2018) are specifically positioned within training and HRM and they are therefore instructive in helping us to discern the factors that are important to each component of our framework.

Training inputs comprise the "why" of training and its impact on firm performance. it included both external and internal context factors that impact why training is undertaken in organisations. It includes both external and internal inputs. External inputs focus on factors in the external environment or what are called macro environmental influences and include global and cultural context; environmental characteristics; and industry characteristics. The internal context factors organization design, structure and task characteristics, industry or sector, capital intensity and resources, business strategy, HRM practice characteristics, technological intensity and legitimacy

These external and internal context inputs are salient in explaining the types of training, the amount of training , who is trained and the timing of training activities. Our review of the existing studies seeks to identify what external and internal context issues have been considered in research pertaining to the training-firm performance relationship.

Training processes pertain to both the content or " what" of training and the process dimensions represent the "how" of training in organisations. The content elements include the training practice implemented, coverage of these practices, who is trained and the resources allocated to implement these practices. The process component of training processes is concerned with how training is implemented and which lead to training outcomes. Schleicher *et al.* (2019) for example specified three processes : climate, culture and leadership; organizational learning and knowledge sharing; and team cohesion, trust and collaboration. We identify organisational processes as an essential component of our framework because they are essential to the implementation of the training content. They are also central to the open systems principle of emergence that we described earlier.

Training outputs comprise firm level outcomes of training content and organisational processes. Our review is specifically interested in identifying the types of firm level outcomes that are derived from training content and organisational processes. We specify three categories of outputs and categorized them into proximal (human resource performance outcomes) and distal outcomes (operational and financial performance outcomes). Consistent with our open systems framework we emphasize that these outcomes are a function of training content and organisational processes however this is something of a black box within the literature in that little research has explored how training content is translated into firm performance outputs.

Key Findings using our Open Systems Model

Given that our primary focus is on discussing the six principles of open systems theory in terms of research agenda we provide o summary of our key findings here. We provide detailed analysis of our findings in Tables 2-4.

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The Input Components of our Framework

Research on inputs has considered both external and internal inputs with most attention having been paid to internal inputs. Examples of global and national context inputs include cross-country differences (Ahmad & Schroeder, 2003), technological intensity (Beugelsdijk, 2008), country of origin (Kwon & Rupp, 2013) and national culture or cross-cultural differences (Choi & Yoon, 2015). Examples of other environmental factors investigated include economic conditions (Kim & Ployhart, 2014), economic uncertainty (Miller & Lee, 2001), market demand and change (Sung & Choi, 2018; Sung & Choi, 2014a), and sector differences (Harel & Tzafrir, 1999; Kwon & Rupp, 2013). Examples of environmental characteristics include economic conditions (Kim & Ployhart, 2014) and market competitiveness and uncertainty (Miller & Lee, 2011). (Beugelsdijk, 2008).

Examples of internal inputs include organization design, structure and task characteristics firm size (Horgan & Muhlau, 2006), single versus multiple establishments (Black & Lynch, 1996), ownership types (Aragon-Sanchez *et al.* 2003), union density (Tzafrir, 2005), work characteristics (Jiang *et al.*, 2012), multiple industries (Glaveli & Karassavidou, 2011) and sectors (Jiménez-Jiménez & Sanz-Valle, 2005; Chowhan, 2016). Strategy characteristics investigated as internal inputs include innovation strategy (Aragon-Sanchez *et al.* 2003), strategic integration or fit (Audea *et al.*, 2005), strategic orientation towards HR (Choi & Yoon, 2015), CSR strategy (Liu *et al.* 2014) and the strategic primacy of training beyond other HR practices (Kooji *et al.* 2013)..

Research has also given attention to capital intensity (Koch & McGrath, 1996), resource investment (Barrett & O'Connell, 2001), and R&D investment (Ballot & Taymaz, 2001), technological intensity (Diaz-Fernandez *et al.* 2017), technological capability (Chatterjee, 2017) and technological change (Sung & Choi, 2014b). HR practices investigated include HRM strategy (Horgan & Muhlau, 2006), HRD / training strategy (Ubeda-Garcia, Claver Cortes, Marco-Lajara, & Zaragoza-Saez, 2014), HR strength (Guan & Frenkel, 2019), presence of a HR department (Wickramasinghe & Liyanage, 2013) and complementariness between training and other HR practices (Buch *et al.*, 2015). It is clear from this limited research base that characteristics of the HR system affect both the types of training and its effectiveness.

The Content and Process Components of our Framework

Research on the training content component has investigated factors such as training on-the-job skills and multi-skilling (Ahmad & Schroeder, 2003), on-the-job and off-the-job training (Aragon-Sanchez *et al.* 2003), general and specific training (Arunprasad, 2017), team training and cross-training (Cappelli & Neumark, 2001), service-related training (Ellinger *et al.* 2008) and internal versus external training (Laursen & Foss, 2003). Studies has also investigated the level of training intensity and extensiveness (Gurbuz & Mert, 2011); the importance or emphasis given to the training provided (Choi & Yoon, 2015); and the commitment and dedication given to the training provided (Aragon & Valle, 2013). performance. another content dimension of training investigated in studies includes total expenditure on training (Diaz-Fernandez *et al.* 2015), the ratio of total expenditure on training to total payroll / sales (Barrett & O'Connell, 2001) and general level of investment in training (Berk & Kase, 2010), number of employees trained (Harel & Tzafrir, 1999), the percentage of employees trained (Estebán-Lloret *et al.*, 2016), the number of training hours (Cho *et al.* 2006), training days (McNamara *et al.* 2012) and percentage of training hours during and outside of work (Aragon-Sanchez *et al.*, 2003).

Another dimension of training content concern who is trained. This dimension is reflected in terms of gender (Akrofi, 2016; Yang *et al.* 2013), age (Nasurdin *et al.* 2014), job tenure (Bell & Grushecky, 2006), organizational tenure (Dysvik *et al.*, 2016), working hours (Boselie, 2010), job contract type (Piaralal *et al.* 2014), wage level (Tessema & Soeters, 2006), employee skills (Katou & Budhwar, 2006), employee / manager ability (Aragon & Valle, 2013) and job readiness (Lee, 2015). Examples of psychological characteristics investigated include employee / manager motivation (Tessema & Soeters, 2006), employee loyalty (Glaveli & Karassavidou, 2011), work engagement and personal role engagement (Fletcher, 2016) and employee enthusiasm for training (Park & Jacobs, 2011).

We conceptualize organizational processes as emergent processes or factors that 'originate in the cognition, affect, behaviours and other characteristics of trainees and are amplified by their interactions and manifest in higher level collective phenomenon' (Kozlowski & Klein, 2000:55). Scholars have investigated some cognitive emergent processes including work climate and environment (Gelade & Ivery, 2003), organizational fairness (Kooij *et al.* 2013), procedural justice (Tremblay *et al.* 2010), transformational leadership (Barling *et al.* 1996), leadership commitment (Burton & O'Reilly, 2004), organizational culture (Lau & Ngo, 2004) and team leadership (Santos *et al.* 2015) in training studies. Examples of behavioral dimensions investigated include organizational learning (Aragon *et al.* 2014), organizational learning orientation (Gutierrez-Gutierrez *et al.* 2016), knowledge sharing (Buch *et al.* 2015), and knowledge integration (Gutierrez-Gutierez *et al.* 2016). Examples of affective emergent processes include supportive leader / manager / supervisors (Coebrer *et al.* 2014), perceived supervisory support (Buch *et al.* 2015), co-worker supports (Bashir & Long, 2015) and teamwork processes (Ely, 2014).

The Outputs Component of Our Framework

Most firm level outcomes focus on human capital and operational outcomes**.** Examples of s KSA outcomes include management skills (Audea *et al.* 2005), increased knowledge, skills and

experience (Cobblah & Van der Walt, 2016), and human capital (Raineri, 2017). Examples of motivational and affect outcomes including organizational commitment (Kooij et al, 2013), job satisfaction (Garcia, 2005), employee involvement and engagement (Odle-Dusseau *et al.* 2013), employee loyalty and motivation (Wright *et al.*, 1999; Hassan *et al.* 2013). Examples of negative HR performance outcomes including absenteeism (Kampkotter & Marggraf, 2015), turnover (Shaw *et al.* 1998), intention to leave (Fam *et al.* 2009) and poaching of trained employees (Beynon *et al.* 2015). Examples include organizational citizenship behaviors (Gavino *et al.*, 2012), work role behaviors (Fletcher, 2016), customer oriented behaviors (Peccei & Rosenthal, 2001) and in-role and extra-role behaviors (Tremblay *et al.* 2010).

Examples of work productivity performance outcomes investigated include subjective labor productivity (Abdullah *et al.* 2005), objective labor productivity (Birdi *et al.* 2008) and industry specific work productivity (Gelade & Ivery, 2003), customer satisfaction (Ely, 2004), product quality (Murray & Raffaele, 1997), service quality (Glaveli & Karassavidou, 2011), radical and incremental innovations (Beugelsdijk, 2008), product and process innovation (Dostie, 2018) and technological and administrative innovation (Jiang, Wang, & Zhao, 2012). Examples of ROA/ROE measures include return on capital employed (D'Arcimoles, 1997), return on investment (Meschi & Metais, 1998), return on assets/ return on equity (ROA/ROE) (Darwish *et al.* 2013). Examples of sales performance outputs include sales level (Birley & Westhead, 1990) and sales revenue and growth (Altinay *et al.* 2008). Examples of profit outputs include profitability (Aragon Sanchez *et al.* 2003), gross profit (Chatteerjee, 2017) and abnormal returns (Riley *et al.*, 2017). Examples of market performance outputs include option value (Berk & Kase, 2010), economic performance (Meschi & Metaiss, 1998) and financial failure (Burton & O'Reilly, 2004).

OPEN SYSTEMS THEORY PRINCIPLES AND FUTURE RESEARCH ON TRAINING AND FIRM PERFORMANCE

Although the strategic turn has contributed significantly to the revitalisation and growth of training-firm performance research it has further narrowed the field because of the theories use, the data collection methods uses and the types of outcome investigated. Our rationale for advocating the use of open systems theory is twofold: First, we see major potential in terms of using an open systems framework to direct researchers to more explicitly investigate interrelationships between different components of the system. Second we also see the potential of using systems theory to investigate the temporal dynamics of the link between training and firm performance and to better understand how changes in both training and firm performance impact the focal relationship.

Accordingly, instead of doing more of the same we argue that researchers should grasp the research opportunities that are presented by an open systems theory perspective of the relationship. We outlined in Figure 1 an integrative open systems model of the training state in organisations . Within this model we depicted the six principles that are central to our theoretical approach and in Table 5 we suggest concrete directions for future research to bring about a fundamental shift in training- firm performance research. We focus on the six principles because they have the potential to point researchers in interesting future research directions.

The Congruence Hypothesis. Both Nadler and Tushman (1980) and Harney (2018) give prominence to the principle of congruence or the idea that there must be 'fit' or consistency between the components of the system. In the context of the impact of training on firm performance, greater performance gains will be achieved where all components are in congruence.

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. This dimension is often conceptualized as horizontal fit (Han Kang, Oh, Kehoe and Lepak, 2019). We need a great deal more research on how various training practices interact with other

components of the HRM system to determine congruence and illuminate effectiveness in terms of firm performance outcomes.

Internal Interdependence. The concept of internal interdependence gives particular emphasis to how the process or transformational components of the system are interconnected and interdependent (Ennen & Richter 2010; Van Assche *et al.*, 2019).

Emergence.

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Capacity for Feedback. A central tenet of systems theory is the notion of an input-process-output model and the notion of a feedback loop (Cummings, 2014). Harney (2018) highlights that the feedback loop plays a major role in identifying the gap between intended and actual outcomes. This line of thinking was recently explored by Shin and Konrad (2017) who utilized the concept of a feedback loop to investigate reverse causality and how firm performance impacts future implementation of high performance HR practices. The feedback loop idea also undermines the futility of conducting static, linear type research studies that assume a universalistic model of HRM (Paauwe & Farndale, 2017).

Equifinality. Garavan *et al.* (2020) utilized the concept of equifinality to argue that investments in specific or general training will lead to similar firm performance outcomes. They found support for the equifinality hypothesis. Katz and Kahn (1978) argued that there does not appear to be a single way to achieve an objective and proposed that a system can reach the same final state utilizing different paths. The utilization of the equifinality principle suggests some important possibilities to investigate the training-firm performance link. Therefore, it makes sense for researchers to investigate different configurations of training and to better understand what configurations work in terms of overall system effectiveness. Researchers should also investigate the types of trade-offs that organizations potentially make when deciding to train or not to train or

whether they invest in on- versus off- the-job training, as examples of different paths and options. Equifinality also raises an intriguing and as yet unanswered question as to whether informal training acts as a substitute for formal training.

Adaptation: Adaptation in the context of open systems theory is conceptualized as adjusting to changing environments and these environments can be internal and external (Van Assche *et al.* 2019).

Research Design: Our review of the training -firm performance research base is essentially a set of study findings generated from one-time studies utilizing cross-sectional designs. Given that systems theory emphasizes dynamic rather than static conceptualizations of the training-firm performance link, there is an urgent need for researchers to utilize more sophisticated research designs. Longitudinal designs are essential in order to understand both adaptation and capacity for feedback principles. It will also help researchers to gain insights concerning causality and reverse causality (Van der Voorde *et al.*, 2010). Our review found very limited use of experimental and quasi-experimental designs. It is possible that the use of field experiments could be valuable in understanding different components of the training system. It could be particularly illuminating in understanding issues related to congruence and particularly the efficacy of different paths to achieve system effectiveness. Researchers need to be much more sophisticated in their choices regarding data sources. In the main, our review highlighted that researchers derived data from a single source (the training participant) but made little use of data form managers, executives, customers and co-workers. Researchers need to ensure higher standards of data collection when conducting research on training and firm performance.

Measurement: The final specific and particularly pressing issue to emerge from our review concerns better measurement of elements of the training system and firm performance outcomes. The way in which researchers have sought to measure the training construct in many ways ignores its complexity. The use of idiosyncratic measures or those designed for a specific study undermines

the potential for study replication and this is particularly troubling where researchers provide limited insights on the validity and reliability characteristics of the measure used. Efforts should also be directed at using more objective measures of training and firm performance outcomes through the use of archival data. The use of archival data for both training and firm performance dimensions can increase the construct validity of both measures. We do, however, acknowledge the problems with the use of archival data (Spector, Liu & Sanchez, 2015) yet we consider the use of this type of data to represent an advance on self-report measures.

CONCLUSIONS

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