

# In-Company Technical Training in Developing Countries

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## Abstract

The article speaks about the need for training within the company; the company's role in the provision of training; the measurement of training (its success, etc.); what its role is in training provision; and what might be the evolution of its training commitment after its provision has been established.

**Keywords:** Technical and Vocational Education and Training, TVET, interfirm and intrafirm training, training needs analysis, international companies, training providers, skills spillovers, tacit and codified knowledge, developing countries

## 1. Introduction

The following paper addresses training in the context of developing countries – with their own special set of challenges and opportunities – as opposed to the normally more fortuitous

circumstances obtaining in developed countries. The evolution of technical and vocational education is a continuous process of interaction between the educational system and the production (business) system. However, in our case the role of pre-training education in schools, undoubtedly a very important matter, is not assessed as the focus here is on training as carried out within or between firms. The objectives of the paper are to explain why a firm chooses to train its workforce, the role of the firm and how active it might be in training provision, what the possible evolution of the training system might be after its initial establishment, and the conclusions that could be reached based on these themes. The paper contributes to theories addressing training needs identification and analysis, capacity building both internally and through external collaboration, and the consequences of training.

Training might involve either an in-company accumulation of content, structure and techniques gradually increasing (and perhaps becoming more specialized) as advances are made; or a coming-together (haphazardly or consciously) of different training components originating and exploited by different agents in different fields, both within a particular sector as well as outside it. (It should be pointed out that the words “company” and “firm” have the same meaning in this article.) The essential element here may be the existence of a reliable system or network – inside the firm (intrafirm) or between firms and other agents (interfirm, cluster, etc.) – of interaction and communication through which necessary dispersal and access to training knowledge may occur (Delvenne & Thoreau, 2012).

In short, there can be a functioning complementarity at the firm-level between internal and external inputs relating to human capital formation. The key points here are accessibility to these inputs, competence to use them, and opportunity to implement them in the workplace. This requires internal learning and analysis, creation or strengthening of internal capacities, and discovery of external tacit and codified knowledge and provision, that are a good fit and available at prices that the firm can pay (Gardingen & Karp (2007), Richter *et al.* (2018)).

According to the literature in peer-reviewed publications contained within scientific databases, the importance of Technical and Vocational Education and Training (TVET) is recognized, in terms of the well-being and growth of companies. It already has a long history, from its role in Small and Medium Sized Enterprises (SMEs) to its profitability and the part it plays in organizational competitiveness and innovation. In Figure 1 we can see which themes are the most recognized and the importance that they have had in a specific period.

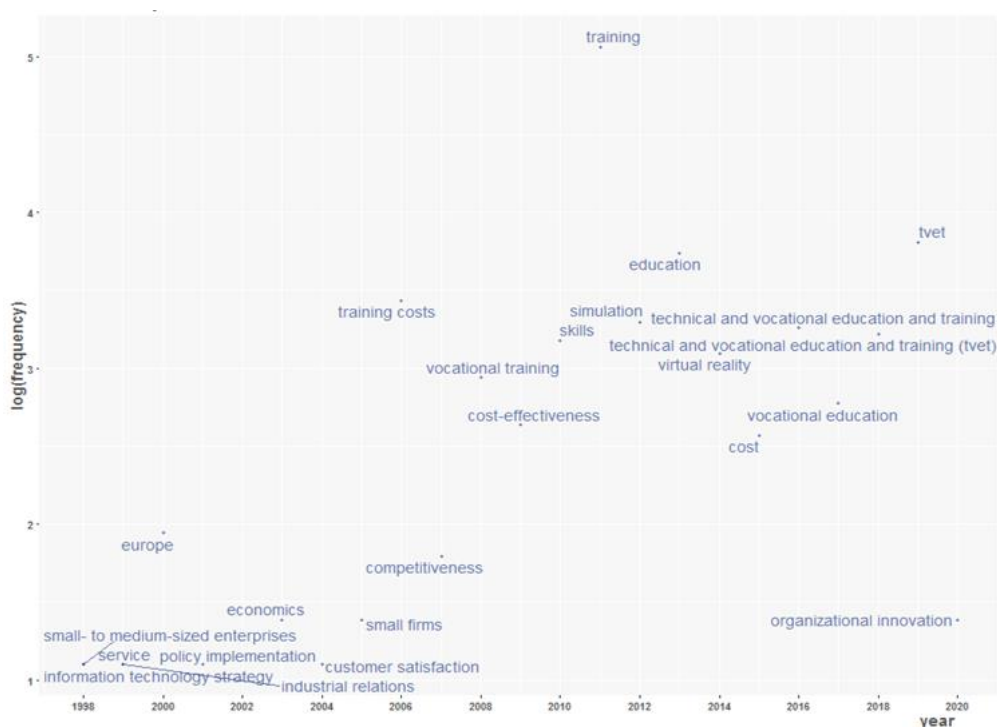


Fig. 1. Trending topics in TVET

As a response to the changing environment, there may come into play timely and appropriate adaptation, integration and reconfiguration of internal and external skills, resources and functional competences. This relates to the dynamic capabilities approach developed by such authors as Schumpeter (1934), Nelson and Winter (1982), Teece *et al.* (1994), and Celo and Chacar (2015). Timely responsiveness depends on the need for service or product innovation, management coordination capability, ability to take advantage of internal and external competences, skills and knowledge level of participants, financing, facilities and technology.

When the issue of training capability is being addressed, there are two very integrated but entirely different issues at stake. The first involves the capability of the company or the external provider to develop skills and knowledge; the second involves the capability of the trainee to be developed. In the same way that the importation of new technology does not in itself mean that a firm will become technologically advanced just by installing it (Djankov & Saliola, 2019), so the installation of a full capacity-building apparatus does not necessarily have to translate into impeccable outputs in the form of skilled workers later on.

There will inevitably be differences concerning the criteria of training value according as the emphasis is on production expansion, human resource consolidation, profit increase, dynamic increasing returns and adoptability (sourced from learning by doing and the appearance of complementary activities and norms (Teubner, 2017)), and the wider implications related to locality, community, sector, general industry and society at the national level. This is further complicated by questions concerning how performance data are generated and analyzed, and its very empirical reliability and appropriateness of interpretation; especially in the near or complete absence of objective criteria for measurement purposes, a lack of specification and

feedback, and so on (Nelson *et al.* (2004), Lundvall (2016).

It is important not to confuse scenarios that belong to a “developed” or industrialized setting, with the quite different set of circumstances pertaining to a remotely located and undeveloped setting. The conditions underpinning economic and knowledge principles are very different. There are differences in terms of timescales, educational base and skills development effort, physical and logistical challenges, support structures, skills pool, employment options, and so on, that should not be ignored.

## **2. Methodology**

This study was undertaken using the following methods:

A revision was carried out of the most pertinent literature on the topic of Technical and Vocational Education and Training (TVET) – with a focus on single firms or groups of firms – employed as a means of raising developing countries from a position of deep poverty, lack of skills, under-utilized natural resources, stunted growth within and among companies, and civic disorder.

A series of visits were made to institutes and companies participating in TVET, in order to identify their best practices through one-to-one interviews, questionnaires, observation of activities and achievements, and collection and interpretation of results. An attempt was also made to interpret enterprise-based TVET using theories and explanations applied successfully in other fields, as a means to achieve an original understanding using transferable and reliable methods of how TVET works, and why and where it is appropriate.

To analyze this research field, raw data was collected for all the published documents on TVET using bibliographic sources such as Scopus. The bibliometric tool was used in order to provide statistical analysis of the quantitative data provided by the scientific literature.

Methodological rigor was attained by placing special attention on overall study design, outcomes evaluation, regional comparisons, analysis of the effects of individual intervention components, measurement of change of attitudes and prestige of TVET. Further emphasis was placed on evaluation of such pivotal but overlooked preoccupations as tacit and codified training, social and institutional cooperation, training spillovers, and others.

## **3. Results and Discussion**

### *3.1 Why Does a Firm Choose to Train Its Work Force?*

A company may find itself in a situation in which, due to some minor need or perhaps for reasons of survival, it has to obtain, create or develop a training service. In the following, we analyze the scientific articles on different topics regarding TVET from the Web of Science database with the VOSviewer software.



- (i) Awareness of the need for specific skills and for the corresponding capacity-building structure and activities.
- (ii) Ability to search for, select, absorb, and implement an appropriate training response.
- (iii) Ability to create, support or contract competent core training capabilities.
- (iv) Development of a skills development strategy that will support the firm's operations.
- (v) Ability to learn from experience and operate flexibly through training-change capabilities.
- (vi) Ability to identify, form and exploit linkages with other learning organizations, in a way which directly benefits the firm and may indirectly help the same collaborators and others.

The choice of whole training model (systemic acquisition) or of component parts of the model (training component acquisition) is the basis of what comes later in the medium- to long-term: a stable, cyclical or turbulent training environment. This choice could be the result of an over-emphasis on the perceived status of the model source (e.g., an industry leader) instead of actual performance or results achieved, the poorness of the firm's selection criteria, the lack of effort to find or adapt options, or the relative absence of adequate alternatives. How this is implemented usually depends on a stage-by-stage advance: to refocus Ishikawa's model a little, the beginning of the process could be, (i) training is copied but with reduced quality, (ii) the copying occurs without a reduction in quality, (iii) with improvements, (iv) major improvements, or (v) original input (Ishikawa (1985: 58), Hobday *et al.* (2002), Nordhaus (2009)). The "radar" that the learning firm has in place to identify and corroborate training quality and appropriateness is very important in these circumstances.

Basic ingredients of the training regime:

- (i) Abundance (or, as the case may be, dearth) of training knowledge.
- (ii) Cumulativeness: Conditions exist that allow a firm to evolve its training offer based on the stability and prosperity of its current training regime; and there is a flow of input, constant or irregular, from within the firm or interfirm system, or from outside it.
- (iii) Appropriability: Training often has low appropriability, thus allowing training knowledge externalities and spillovers (Lavie (2012), Veeramani (2014)).
- (iv) Nature of training knowledge: Knowledge may be embodied in codified, tacit or mixed form, affecting its transmission capability, relative dynamism (tacit) and standardization (codified) (see similar ideas in Groenewegen & van der Steen (2006)).



Within the institution(s) that house the firm-level, local or sectoral training system, there are three basic components: (i) training knowledge and technology, (ii) training agents, learners, stakeholders and organizations, and (iii) networks between these participants (adapted from Malerba & Orsenigo (2000) and Malerba (2002)). We would like to go beyond this by listing what appear to be the main forms of learning that influence the assets and systems that make up training knowledge: education, skills development, knowledge acquisition, knowledge creation, knowledge transfer, absorption, diffusion and experience accumulation (Bell, 2007: 7).

What are the typical weaknesses when a firm starts capacity building? There exists the risk that whatever training system is established either at the firm or interfirm level, that the primary impetus behind it is an ill-considered and poorly developed framework of ideas emanating more from “faddish” or “herd” thinking and criteria, and financial or other (including legislative) influences. This does not bode well for the efficacy of the training project as a whole. In its early stages, capacity building is characterized by uncertainty, situated as it may be between hopes for its utility and fears that it is wasteful of needed resources; and this lack of clarity is not aided by but may disguise poor preparation, inexperience and inappropriate inputs.

More particularly, if the training experiment itself is sponsored and developed by one firm pretty much on its own, the risk (or at least the sense of risk) is higher *for the firm* because of the unknown outcomes and smaller scale assumed *on its own*. On the other hand, there are companies whose institutional capability is extensive and experienced enough to take on this challenge and carry it out successfully on their own. This idiosyncratic, firm-level risk is different from the cluster risk in that the first involves one firm (with its limited resources and knowledge base, etc.) and the second a collective configuration of firms and institutes (with their greater shared inputs of expertise, personnel, knowledge, budget and self-confidence) (Campbell *et al.* (2001), Mazzucato & Tancioni (2005)).

Afterwards, once a certain amount of time has passed and experiences retained, then a given level of skills development memory is in place by which training is improved, management is convinced of its returns, and resources can be invested, the precedent acting as justification. Internally, this is called memory; externally it is spillover of training components or model. In the case of mining, training is often carried out in a skills context that has a large sectoral memory in capacity building, in an industry where physical challenges and the means to meet them are more or less well known, understood and resolved. This is not a new sector that generally requires high levels of innovation in training knowledge or technology (Adeoye, 2015).

Firms which are new start-ups, and even ones which are well-tested but now located in a new environment with unknown local challenges and resources, will learn their training needs and capabilities by performing initial tasks of design and establishment, revision of local skills pool and training provision, assessment of internal capabilities, etc. A longer established firm should ideally have a good base upon which to grow and specialize its training system, however less than perfectly it might do this. If it fulfils the role of local training leader, and if the required

infrastructure is in place (a functioning local training support system), then the start-up could be helped to overcome mistakes arising from its naivety in skills development, its inability to reach a minimum training efficiency scale on its own and overall training underperformance.

The chances that the wrong training decisions will be made are high in the case of a new firm or one that does not yet know the environment – community, physical challenges, institutional support, etc. – in which it operates (Briscoe *et al.*, 2015). Other liabilities at this stage could include the lack of a mutually supportive cluster of firms and training providers, the fragile and small-scale character of the first training endeavors, the poor selection of managerial and teaching personnel, and the incompatibility of organizational strategies with the underdeveloped human formation activities that are supposed to nurture them. There is also a possibility that a new training system can start with high rates of return, and of course produce highly impressive achievements such as the transition from semi-literate to semi-skilled to skilled workers, which makes later developments less eye-catching and perhaps less worthy of managerial support. Long-term continuity of the originators' project is an important theme in this respect (Löf & Pardis, 2014).

It could be argued that what is important at the beginning of the training odyssey is that the organizational structure, course content, assessment methodology, associated quality-protecting rules and physical stock (i.e., the training system) are all put in place; and that later on, perhaps after some tinkering, the capability to be flexible, timely, specialized, upskilling and innovative (i.e., the training process) take on an importance of their own, on the back of the firm's better understanding of and self-confidence in its training system, and the related phenomena of firm growth, greater technological and related skills sophistication, as well as changes in the wider business, knowledge and social environment.

Looking at matters from a slightly different angle, the survival and growth of the training regime (whether it is dominated by internal or external inputs) depends on the perception of management and their masters on the value of the training undertaken (Ravasi *et al.*, 2012). If novelties in the training offer are observed to be beneficial to company growth and profit-making, then there is no reason why it should be limited or barred. But on the other hand, a firm cannot long permit a situation in which the skills formation department is a type of laboratory of training experiments that have few positive results and take the place of other activities which have been seen to be more successful. The existence at the local level of either rudimentary or sophisticated training provision, at the sectoral level of developments by collaborators and competitors in the field of skills development, and at the national level of skills-supporting institutes, will also affect this scenario.

There is no inherent reason why the training system should not grow proportionately with the expansion of the firm, on the simple logic that a rise in staff numbers will lead to an increase in trainee numbers. An increase in the numbers of employees, a greater plurality of education and skills, and developments in the operations and equipment/technology of the firm will all play a part in *pulling* the scale and levels of the training system. Whether there exist the management recognition of the skill development response required (Lee *et al.*, 2001; Shane, 2003) or the funds available is, of course, another matter (Fai *et al.*, 2018).





would be crucial issues here. But countering this could be a recognition that a firm is unable to perform all three roles or that it feels that its core activities should not be weakened by dispersing resources to skills formation.

It is important to realize that a firm might have to become a “manufacturer” or “provider”, though it might not feel entirely competent or committed, simply because there is little or nothing else available. However, at the end of the day, power resides in consumption as it is this category that most of the decision-making (and finances) is located. An interesting configuration involves the firm as final consumer becoming actively involved in the manufacture and provision of the training offer, in such a way that the offer is firm-specific, responsibility is shared and a mechanism that facilitates continuous updating is put in place (Graf, 2011). The question is, how good has the manufacture and provision been in response to consumer pressure, and what is there to substitute them if necessary? A dangerous situation in this context would be one where there is mutual dependency between firm and training agent, and no credible alternative should one cease to operate (this is not so bad if the agent is of a poor quality, a different matter if its services are worthwhile).

The participation of a firm in capacity building can range from extreme passivity up to highly active. According to where they are situated in Figure 4, they could be described as dormant, as emulators or as innovators, though with mixing of intensities occasionally or habitually.

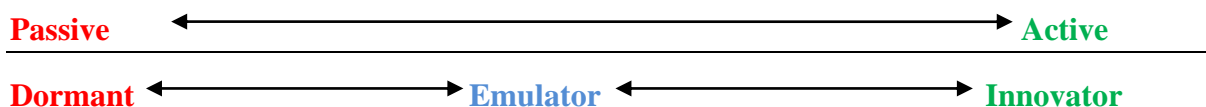


Fig. 4. Training “intensities”

This level of commitment and participation in the training undertaking itself depends on a number of factors:

- (i) Stakeholders in the decision-making and follow-up process
- (ii) Employee profile and cooperation
- (iii) Perceived internal needs and acceptance of skills development as a solution
- (iv) Commercial and financial conditions
- (v) Inputs by external providers, government, community, interfirm cluster, corporate headquarters, etc.
- (vi) Allotted budget (possibly with a promise of long-term commitment)
- (vii) General firm dynamics (e.g., propensity to be passive or active)
- (viii) Autonomy of training section and collective support it receives
- (ix) Ability to adopt, abandon and innovate in a timely and astute way
- (x) Other factors.

We might describe a firm as a training innovator if, for example, it has created part or most of

its training system through its own creativity, exigency or appreciation of its condition. Most firms have to be innovative to some extent, as circumstances which each confronts often require a certain innovative response. This response could relate to a particular course design or a new assessment method that is fairer to the particular strengths and weaknesses of the given participants. If the training operation in the firm is of a sufficient critical mass and competence, then perhaps innovation can be facilitated more easily when necessary (Carnahan *et al.*, 2012).

In terms of in-house provision, the work that is undertaken by training managers could relate less to the creation and development/innovation of a firm-specific training offer and more to the appropriation of a training capability. The size, budget and personnel of a firm, and the existence of an external resources and providers would all influence this practice. Other key external inputs in this activity would be intermediary ones involving assessment and testing, etc. However, the contrary might happen: if the firm has cultivated the capability as well as the tendency to take advantage of in-house resources, then again a specialist scope for innovation might take place.

On the other hand, if the firm devolves most of its training to outside provision, the innovation along with its appropriateness are somewhat at the mercy of the provider. Lastly, one might expect the possibilities of training innovation analyzed and designed by a group within a relatively mature training system (whether firm- or cluster-level) would be greater than in a younger, dynamic but inexperienced regime.

Training can be said to have different positive roles in the growth of a firm. For example, if one looks at it in terms of human capital theory, more and better training should lead to higher productivity. However, a lower productivity does not necessarily mean that training is responsible as there are other factors: the most obvious one being a slump in sales and therefore in commodity demand and income (Taylor & Lybbert, 2015). In fact, in human capital terms there appears to be a positive relationship between the level of productivity growth and the progression of employees through the different levels of specializations of training (see the remarks of Clarke (2012)). Similarly of course, there is a mutually beneficial relationship between investments in physical capital, R&D, organizational development, different forms of knowledge research and other “capacity components” (Bell (2007: 2); see also Madsen & Timol (2011)), and so on, and the level and choice of training offer.

Another important aspect of skills development has to do with the convergence (or catch-up) model, a situation in which diffusion of better practices and knowledge through training – aided internally by investment, physical capital, stock of human capital and labor, and technology level (Wolff (2001), Bacchiocchi & Montobbio (2010)), and externally by commercial/trading relations, local support structures and advantageous political conditions – permits a firm to take advantage of resources, new productive techniques and technologies (Hsiang & Jina (2015), and Mowery *et al.* (2015)). The last categorizes these characteristics as forming “social capability”, an important point when analyzing the importance of skills spillover that basically originates in training.

A question that is pertinent in the context of the effect of different levels, types and

applicabilities of education (primary, secondary, technical/vocational, tertiary) is, does vocational training have a significant effect on the firm’s efficiency, profits and growth? Indeed, one might extend this inquiry by asking whether a current high productivity level has initiated and supported a training culture in the firm, or whether this productivity is largely the result of previous and ongoing skills formation. Furthermore, is it important to break down training into different skills and focuses to analyze this properly? Departing from the long-held theory that learning is easier and produces greater efficiencies once there is a reasonably strong base in place (Arrow (1962), Clark & Nilssen (2013)), is it possible to say that basic training for the low-skilled (to give one example) has a more or less assured probability of improving working efficiencies, productivity and income in the long-term? And later, is it the platform from which continuous learning (in the form of upskilling and so on) can be achieved in a competent way and keeps producing “goods” for the firm?

### 3.3 What Is the Possible Evolution of the Training System After Its Initial Establishment?

The fact that this is a topic with a wide range of implications is reflected in the large number of publications that address the subject: our research found 4,690 publications that directly or indirectly relate to the topic. In one field of research, the main topics are education, virtual reality, the training system itself and evaluation. Evolution is an important topic in another field, which also includes e-learning, and knowledge management and integration; and other issues of relative importance are differential evolution, classification, and even genetic algorithms and neural networks. It is obvious that some of these more advanced activities are aimed more at training that takes place in developed countries and not so much in poorer countries where such sophisticated questions, for practical reasons, are not a priority.

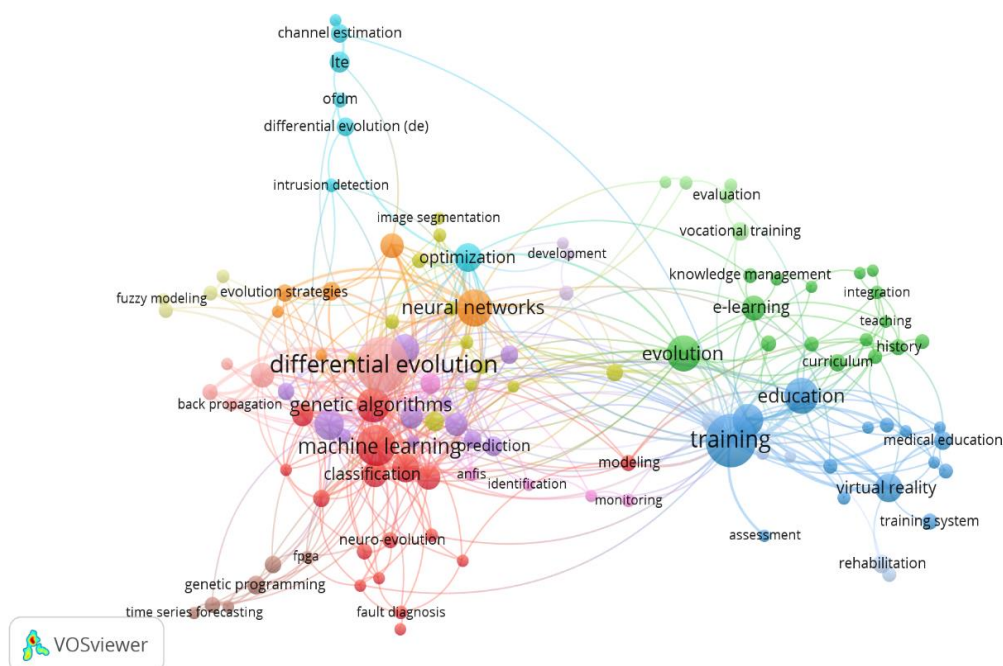


Fig. 5. Evolution of the training system: results of 4,690 documents

The content of the training system (its organizational structure, syllabus, assessment procedures, equipment, installations, etc.), when properly established, can be relatively stable and follow human formation and technological trajectories, so long as a radical occurrence does not intervene. This occurrence need not be detrimental. The radical variance could be the arrival of training staff with new ideas or recruits with learning needs that are not covered by the current system (and there is an argument that contends that radical changes will only occur when new experts are brought into a company (Su *et al.* (2012), Teubner (2017)); developments in methods, workplace know-how and equipment (both in the teaching and the associated productive fields); radical new training knowledge, and so on.

The rate of change might well have been quite quick at the beginning, before settling down so to speak; corrections and new directions might have been common practice at this juncture. Later, instead of large modifications, the emphasis could be on “cumulativeness” as the prior work is found to be a good foundation upon which new courses and activities can be built (McFadden, 2008). In the case of certain industries (such as mining), it could be argued that certain skills objectives exist and that the methods and means to reach them are well-tested and reliable. While this might appear patronizing to the specific complexities bundled within a firm and may support some degree of complacency in practice, it does not appear to be discredited by comparison with a range of industries and their regular rates of innovation and range of activities.

We would like again to develop some ideas that go beyond current literature. With regard to the rate of development of the training operation, the question arises whether and to what extent “cumulativeness” in the skills formation project exists, as well as training routines and collectively shared training frames (akin to those mentioned by Spillane *et al.* (2011)), This suggests that there may exist training routines and collectively shared training frames, obviously with certain differences of emphasis and adaptation by each firm in the collective. There could exist, in practice, “fixed” training inputs such as the organizational structure, assessment methods, etc., and “variable” ones that are readily adaptable (instructors, new courses, training equipment, etc.). The procedures by which these inputs are managed might be constrained by habitual training routines or the new mix might be allowed more procedural latitude: confidence in procedural precedence must be weighed against the possible benefits of low-risk experimentation.

#### **4. Conclusions**

The training system can only be viable, credible and innovative when it is related to that living and voluble organism called the firm. It is a consequential construct, in the sense that what it does is not performed in and for itself but is designed and carried out according to real-life company-level and market demands. Though there may be present such considerations as obligations related to licensing and CSR (Corporate Social Responsibility), and though the repercussions of the actual skills development itself might go beyond the walls of the firm as some sort of spillover to other enterprises and the community, this consequential relationship identifies the bottom-line of human capital formation in the firm (Briscoe *et al.*, 2015). Of course, once it is competently established, the relationship works



both ways – a consequence of good training is an improvement in the firm (that is what makes it “good”) and a justification in continuing the service – but the needs of the firm will always be paramount.

Training can involve such elements as infrastructural issues (e.g., finances, company policies, management competence, etc.), and the vaguer but crucial super-structural matters of labor and interpersonal relations, knowledge sharing, skills competence and systemic cooperation. There are both “closed” and “imposed” reasons for establishing and innovating a training regime, and “open” or “proactive” reasons, with both internal and external origins. The first type (“imposed”) includes such pressures as finances, schedule, “rules” (legislation, company policy, local customs, etc.), external conditions (physical, market, etc.) and human resource limitations (skills level of current employees and trainees, and that of potential employees locally; plus in-company and external training capabilities).

The large, contextual forces that directly affect the design, implementation, performance and outcomes of the training system are economic stability, regulatory conditions, competitive markets and investment climate, as well as resource provision, private institutions, standards and qualifications, and public services and funding developed and managed by government (Gallacher *et al.*, 2012).

This list could be extended to the influence of sectoral and local associations (trade, community, skills improvement and awarding bodies, etc.) and donors (particularly those partly governed by the concept of knowledge-based assistance (King & McGrath, 2004)), as well as inputs from head office decision-makers. The second type (“proactive”) is often more a matter of good fortune (or at least the positive consequences of good preparation and staff selection): personnel input based on motivation over inertia, preference for novelty over status quo, creativity, capability diversification and critical assessment. This latter dynamism could be critical should the firm wish to be flexible in the face of unpredictable volatilities, enter new areas of activity having perhaps reached a certain equilibrium or limit in its commodity-centered activities, or improve organizational linkages and HR capabilities through which production-related knowledge can flow.

To justify the initiation and/or continuation of firm-level training, it is important to address the relationship between the level of productivity growth and the progression of employees through the different stages of training. The comparison between training effort or inputs (embracing the whole structure and effort to instil needed practical and intellectual capabilities in the trainee) and training outputs (increased productivity/profits, skills abundance and flexibility, etc.) will give management an idea of how well the experiment is working. The data could be incomplete, incorrect or misinterpreted; additionally, there could exist wilful prejudice against the whole non-core business nuisance of a training commitment and its long-term strain on resources.

But if done well, the contrast could be quite fair and unarguable. One complication in this assessment is the time-lag issue: the question as to how long a firm should wait to make a fair comparison (Hall *et al.* (2005), Bacchiocchi & Montobbio (2010)). Another complication is the simultaneous occurrence of a powerful effect (e.g., sudden strong commodity demand)



that influences whatever outputs are being measured, but has little or nothing to do with the training being evaluated and perhaps goes unreported as irrelevant to the issue being analyzed.

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