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## **Opening the black box: How staff training and development may affect innovation**

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### **Davide Mate\***

University of Turin, 14 Via Po, Turin, 10123, Italy.  
E-mail: [davide.mate@gmail.com](mailto:davide.mate@gmail.com)

### **Alberto Carpaneto**

University of Turin, 14 Via Po, Turin, 10123, Italy.  
Mida S.p.a., 1 Via Recanati, Milano, 20124, Italy.  
E-mail: [alberto.carpaneto@mida.biz](mailto:alberto.carpaneto@mida.biz)

### **Corrado Tirassa**

CareerBuilder Italy S.r.l., 8 Via Pordenone, Milan, 20132, Italy.  
E-mail: [corrado.tirassa@fastwebnet.it](mailto:corrado.tirassa@fastwebnet.it)

### **Adelina Brizio**

University of Turin, 14 Via Po, Turin, 10123, Italy.  
E-mail: [adelina.brizio@unito.it](mailto:adelina.brizio@unito.it)

### **Raffaele Rezzonico**

University of Turin, 14 Via Po, Turin, 10123, Italy.  
E-mail: [raffaele.rezzonico@unito.it](mailto:raffaele.rezzonico@unito.it)

### **Barbara Brassesco**

University of Turin, 14 Via Po, Turin, 10123, Italy.  
E-mail: [bbrassesco@libero.it](mailto:bbrassesco@libero.it)

### **Fabio Surra**

Praxi S.p.A., 3 Corso Vittorio Emanuele, Turin, 10125, Italy.  
E-mail: [fabio.surra@praxi.com](mailto:fabio.surra@praxi.com)

### **Daniela Rabellino**

University of Turin, 14 Via Po, Turin, 10123, Italy.  
E-mail: [daniela.rabellino@unito.it](mailto:daniela.rabellino@unito.it)

## Maurizio Tirassa

University of Turin, 14 Via Po, Turin, 10123, Italy.

E-mail: maurizio.tirassa@unito.it

\* Corresponding author

**Abstract:** We describe a research on the interplay that appears to exist in companies between Human Resource Management and innovation. This complex, multicomponent, non-linear and dynamic interplay is often viewed as a "black box". To help open the black box, we outline both a theoretical framework and preliminary empirical data. We view innovation as an organization-level property, favored by the organization's self-perception as a knowledge engine. Therefore, we devised a protocol to study the companies' strategies for training and development and their innovation profile. The protocol consisted in a questionnaire with 100 closed questions, suitable for companies which rely mostly on an inner training and development service. The questionnaire was administered to a sample of Italian firms from the Food & beverages and Fashion markets. The results show that certain facets of training and development are indeed correlated to innovation. Finally, we discuss the results.

**Keywords:** Innovation; Human resource management; Staff training and development; Business performance.

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### 1 Theoretical framework

This paper deals with the relations that appear to exist between human resource management – more specifically, staff training and development – and innovation in a given segment of Italian companies. Our aim is to provide something more than, or different from, a survey of the current state of affairs in such segment. What we really aspire to is to explore and understand the dynamic, multi-component, non-linear interplay between how, and how much, companies create and manage knowledge and how, and how much, they are capable to innovate. In this paper we outline the theoretical framework and present the preliminary results of an empirical analysis of the complex relations between the structural and dynamic components of companies' strategies for training and development and their innovation profile.

#### *Organizations as systems*

Our view of enterprises is derived from system theory (e.g. von Bertalanffy, 1967). Like all complex agencies, a company is composed of different organizational subsystems, each with its own identity, dynamics, interactions with the other subsystems and possibly with the external environment, and (partial) autonomy (Tirassa, 2009). A crucial issue that should be added to the standard system-theoretical perspective, however, is that the individuals involved and, in however metaphorical a sense, the subsystems and the whole

organization itself entertain a mind. This has several implications. Firstly, individuals and enterprises at their various level of organization actually make choices, using their available degrees of freedom to enact strategies and complex actions that depend in turn on a somewhat idiosyncratic interpretation of the context and of the viable spaces it affords for interaction. Secondly, both these interpretations and the strategies and actions that they allow for are best understood as narrative meanings (Clancey, 1997; Carassa, Morganti & Tirassa, 2004, 2005): what human beings and social assemblies thereof deal with, reason upon, make decisions about, trade with each other etc. is meanings and the narratives into which they are weaved. Narratives provide in turn the background needed for actions and meanings to exist and make sense. Thirdly, to study both the individuals and the organizations, as well as the interactions that they enact, it is necessary to adopt a subjective perspective (e.g. Merleau-Ponty, 1945; Nagel, 1986; Varela, 1996): interpretations and actions can only be understood from the viewpoint of the individual or assembly of individuals who entertains them. Subjective does not mean arbitrary, in that feedback coming from the external world provides a counterpoint to the agent's interpretations and actions and invites the agent to operate relevant changes whenever deemed appropriate.

### *Knowledge*

Interpretation and action are heavily based on knowledge. Complex systems tend to exhibit emergent properties, that is, properties that are not reducible to the properties of any specific subsystem. To put it the classic way, the whole is more than the sum of its parts. This holds for knowledge too: the knowledge that an organization possesses and produces includes both the knowledge possessed by the individuals and the subsystems and the knowledge that emerges from significant relations between them, and between each of them and the whole organization and the external environment. Actually, the knowledge possessed by the individuals, the subsystems and the organization as a whole is only relevant to the other levels, or to the other agents belonging to the same level, inasmuch as it becomes manifest and available to them in the unfolding of the interactions that they have with each other. In this process the knowledge at play is continually transformed and reinterpreted. Knowledge can again be viewed as a subjective property (Mate & Tirassa, 2010), that is, one that depends on – and, of course, crucially structures – the ways in which an agent looks at itself, at the environment in which it is immersed, and at the interactions that it affords. Knowledge in interaction with other agents is therefore a matter of intersubjectivity (Tirassa & Bosco, 2008).

An agent's flows of knowledge may be oriented to the self or to the environment. Self-oriented knowledge contributes to the construction of meanings and narratives that may become shared between the subsystems and the individuals that participate in the organization. It is also crucial to the formation and the maintaining of a coherent identity of the whole organization. Knowledge which is centered on the environment helps the agent to maintain adaptedness to it. Adaptedness is a dynamic property which depends on the relation between the states, the flows and the events that are internal to the agent and those that are external to it (Tirassa, Carassa & Geminiani, 2000).

In a company, Human Resource Management (HRM), taken as a broad functional subsystem, plays a key role in developing and managing these flows of knowledge, both those that are self-centered and those that are world-centered. It does so in several ways,

ranging from recruiting policies to the management of internal criticism and so on. Among these many ways, we focused on staff training and development.

### *Innovation*

We view innovation as a property which is (possibly unevenly) distributed across the organization. Its scope encompasses not only technological improvement, but also the ability to scout new markets, to implement new industrial processes, to modify the relation between the company and the trade unions, and so on. So viewed, innovation turns out to be one of the most crucial facets of the enterprise's actual fitness and performance (Laugen & Boer, 2008).

We think that innovation is favored by the organization's self-perception in terms of (also) a knowledge engine. The evidence is compelling of a relation between an organization's management of human resources and its performance. However, the models that have been proposed to understand this link (see Wright, Gardner, Moynihan & Allen, 2005 for a review) often are unclear as to 'what exactly leads to what' (Alcazar, Fernandez & Gardey, 2005; Gerhart, 2005). Katou and Budhwar (2010) ascribe this limitation to the use of inappropriate statistical methods: actually, most studies have been based on cross-sectional data, employing either hierarchical regression models or competing regression models, without proving causality.

While the importance of methodology is undeniable, we believe that the problem of proving causality goes beyond just it, and that a further theoretical analysis of the very nature of the relation between HRM practices and firm performance is needed. According to Baker and Sinkula (2002), differences in learning orientation may yield differences in innovation. It has also been suggested (Day, 1994; Slater & Narver, 1995; Dickson, 1996; Han, Kim & Srivastava, 1998; Baker & Sinkula, 1999a, 1999b) that the ability to engage in higher-order learning, united to a strong market orientation, makes a company more likely to achieve long-term competitive advantage in dynamic markets.

Of course, it would be factitious to look for linear causation when studying a relation which appears to be circular and complex. A virtuous circle may be envisaged where well-framed HRM practices impact positively on firm performance, making further investments in human resources themselves possible; and, of course, a vicious circle functioning the other way round.

It may also be remarked that highly innovative companies often find it necessary to invest on training, as the specialized skills that they need are not easily recruited. Finally, there can be little doubt that the whole picture would include internal factors that are not strictly knowledge-based (e.g. corporate climate) as well as broader socio-economic ones (Purcell, Purcell & Tailby, 2004). Therefore, to capture the actual causal dynamics, time becomes the crucial factor: it should be taken into account with longitudinal studies (Katou & Budhwar, 2010).

With the aim of shedding light into this "black box", we focused on two issues which we view as crucial in the interplay between HRM and performance, namely (a) the management that the company makes of knowledge by way of training and development and (b) its innovation profile.

## 2 Design and methodology of the empirical study

The protocol we developed consisted of a questionnaire with 100 closed questions, each taking the form of either a multiple choice or a self-assessment evaluation.

The questionnaire was divided into four sections, each investigating one of four main topics: (A) general information about the firm, (B) procedural features of its training and development system, (C) identity and self-perception of the business function in charge of training and development, and (D) the firm's innovation profile.

The first three sections were administered to the company's HR Manager. The interviewee was instructed to fill them in from the vantage point of the function in charge of training, not that of the firm as a whole, and to always refer to what the state of affairs was in the "real company", rather than to what it was desired or proclaimed to be.

With an analogous set of instructions, the Chief Operations Officer was asked to score the company's types and degrees of innovation as investigated in the fourth section.

The survey was conducted during late 2009 and early 2010, and the questions referred to the years 2006-2008. Three years are a time frame long enough to capture at least partially the dynamics and structural flows that characterize both training and innovation. On the other hand, it might have been, for several reasons, too difficult for the interviewees to refer to facts more than a few years older.

### *Section A: General information about the firm*

This section concerned data like corporate designation, size, geographical location, annual revenue, economic situation (e.g. improvements or crisis), etc.; that is, company information and data about those factors that supposedly are involved in the relation between training and innovation, but are not strictly knowledge-based..

### *Section B: Procedural aspects of the firm's training and development system*

Here we gathered both quantitative data (e.g., how many training and development hours were delivered per year, or how they were distributed along the hierarchies of employees) and qualitative data about the processes (e.g., how the training and development plan was devised, or what was the overall sense that the company made of it).

The idea here is to go beyond merely listing or benchmarking the relevant activities. There is no list of suitable or necessary training activities. All the relevant decisions that a company will make are weaved into the web of the interpretations that it gives of the internal and the external environments, and of the strategies that it devises and enacts to deal with them; therefore, such decisions can only make sense and be understood within that specific frame of reference. Unsurprisingly, the actual choices concerning training and development, like all other practices, are too diverse to be compared. The data gathered in section B were concerned with:

1. Planning: the range of activities aimed at structuring the complete training program, like the diagnosis of the training needs, the setup of the training plans, the actors involved in the relevant decisions, etc.

2. Delivery: the logistic and operative features of training supply, like micro-planning, agenda scheduling, the choice and management of trainees, etc.
3. Evaluation: the activities aimed at monitoring the success, efficacy and impact of the training activities; particular attention was paid to whether and how results are shared and discussed within the firm and used as feedback.
4. Resources: the types (economic, technological and human) and quantity of resources made available by the firm for staff training and development.

*Section C: Identity and self-perception of the business function in charge of training and development*

The notion of identity can be understood in terms of subjective positions like "who I am", "what my situation is", "what I want to achieve", "what I am going to do" and so on. This is the foundation on which an agent (whether "economic" or otherwise) frames its environment and situation, its actual and potential actions in that situation and its interpretation of feedback received. Identity is not a still image, but a complex process in which drives toward differentiation and integration are dynamically balanced. In the case of enterprises, or in general of organizations, several layers of identity need be identified: the organization itself, its subsystems, and the individuals. The relation between these layers is neither hierarchical nor one of reduction; the overall identity and strategy result instead from the complex interplay of semiautonomous systems that affect each other while following each its own trajectory. Such trajectories include centrifugal and centripetal processes: a dynamic balance between the various types of trajectory is needed to maintain the fitness of the organization as a whole.

In this section of the questionnaire, these theoretical assumptions were broken down into three main areas:

1. Knowledge: how and how profoundly the function in charge of training and learning has knowledge of the firm as a whole (i.e., its business strategies, the other subsystems and their activities, the professional skills of the staff, etc.); whether and how it keeps track and makes use of past events relevant to the firm and of its prospective representations of the future
2. Networking: whether and how the function in charge of training maintains cultural, functional and managerial autonomy in the interaction with the other subsystems and with the firm as a whole.
3. Sense-making: what role(s) and value(s) the firm attributes to staff training and development.

*Section D: Innovation profile of the firm*

This section of the questionnaire was derived from Community Innovation Statistics indications (CIS by Eurostat, ISTAT, 2008). It included questions about the type(s) of innovation the firm had created (Product, Process, Organizational, Market). Each type of innovation was further broken down into four possible degrees: Radical, Incremental, Absolute, Relative.

### *Methodological considerations*

In order to build the questionnaire we adopted a formative indicator measurement model, acknowledging the suggestions of Diamantopoulos and Siguaw (2006) and taking into account the theoretical considerations regarding the nature of the causal link between the construct and its indicators (Blalock, 1968; Costner, 1969; Edwards & Bagozzi, 2000).

In particular we conformed to the following rules:

- the accepted direction of causality is from items to construct;
- the indicators are defining characteristics of the construct;
- changes in the indicators should cause changes in the construct;
- changes in the construct do not cause changes in the indicators;
- indicators should not be interchangeable;
- dropping an indicator may alter the conceptual domain of the construct;
- it is not necessary for indicators to covary with each other;
- the indicators are not required to have the same antecedents and consequences.

Those in section B and C were considered the independent variables of the research. Those in section D were considered the dependent variables. Overall, we correlated seven independent variables and sixteen dependent variables.

### *Focus groups*

A beta version of the questionnaire was tested in two focus groups involving the HR Managers and the Chief Operations Officers of 15 firms selected to reflect the population of interest (Nassar-McMillan & Dianne-Borders, 2002). The final version embodied conceptual and linguistic integrations emerged from the focus groups.

### *Participants*

As we write the sample consists of 17 Italian companies from the Food & beverages and Fashion industries, but we are still collecting data and foresee a final count of about 80 out of a universe of 300.

The choice of these businesses was due to several reasons. From the social and cultural points of view, they are among the areas for which Italian industries and their products are most renowned in the world. From a methodological point of view, we wanted to avoid industry-specific effects in the statistics and therefore needed to sample not more than one or two business areas. Also, we needed firms having an internal structured management of HR and specifically of staff training and development. A safe threshold for this feature is 200 employees and, given the highly peculiar structure of the Italian economy, there exist only a few businesses with a substantial number of firms so large. Taken together, the Food & beverages and Fashion industries have a universe of 300 such enterprises.

All 300 firms of the universe were contacted by telephone. Of course participation in the research was on a purely voluntary basis. Therefore, our sample reflects the participants' particular sensitivity to the topic, and may thus be biased.

A few relevant data are:

- the average number of employees was 1228 (range: 148 to 5300, sd = 1625);
- 12 companies rely mostly on an inner training function; the remaining 5 rely on informal learning and other HRM practices like job rotation, compensations and incentives
- in 2006, 12% of the firms participating were in a phase of substantial growth, 71% in a phase of moderate growth, 12% were in economic stability, 5% were facing crisis. These figures changed to 12%, 53%, 29%, and 6%, respectively, in 2007 and to 18%, 41%, 35%, and 6% in 2008.

### **3 Results**

Data analysis showed that Planning correlated with Absolute Product innovation ( $d = .606$ ,  $p = .01$ ), Incremental Process innovation ( $d = .563$ ,  $p < .05$ ), Absolute Process innovation ( $d = .676$ ,  $p < .01$ ), and Absolute Market innovation ( $d = .579$ ,  $p < .05$ ).

Evaluation correlated with Absolute Market innovation ( $d = .619$ ,  $p < .05$ ).

Knowledge correlated with Relative Process innovation ( $d = .516$ ,  $p < .05$ ), Absolute Process innovation ( $d = .530$ ,  $p < .05$ ), Incremental Organizational innovation ( $d = .536$ ,  $p < .05$ ), Relative Organizational innovation ( $d = .528$ ,  $p < .05$ ), and Absolute Market innovation ( $d = .582$ ,  $p < .05$ ).

Other independent variables (Resources, Delivery, Networking and Sense making) did not correlate with any innovation profile.

To sum up, several correlations were found for the seven independent variables. The sample is currently too small to warrant factor analysis. However, we intend to perform it on the wider dataset to further define the underlying structure of the correlations between variables.

### **4 Discussion**

This research provides evidence of the positive relation between staff training and development practices and innovation in a small sample of Italian firms. Furthermore, it gives some interesting foundations for drawing valid causal inferences that its main direction of causality goes from HRM practices to innovation.

Planning (that is the range of activities aimed at structuring the complete training program) correlated with several types of innovation, namely Absolute Product innovation, Incremental Process innovation, Absolute Process innovation, and Absolute Market innovation. Evaluation (that is the activities aimed at monitoring the success, efficacy and impact of the training activities) correlated with Market absolute innovation.



However interesting, these results do not warrant conclusions about the direction of causation. Results concerning Knowledge are more enlightening in this respect, although even they do not prove conclusively that HR practices are causal factors of innovation. High scores in Knowledge correlated with high performances in Relative Process innovation, Absolute Process innovation, Incremental Organizational innovation, Relative Organizational innovation and Absolute Market innovation. But what does this variable Knowledge really stand for? It is a measure of the extent to which the internal training and development system strives to have a well framed understanding not only of the strategic, managerial and operative aspects of the company, but also of its history and of its prospective representations of the future: in a word, of the firm's identity. It makes sense to suppose that the more awareness the internal training system has of these issues, the more it may impact on innovation, while to hypothesize that causation functions the other way round would appear to make little sense.

Also interesting is that Resources had no significant correlation. The issue of resources is generally viewed as controversial, in that a reverse direction of causation may be hypothesized whereby firms that perform well on the market can afford more investments on HR rather than (or in addition to) the contrary. It may thus be worth to briefly consider the type of information which we collected with the questionnaire and the companies that made up the sample.

As regards the former issue, the reader should keep in mind that we focused not on quantitative and financial data (like lists of training activities or the size of the budget available for training), but on the subjective perception of the expert individual interviewed (e.g.: In your view, are the financial resources available for training appropriate to the firm's actual needs?).

As regards the latter issue, the 17 companies of our sample to date accepted to participate in the survey on a voluntary basis and did so rather quickly. They are likely to care peculiarly for staff training and development and innovation, and therefore to invest above a physiological threshold. This is all the more remarkable when considering the peculiar historical moment in which we conducted the survey. 2009 appears to have been the peak of the worst economic, financial and industrial crisis since the Great Depression of the 1930s. Even in the midst of this turmoil, these firms, or most of them, have maintained a high or at least satisfactory business performance, they appear to view training as a strategic asset, and they are even willing to participate in a time-consuming scientific research from which they expect no specific return.

We expect the data gathered from a larger and less biased sample to yield a potentially different picture.

Product and technological innovation appear not to require sophisticated or diffuse training and development policies, probably because they are not based on an open model of innovation (Chesbrough, 2006), that is they tend to be the product of the efforts of specific subsystems and not of the entire company.

## 5 Conclusions

This work represents an articulated attempt to shed light into the "black box" that is the complex, multicomponent, non-linear, dynamic relation between Human Resource Management– or at least a key component thereof, namely staff training and development – and innovation. The theoretical background we propose is corroborated by empirical evidence concerning good practices and models of HR management.

From a scientific point of view, we intend to substantially broaden the sample, which should also warrant more sophisticated analyses of the results. We also foresee that the results will probably bring us to revise and improve the questionnaire. Finally, we would like to extend the survey to other industries and to repeat it at given time intervals, so to gather more data, horizontally, and to yield a more profound understanding of the dynamics involved, diachronically.

Also, we hope that practitioners and other parties involved, like companies, trade unions, consulting firms and professionals etc., may find in this research area a guiding framework for the stimulation of innovation through a better management of human resources.

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