# The Role of HR Management in Developing Innovation Culture in Tech Startaps

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The aim of this paper is to examine the role of HRM in development of innovation culture in technology startups. The research was conducted through a questionnaire and included 94 respondents employed in the field of technology entrepreneurship and HR. All data were processed in SPSS software, the Kolmogorov-Smirnov test was used to assess data distribution and descriptive statistics, and ANOVA to determine differences between groups. The analyses of differences and correlations indicate that the "levers" that best support innovation culture are employee involvement, the quality of performance appraisals and meaningful rewards. These HR dimensions are consistently associated with the implementation context, market orientation, value creation and creative empowerment.

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## 1 Introduction

In recent decades, research in the field of human resource management (HRM) has increasingly emphasized that employees, their competencies, motivation and initiative are key drivers of innovation and development of organizational culture. The literature largely agrees that HR activities and organizational culture are two pillars that together shape the innovative capacity of technology startups. HR provides capabilities, motivation and opportunities, while culture provides norms, meanings and expectations that guide behavior towards innovation (Appelbaum et al., 2000; Schein, 2010). However, the literature also indicates that in practice, coherent HR packages that link recruitment, training, appraisal and reward with behaviors that lead to innovative outcomes are often lacking (Collins & Smith, 2006; Subramony, 2009). The problem analyzed in this paper is the gap between the declarative orientation of startups towards innovation and the internal conditions that should ensure the conversion of ideas into value for users.

The research therefore focuses on the role of HR management in shaping innovation culture in technology startups, with particular attention to practices such as employee involvement in decision-making, linking training to strategy, fair reward systems and clear performance criteria. These practices are viewed in conjunction with cultural dimensions such as adaptability, inclusion and learning orientation, which have been shown to foster creativity and organizational effectiveness (Hartnell et al., 2011). The aim is to empirically examine the extent to which HR activities in technology startups support key dimensions of innovation culture (e.g. implementation context, organizational consistency, learning, market orientation), and to determine the strength and manner of their interrelationships.

The purpose of this research was to examine internal organizational factors that influence the development of an innovation culture in a technology startup, with a particular emphasis on the role of HR activities and how employees perceive these practices. In particular, the goal was to determine whether there is a statistically significant relationship between the perception of HR practices and the level of innovation culture, i.e. whether more positive perceptions of HR activities correlate with more pronounced innovative behavior and climate within the organization.

## 2 Innovation culture in startups

Innovation culture has been developed from classical approaches to organizational culture, which viewed culture as a set of values, norms, and beliefs that shape employee behavior and organizational outcomes. Early work suggested that culture acts as an "operating system" for an organization, providing guidance on desirable behavior and how mistakes, risk, and collaboration are interpreted. This perspective was later expanded by models that quantitatively link cultural dimensions to effectiveness and innovation (Denison & Mishra, 1995; Hartnell et al., 2011).

Contemporary discussions on innovation culture connect these classical frameworks with the logic of digital innovation: modularity of solutions, platform architectures, while continuous improvement increase the importance of a culture that enables rapid reuse of knowledge and expertise (Yoo, et al. 2010; Tiwana, 2014). In this setting, innovation culture is not just a "set of values," but a set of practical rules, how ideas are reported, who evaluates them, how they are tested, and how contributions are rewarded. Finally, the literature on innovation climate and culture emphasizes the need to measure and manage these aspects systemically. Validated scales have been developed that capture dimensions such as learning orientation, implementation context, and market orientation (Muñoz van den Eynde et al, 2015, Dobni, 2008), allowing for the empirical linking of cultural patterns to innovation outcomes. In practice, this means that short iterative cycles (sprints, MVP) rely on values that reward collaborative learning and discipline in execution, rather than just spontaneous creativity (Schein, 2010).

The ambidexterity perspective adds that culture should simultaneously legitimize exploration (exploration of new opportunities) and exploitation (deeper exploitation of existing solutions). Startups often "slip" towards one side; therefore, clear context-breaking routines are needed, e.g. different rhythms for ideation and for introducing standards, different success indicators for research and for operational efficiency (O'Reilly & Tushman, 2013). Research shows that it is precisely the balance between these two modes that best correlates with performance in dynamic conditions, where innovation culture is in this sense the "glue" that holds this balance: it normalizes experimentation, but also introduces discipline in the standardization of successful practices.

## 3 The role of HR management in developing innovation culture

Human resource management in technology startups plays an important role in shaping a culture that encourages innovation. The selection and recruitment of personnel with a penchant for innovation enables the entry of new ideas and technological competencies into the organization. Training and professional development programs ensure the continuous adoption of new technologies and work methods, which enables the rapid implementation of innovations. Also, reward and recognition systems for innovative results encourage motivation and orientation towards entrepreneurial activities. Furthermore, involving employees in decision-making and providing space for expressing ideas creates an organizational context that supports creativity and experimentation. Additionally, the role of HR is to introduce the startup's brand strategy among employees (Nikam, 2023).

Empirical research confirm that HR practices, when complementary, significantly increase the innovative performance of firms (Laursen & Foss, 2003; Collins & Smith, 2006). Especially in technology startups, where human capital is the main resource, HR activities act indirectly through the construction of knowledge, motivation and an organizational climate that encourages innovation (Jiang et al., 2012). A work environment in startups should encourage creativity, inclusivity, diversity of thought, open dialogue and embracing failure as a catalyst for growth, as every decision holds the potential to shape the future (Maria, 2024).

The synergy between HR practices and culture is particularly important, as it enables the development of an environment in which employees actively contribute to innovation and accept risk, which is necessary for technological entrepreneurship (Bowen & Ostroff, 2004; Schneider et al., 2013). For the startup context, the key is a "light" and scalable design of the HR package, basic selection rules, short training cycles, a simple feedback system and transparent incentives. Such configurations are more effective than copying heavy corporate procedures (Cardon & Stevens, 2004; Harney & Dundon, 2006). The routine of work can hinder innovation in the organization, so the role of organized training is to avoid this by encouraging creative thinking and creating a stimulating work atmosphere that can sometimes compensate for the lack of significant rewards for creative work (Çera et al., 2023).

Given that startups rapidly change priorities and structures, it is expected that the alignment of HR practices and cultural patterns will enable faster conversion of knowledge into prototypes and products to be launched on the market (O'Reilly & Tushman, 2013; Jansen, Van Den Bosch, & Volberda, 2006). Of particular importance are the conditions that make innovations sustainable in small teams: psychological safety for presenting ideas, important results (team performance), and incentives (ESOP, innovation bonuses) that translate contributions into rewards (Edmondson, 1999; Sun et al., 2007). Also, by using proven instruments, for example HR Activity Assessment Scale and the Multidimensional Innovation Culture Scale, it is possible to measure relationships in a structured manner and provide more precise guidelines for practice (Appelbaum et al., 2000; Muñoz van den Eynde, et al., 2015). In this context managers are recommended to consult directly with employees regarding practices that motivate them (Boudlaie, 2022).

Many HR activities have a direct role in building an innovation culture. Selection and recruitment provide employees with a predisposition for teamwork and creativity, while training and professional development programs enable the adoption of new technological knowledge. It is important to create an environment that is supporting new knowledge and skills, innovative thinking and confidence in mplementing creative ideas (Çera et al., 2023). Start-up companies with small teams could develop inclusive and innovation-oriented work culture, with individual approach to employees and their dveelopment (Rismayadi, 2024). Knowledge management systems, should provide that valuable insights and experiences are accessible to all employees, enhancing a culture of continuous learning and innovation. Quick reactions and response are possible with agile practices, iterative development, rapid prototyping, and continuous feedback (Kartika, 2022).

Activities such as mentoring and project rotations facilitate quality knowledge transfer. In technology startups, it is also useful to implement agile HR practices, short feedback cycles, experimental budgets for prototypes, and HR analytics that track indicators such as the team's learning rate, the rate of internal knowledge sharing, and the time from idea to MVP (minimum viable product). Such analytics enable the focus of HR resources on areas that have the greatest impact on innovation performance (Jiang et al., 2012; Yoo et al., 2010).

## 4 Research focus and methodology

The main problem that this paper explores is the mismatch between the technical potential of teams (knowledge, skills, technology) and their actual ability to systematically build and maintain an innovation culture, i.e. a set of values, norms and practices that encourage experimentation, rapid iteration and knowledge sharing. The subject of the research is to examine the impact of specific HR practices on the formation and maintenance of an innovation culture in a technology startup, as well as to identify operational and cultural barriers that reduce the effectiveness of these practices. The research aims to provide empirically grounded guidelines for the design of HR policies that support agile teams, foster psychological safety, and enable faster conversion of ideas into market results (Teece et al., 1997; Shipton et al., 2005).

The starting point of this research was the understanding that in technology startups, innovation performance is not based solely on technical resources, but primarily on the way in which HR practices and cultural norms are "assembled" in the daily work of the team. Therefore, the problem was operationalized through two related questions: (a) to what extent are employees' perceptions of key HR activities (selection, onboarding, training and development, performance management, rewards, involvement in decision-making, and job security) related to the dimensions of innovation culture; and (b) which cultural elements most mediate the relationship between HR practices and innovation behavior (Denison & Mishra, 1995; Bowen & Ostroff, 2004; Jiang et al., 2012).

The context of the research was a segment of technology startups in which products and services were created through short iterative cycles (lean, agile) and where limited resources required precise prioritization of HR interventions. The focus was on teams whose work involved a high level of interdependence, rapid knowledge exchange and frequent collaboration with users/clients and conditions in which culture and HR most visibly affect the speed and quality of innovation (Ries, 2011; Yoo et al, 2010).

The empirical focus was on employee perceptions, because it was through them that the "signal strength" of the HR system and the actual cultural patterns in everyday work were manifested. It was particularly relevant to examine whether positive

attitudes towards HR practices were accompanied by a higher level of innovation culture in domains such as implementation context, organizational consistency, learning, market orientation and creative empowerment.

For the purposes of the research, an online questionnaire was created in which the questions were grouped into three segments: (1) Demographic characteristics, (2) Questionnaire A – Human Resources Management Policies and Practices Scale and (3) Questionnaire B – Innovation Culture Scale. All attitudes were measured on a five-point Likert scale (1 – "strongly disagree" to 5 – "strongly agree"). Valid questionnaires were collected from 94 respondents. The condition for participation was that the respondent was employed in the technology or HR sector. Responses were collected from 57 men and 37 women, of different ages, younger than 25 years (30.9%), 26–40 years (60.6%), 41 and older (8.5%). According to the length of work experience, 26.6% had less than 1 year of work experience, 34.0% had 1 to 3 years, 20.2% had 4–7 years, 8.5% had 8–15 years, and 10.6% had more than 15 years of work experience.

## 5 Results and discussion

Due to space limitations, this paper will not present the results of descriptive statistics, but rather the correlations determined through ANOVA tests and Spearman's correlation analysis.

### 5.1 Results based on ANOVA test

This section shows the differences between respondents based on age category.

Based on a one-way ANOVA analysis, statistically significant differences were found by age group in seven domains (Table 1). In the domains "Training and development" and "Organizational learning", the youngest respondents have the highest ratings, while the oldest group has the lowest. Younger respondents enter new roles more intensively and use upskilling/reskilling programs faster, while older respondents more often lack tailored content (advanced curricula, mentoring routes) and time for learning. This suggests that it is cost-effective to adapt training design to career stages and include reverse mentoring and communities of practice. "Employee involvement", "Implementation context" and "Value creation

orientation" are highest in the 26–40 age group, which is typically the "operations driver". It is necessary to expand the channels of influence to the oldest group (project sponsorship, co-leading initiatives) and give young people more structured opportunities to participate in decision-making. All of the above is also reflected in the overall "Innovation Culture" index, which is highest in the 26–40 age group, followed by the youngest, and the oldest lag behind. Where training and organizational learning are most pronounced (mostly among the youngest), a greater willingness to experiment and faster adaptation is seen, while the most experienced lack adapted content and time for learning. The operational translation of ideas into solutions and the orientation towards value creation are strongest in the 26–40 age group, this is the "innovation driver" that drives implementation every day.

**Table 1: Subsample differences based on age (ANOVA)**

| Domain / subscale | <25 y. (M±SD) | 26–40 y. (M±SD) | >41 y. (M±SD) | p |
|---|---|---|---|---|
| HR — Recruitment and selection | 3,7±0,8 | 3,9±0,7 | 3,6±0,9 | 0,290 |
| HR — Training and development | 4,1±0,7 | 3,8±0,8 | 3,5±0,9 | **0,021** |
| HR — Performance appraisal | 3,5±0,9 | 3,6±0,8 | 3,4±0,9 | 0,660 |
| HR — Rewards and compensations | 3,4±0,9 | 3,6±0,8 | 3,5±0,8 | 0,470 |
| HR — Employee involvement | 3,6±0,8 | 3,9±0,7 | 3,5±0,8 | **0,036** |
| HR — Job stability | 3,3±0,9 | 3,6±0,8 | 3,9±0,7 | **0,023** |
| Innovation culture — Implementation context | 3,5±0,8 | 3,8±0,7 | 3,4±0,8 | **0,022** |
| Innovation culture — Organization consistency /participants | 3,7±0,7 | 3,8±0,7 | 3,6±0,8 | 0,410 |
| Innovation culture — Organizational learning | 3,9±0,7 | 3,7±0,8 | 3,3±0,9 | **0,013** |
| Innovation culture — Market orientation | 3,6±0,8 | 3,8±0,7 | 3,5±0,8 | 0,216 |
| Innovation culture — Innovation tendency | 3,7±0,8 | 3,9±0,7 | 3,6±0,8 | 0,144 |
| Innovation culture — Orientation towards value creation | 3,8±0,7 | 4,0±0,6 | 3,5±0,8 | **0,008** |
| Innovation culture — Creativity and empowerment | 3,9±0,7 | 3,8±0,7 | 3,6±0,8 | 0,235 |
| HR — Total index | 3,6±0,6 | 3,8±0,5 | 3,6±0,6 | 0,098 |
| Innovation culture — Total index | 3,7±0,6 | 3,9±0,5 | 3,5±0,6 | **0,018** |

Legens: M±SD – mean and standard deviation.

## 5.2 Results based on Spearman's correlation analysis

This section presents the results of determining the correlation between HR management role and development of innovation culture in technology startups.

**Table 2: The relationship between HR management and development of innovation culture in technology startups**

| HR → Innovation culture ↓ | Selection | Training/development | Performance appraisal | Reward, compensation | Involvement | Job stability | General impression HR |
|---|---|---|---|---|---|---|---|
| **Implementation context** | 0.21 | 0.11 | r=0.411 0.04 | 0.24 | r=0.410 0.03 | 0.28 | r=0.456 0.03 |
| **Organization consistency / participants** | r=0.101 0.05 | 0.21 | 0.39 | r=0.187 0.05 | 0.31 | r=0.161 0.05 | r=0.176 0.05 |
| **Organizational learning** | r=0.345 0.04 | r=0.451 0.03 | 0.19 | r=0.289 0.05 | 0.2 | 0.21 | r=0.336 0.04 |
| **Market orientation** | 0.27 | r=0.451 0.05 | 0.43 | r=0.287 0.05 | r=0.311 0.05 | r=0.301 0.05 | r=0.332 0.05 |
| **Innovation tendency** | 0.21 | 0.30 | r=0.511 0.03 | r=0.380 0.05 | r=0.611 0.02 | 0.18 | r=0.506 0.03 |
| **Orientation towards value creation** | 0.29 | 0.19 | 0.33 | r=0.366 0.04 | r=0.376 0.04 | r=0.111 0.05 | r=0.345 0.04 |
| **Creativity and empowerment** | 0.18 | 0.16 | 0.30 | r=0.251 0.05 | 0.21 | r=0.289 0.05 | r=0.341 0.05 |

Legend: r – strength of correlation.

The analysis shows that "Implementation context" is most strongly correlated with the "General impression of HR" (r=0.456; p=0.03), "Performance appraisal" (r=0.411; p=0.04) and "Involvement" (r=0.410; p=0.03). The result indicates that the willingness to turn ideas into projects occurs where people participate in processes, where there are clear performance monitoring criteria and where the entire HR system is perceived as consistent and fair. "Organizational learning" is most strongly correlated with "Training/development" (r=0.451; p=0.03) and, to a lesser extent, with "Selection" and "Reward/compesation", suggesting that job-oriented training and systematic selection of competent profiles build the basis for continuous acquisition and application of knowledge. When it comes to "Market orientation", stable, albeit moderate, relationships are obtained with "Training/development", "Reward/compesantion", "Involvement", "Job stability" and "General impression of HR" (all p≈0.05), which is in line with the expectation that sensitivity to client needs relies on both: trained people and fair evaluation systems. The most pronounced finding relates to "Innovation Tendency": it correlates strongly with "Involvement" (r=0.611; p=0.02) and "Performance appraisal" (r=0.511; p=0.03), and significantly with "Reward/compensation" and

"General impression of HR". In practice, teams show more initiative and risk-taking where they are involved in decisions, receive clear feedback, and where progress is recognized and rewarded. The dimension "Value orientation" is primarily correlated with "Involvement" ($r=0.376$; $p=0.04$), "Reward/compensation" ($r=0.366$; $p=0.04$), and "General impression of HR" ($r=0.345$; $p=0.04$), indicating that the focus on customer value is reinforced through systems that reward contribution and give employees a voice. "Creativity and empowerment" have lower but significant correlations with "Reward/compensation", "Job stability", and "General impression of HR" ($p\approx0.05$), suggesting that both security and fair incentives increase willingness to make original suggestions.

## 6 Conclusion

Based on the conducted conducted, it is concluded that the basic levers of the HR system in the technological startup environment are in place and support innovation, but it is necessary to more consistently link evaluation, reward and post-training with the expected innovation behaviors. It is also important to strengthen formal mechanisms for faster transfer of ideas into market value. Analysis of differences and correlations indicates that the "levers" that best support an innovation culture are employee involvement, quality of performance appraisal and meaningful reward. By age, the 26–40 year old group consistently reports the most favorable ratings for evaluation, reward and innovation orientation; older employees most strongly recognize stability and consistency, while the youngest need more structure, feedback and mentoring support. Theoretically, the research contributes to the integration of two fields that are often viewed separately, HR practices and innovation culture, in the specific context of technology startups. It offers an operationalized framework that shows how selection, training, evaluation and reward translate into dimensions of innovation culture (learning, market sensitivity, implementation context). For practice, the findings can be directly translated into a "diagnostic panel" for managers: where HR practices are weakest, there is the need for intervention (clear performance criteria, consistent reward for outcomes, alignment of training with strategy, active coaching after training).

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**Summary**

The paper examines the role of HRM in development of innovation culture in technology startups. The research was conducted through a questionnaire and included 94 respondents employed in the field of technology entrepreneurship and HR. All data were processed in SPSS software, the Kolmogorov-Smirnov test was used to assess data distribution and descriptive statistics, and ANOVA to determine differences between groups. The analyses of differences and correlations indicate that the "levers" that best support innovation culture are employee involvement, the quality of performance appraisals, and meaningful rewards. These HR dimensions are consistently correlated with the implementation context, market orientation, value creation, and creative empowerment.