Chapter 3
HRM as Challenge for the Top Management of Technology Start-Ups

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Abstract This chapter deals with the challenges that Top Managers of technology start-ups face in regard to human resource management. Technological innovation is seen as main driver of our economy. However, SMEs developing these high-tech products are widely neglected in the public discourse and in research. As human resource management in this setting is completely different to HRM carried out in HR departments of large firms, we raise awareness of HRM in technology start-ups, shed light on the characteristics of HRM in this context, present two case studies and identify their HRM practices, discuss strengths and weaknesses of identified practices, deal with the challenges for the Top Management regarding HRM in the growth process, and derive success factors for HRM in technology start-ups. In the end, we present the managerial and theoretical implications of our research.

3.1 Relevance of HRM in Technology Start-Ups

During the past decades, the organizational landscape dramatically changed. Firms are increasingly confronted with highly dynamic environments, high levels of competition, and rapidly changing technologies. New technologies such as the Internet revolutionized our way of living in the private and the business context.

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Whereas the focus of research and the public discourse is shifting toward multinational corporations, a certain type of firms delivering these strongly demanded high-tech products seem to be forgotten—SMEs. "What usually gets lost is that more than 99 % of all European businesses are, in fact, SMEs. They provide two out of three of the private sector jobs and contribute to more than half of the total value-added created by businesses in the EU. Moreover, SMEs are the true back-bone of the European economy, being primarily responsible for wealth and economic growth, next to their key role in innovation and R&D" [1]. Also by the US Academy of Engineering (1996), small- and medium-sized technology firms are seen as a unique source of diversity and flexibility and therefore significantly contribute to the long-term success of innovation systems. They take opportunities that stay unrecognized by larger firms and therefore play a decisive role in creating and developing new markets and build product diversity [2]. In particular, the technology start-ups we were looking at offer a high degree of innovativeness as the university background of founders and the funding by national research funds at an early stage of activities ensured the development of new technologies without or only limited constraints from market side.

As SMEs per se are underrepresented in research, also the role of HRM in SMEs is neglected. Literature on HRM primarily refers to HRM as a function pursued in HR departments of large firms [3, 4]. It widely neglects that this function does not exist in SMEs where the Top Management is strategically and operative responsible for HR agendas. OECD states that management capabilities are crucial to survival in early stages and human resource management gets increasingly important as the firm grows. Also, European Commission labels HRM as important issue for an SME's success, "SMEs regard four factors as constituting equally important barriers to innovation: problems in access to finance, scarcity of skilled labor, a lack of market demand and the high cost of human resources" [2]. According to Delaney [5], labor costs and finding skilled personnel are under the top 5 reasons that hamper growth.

Not surprisingly, entrepreneurs are deeply interested in new information about HRM issues [6] as they rarely have the financial resources to employ a HR specialist [7]. As SMEs are not a smaller version of their large competitors, it is crucial not to impose the same practices to them, but to investigate their characteristics [8]:

- HR is not the focal activity of the Top Management.
- Top Management lacks HRM knowledge.
- Top Management lacks managerial capabilities.
- Top Management lacks leadership skills.
- Knowledge workers as specific type of workforce have certain expectation to their work environment.
- Scarcity of resources impacts recruiting and retention.
- Growth processes pose various challenges to HRM.

Due to these specifics in comparison with larger firms, we apply a broader understanding of HRM following Boxall and Purcell [9] that "HRM refers to all of

those activities associated with the management of employment relationships in the firm" and do not only deal with the traditional HRM practices recruiting, induction, development, and compensation, but additionally think on their impact on motivation, ability, and opportunity, especially when it comes to job design. Also, Snell et al. [10] refer to a broader understanding of HRM as in knowledge-intensive firms and dynamic environments, shaping the values, attitudes, and commitment gets increasingly important. Strategic HRM provides firms with the internal capacity to adapt and adjust to their competitive environments by aligning HRM policies and practices [10].

Alignment of HRM policies and practices should gain center stage when start-ups grow in order to adjust to internal complexity. Churchill and Lewis [11] and Greiner [12, 13] emphasize the managerial challenges of growth (Fig. 3.1) and are thereby also touching the field of HRM. At the beginning, firms are characterized by technically and/or entrepreneurially oriented founders that work in close relation with their employees who are also completely dedicated to the product (development) and the firm. Communication is immediate and informal. The more successful the company is at that stage, the more likely growth becomes an issue. In particular, in fast growing firms, entrepreneurs are challenged by introducing formal processes and get burdened with managerial tasks. The success factors of
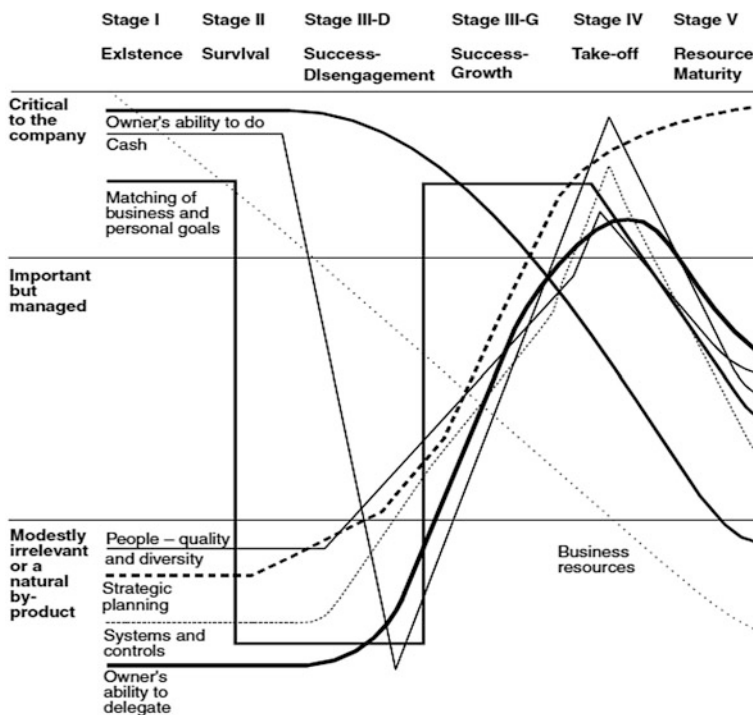

Fig. 3.1 Management factors and the stages of growth [11]

early stages become pitfalls in subsequent ones. Whereas a hardworking founder deeply involved in operative activities is important to survive the first years and bring his vision across, the ability of taking over a more managerial role or pass this responsibility on to somebody specialist in the field becomes essential. Greiner [13] calls it the "crisis in leadership," when founders become overloaded with managerial responsibility although they do not feel comfortable in this position. Therefore, founders tend to trivialize the problems and resist implementing more formal structures in the first place [14]. "Owner's ability to do" must be exchanged against "owner's ability to delegate," and "strategic planning and systems" get increasingly important. This also refers to HRM that is done on a case-by-case basis at the beginning but needs more strategic consideration when a firm grows.

Growth processes and adapting to them is at the moment the challenge for the two case firms we selected for presentation in the following section. By growth, we mean an increase in the number of employees [15] and the number of customers and increases in market share [16, 17].

3.2 Two Case Studies of Technology Start-Ups

As part of a larger research project on the influence of HRM practices on a firm's innovativeness, we picked out two start-ups engaged in the high-technology sector, which can be subsumed in the category of SME. The main factors determining an SME are (1) the number of employees and (2) either turnover or balance sheet total (see Table 3.1) [18].

We decided to follow a case study research design [19] as this design offers the chance to analyze complex social phenomena in depth and within the natural context. As we got rich data to analyze [19], the method facilitated a deeper understanding [20] of the Top Management's role in HRM. The data source consists of problem-orientated in-depth interviews at both firms. Each interview lasted between 1 and 2 h. We tape-recorded and transcribed them. Additionally, we collected data from other sources, e.g., annual reports, strategy documents, artifacts, and Web pages, in order to improve the understanding of interviews, the organization as a whole and its products. Multiple data sources enabled data triangulation and helped us to improve the validity of our findings [20]. Data analysis rooted in thematically coding the interviews [21].

Table 3.1 Definition of SME [2]

Company category	Employees	Turnover (m)	Or balance sheet total (m)
Medium-sized	<250	≤€ 50	≤€ 43
Small	<50	≤€ 10	≤€ 10
Micro	<10	≤€ 2	≤€ 2

Both SMEs are operating in a highly dynamic, knowledge- and research-intensive sector and are currently going through an intense growth process regarding the sales volume and the number of employees. Due to the rising number of products, customers, financial resources, and employees, the firms are ideal for showing how the Top Management is challenged by managing HR in the process of growth.

Both firms have their roots in university, where some students fascinated by a certain topic started working toward having their own business. Supported by incubators working in close cooperation with the university, the founders could concentrate on product development, while they received professional support on side of founding and leading a company. While there were only technicians in the founding team of Flyspy Ltd., a fictive name, Sports-Pro Ltd.'s founders were a mixed team of technicians and people with background in business administration (Table 3.2).

3.2.1 The Case of Flyspy Ltd.

Flyspy Ltd. was founded in 2005 and employs around 30 people. At the beginning, Flyspy Ltd. primarily focused on research projects, financed by the European Union, to ensure its survival. Research projects were necessary because, so far, Flyspy Ltd. had no product to sell, just some scientific results (knowledge) but a vision. After numerous small intermediate steps, Flyspy Ltd. translated its knowledge into marketable products (e.g., self-propelled lawn mower, automatic guided robots) and it started to accomplish customer orders, too. Flyspy Ltd.'s products are primarily sold in German-speaking countries, but it continuously enlarges its presence outside Europe. Fulfilling customer needs reduced its dependence on research funds and was helpful for building up a comprehensive client-base and partner-base. Flyspy Ltd.'s major customer groups are aviation and maritime organizations, government, and organizations that are in need of automatic guided vehicles. On the other hand, the organization spends plenty of time

Table 3.2 Firm profiles of Flyspy Ltd. and Sports-Pro Ltd.

	Flyspy Ltd.	Sports-Pro Ltd.
Foundation	2005	2009
Number of employees	About 30	About 70
Products	Technology suppliers in the field of navigation, motion tracking, and mobile robotics	Software development (apps) + sports equipment
Top Management	At the beginning CEO (= founder), later CEO + CTO + CFO, now CEO (= previous CFO)	Founding team (4 founders)

and money on R&D to develop a system that increases the value of the core product, but might also be sold as a component of objects produced by other firms. There was little competition; however, it was uncertain if or when the break-through could be achieved. The new technology required major investments, whereas the date of returns remained unclear.

Due to Flyspy Ltd.'s success, a strategic decision that successful start-ups are confronted with sooner or later arose—grow or stay small and serve a niche. These opposing directions were represented by the conflict within the Top Management at that time. The CEO preferred to grow, whereas the CTO considered staying small and operating in a niche. During that time, the flexibility and spontaneity that formerly brought the success resulted in confusion, insecurity, and inefficiency. In the end, the conflict was resolved by the CTO leaving Flyspy Ltd., but issues of structuring and organizing HR agendas still persist.

3.2.2 The Case of Sports-Pro Ltd.

Sports-Pro Ltd. was founded in 2009. The initial idea was born during a project at university for tracking sailboat races. As the target group was too small, the founders decided to focus on more popular sports, such as running, cycling, and walking, and developed an app that can track and analyze different kinds of sport activities. All relevant sports' data can be uploaded to a fitness portal and shared within the community. Subsequently, Sports-Pro Ltd. also launched hardware products in order to broaden its reach in the fitness industry. Additionally, Sports-Pro Ltd. develops apps for other companies. As living on the development of apps is difficult, all four founders completely reinvested the money into their firm, which is one characteristic that ties the Top Management of Sports-Pro Ltd. together and helps with rapid growth. Now, Sports-Pro Ltd. employs around 70 people with different national backgrounds. Sports-Pro Ltd. is not only operating in Europe, but also expanding to the United States by now. Sports-Pro Ltd.'s main competitors are firms in the United States, which is really tough as changing to another app is easy and free of charge for the end-customer. Therefore, close contact to end-customers and immediately reacting to their feedback is success-critical. This is done via a customer portal on the Internet. Due to direct com-munication and a flat hierarchy, responding to customer needs is comparably fast and easy and the main source of competitive advantage. Routines are only applied in quality checks and when it comes to answering customer queries. The Top Management persists since the foundation by clearly following their defined roles in sales, marketing, technological development, and internal agendas.

As SMEs and in particular technology start-ups are different to larger firms, we show their characteristics in the next section as they impact the alignment of HRM practices in the growth process.

3.3 Characteristics of Technology Start-Ups Impacting HRM

3.3.1 Top Management as HR Agents

Research on SMEs shows that their competitiveness is strongly related to the formal education and training of its Top Management, but the formal qualifications are in general inferior to those of the management in larger firms as founders rarely attend formal training [18].

In the case of Sports-Pro Ltd., the Top Management consists of persons having the technical understanding and also knowledge in business administration. Therefore, they strictly divide responsibilities and lay emphasis on product as well as organizational development. One founder is responsible for server infrastructure, one for mobile products, one for marketing and sales and representation activities, and one for gaining research funds and internal agendas. In contrast, Flyspy's founder has proficient technical background but lacks competence in business administration. Therefore, he stayed involved in operative product development tasks and neglects administrative, management, and leadership tasks. However, employees appreciate having a Top Management that knows that the process of developing new technologies takes time and includes making failures but complain about lacking communication structures and information management. Introducing an attendee recorder without prior communication at Flyspy Ltd. leads to extreme reactions of employees and serves as an example for the relevance of leadership and management skills. Instead of loosing the trust in the case of Flyspy Ltd., Sports-Pro Ltd. tracks working hours via its project management system to which employees are highly committed as they understand that tracking hours is crucial for planning and calculating projects for external customers. Learning leadership and management skills by doing bears the risk of loosing trust and credibility and in the end of loosing employees.

3.3.2 Knowledge Workers as Workforce

OECD's comparison on successful SMEs showed that hiring skilled employees and motivating them is crucial to success [2]. Employees are autonomously motivated and fascinated by new technologies. They are driven by the wish to constantly develop a certain technology further and by finding new technological solutions for given problems. They are therefore highly committed and appreciate an autonomous job design with the possibility to informally exchange ideas with their colleagues without any bureaucratic restrictions. Davenport [22] shaped the term "knowledge workers" as individuals with a high degree of expertise, education, or experience, and the primary purpose of their jobs involves the creation, distribution, or application of knowledge. North and Gueldenberg [23] showed that

these workers call for a completely different human resource management than people engaged in material work. Knowledge workers are high potentials possessing specific knowledge regarding the processes, products, or services of a firm. Therefore, changing and formalizing HRM processes needs to consider this specific workforce.

3.3.3 Scarcity of Resources

The build-up process of such job-specific knowledge takes time and is costly for the firm. Consequently, it gets more and more decisive to tie knowledge workers to the firm to reach ambitious business objectives and shape the firm's future. In particular, in periods of economic highs, small enterprises with limited resources have to find ways to retain their best employees. Also, the current shift in demographics and the consequent potential lack of workforce raise the challenge of how to recruit and retain good employees. Difficulty in recruiting qualified staff is a main barrier for SME's innovative capacity what makes it even more important to position oneself as attractive employer although compensation cannot be the motivator comparing to larger competitors [2].

3.3.4 Environmental Dynamism

Developing a new product that requires a new technology takes years, and the date of market entry is difficult to estimate. Therefore, forecasting what the market will look like when the product finally could be launched is hard, and planning the necessary HR resources and processes to serve the market is not easy. However, both start-ups have an advantage that literature also identified: "Not burdened by layers of bureaucracy or entrenched cultural barriers to functional area cooperation, these firms often outmaneuver their larger and older rivals by quickly responding to emerging markets" [24]:

- Working in open-space offices allows informal and direct communication and therefore fast information transfer.
- Flexible allocation of human resources to projects allows responding immediately to market demands.
- Autonomously motivated employees are willing to work longer hours on short notice in stressful times when demand is high.
- Employees fascinated by the product inform themselves outside the workplace about trends in the market.
- Developers' engagement in customer projects enhances their understanding of customer needs and the customers' understanding of technical limitations.
- University contact of founders ensures access to cutting-edge knowledge.

- Founders' engagement in industry networks shapes the future market situation also regarding legal regulations.

Due to the small firm size, technology start-ups often operate in niches, and therefore, competition is not that tough. Larger firms do not offer additional services such as integration and maintenance of their products in the case of Flyspy Ltd. or react to customer complaints that fast as in case of Sports-Pro Ltd. However, being informed about competitors and changes in the market is crucial as realizing the changes is a precondition to take the advantage of being able to flexibly react. This is especially important for Sports-Pro Ltd. as the demand for apps is constantly changing.

3.3.5 Growth Processes

As start-ups grow in terms of human resources and diversify in terms of products and financial resources, it gets increasingly complex to govern organizational processes. Top Management is broadly integrated into operative tasks, and management or leadership tasks are in the background. Due to rising complexity, the Top Management becomes overwhelmed, and therefore, rising complexity is often represented by problems and crisis [11] as managers of young growing firms have difficulties to understand the necessary changes [24]. In the case of Flyspy Ltd., product managers were installed to separate the core from the developing business. However, as the Top Management feared to lose power, their function was to give more information from the Top Management to the rest of employees than having concrete responsibilities to relieve the Top Management. Sports-Pro Ltd. laid more emphasis on the project structure and on clearly dividing responsibilities among Top Management members. As there are 4 founders, it is much easier for Sports-Pro to keep an eye on organizational development and leadership as this role is clearly assigned to one of them. Adaption of the organizational structure is especially critical for young firms as they are most susceptible to the adverse effects of an inappropriate organizational structure as their resource base is limited and their organizational slack resources are small [24]. Also, our case firms are permanently struggling to structuring and specializing and at the same time not loosing flexibility and motivation of employees. Lacking structures on the other hand leads to a loss of velocity, chaos, and uncertainty. Due to Flyspy Ltd.'s early success, the number of employees, products, markets, and financial resources increased over the years. Top Management focused on product development and forgot organizational development. Structures are basically the same as in the beginning. Employees call for more formal rules, tighter structures, and better top-down communication but are annoyed by losing autonomy and formal ways of control. As the Top Management invests little in leadership, role confusion, insecurity, and concerns on side of employees are the consequence. Basically, the culture of open informal communication enables a good climate of working together; however, difficulties in sharing information and knowledge [24] appear with growth.

Literature on HRM applies a static view on HR practices; however, in growing start-ups, HRM practices are evolving. Formal processes are mostly missing in early stages, and HR is more done on a day-to-day basis with lacking strategic focus. In particular, when it comes to job design structuring, efforts are often done with minimal thinking about the consequences for employees' motivation. Interestingly, firms producing high-tech products handle HR without technical support. Therefore, it is complicated to keep track of everything and administration becomes a burden.

3.4 HRM Practices in Technology Start-Ups

Although HR practices of SMEs and large organizations are more or less the same, in terms of how they are performed lays a huge difference. Therefore the practices of

- Recruiting
- Induction
- Compensation
- Development
- Job design

in the two case firms are described in this section (see Table 3.3).

Table 3.3 HRM practices at Flyspy Ltd. and Sports-Pro Ltd.

Recruiting	Recommendations, networks, internships (master thesis)
	High-performance values
	Fascination for product
	Fit with established team
Induction	1st day: Top Management tells about relevant firm data and processes, getting to know the team in an informal way
	Learning on the job, assignment of small projects, special attention of Top Management
Compensation	Based on qualification but low in comparison with larger competitors
Development	Learning on the job
	Internet platforms, blogs
	Trade fairs, conferences
	University cooperation
	Supervision of master thesis or doctoral thesis
Job design	Projects with different staffing;
	Time for own creative projects at Sports-Pro Ltd.
	Autonomy regarding working hours autonomy restraint by customer demands
	Close customer contact
	Performance judged by result at deadline
	Jourfixe for coordination at Flyspy Ltd.; not regularly held at Sports-Pro Ltd.

3.4.1 Recruiting

Recruiting in both firms lies in the Top Managements' hands. Thereby, Top Management team members rely on recommendations of their networks. They are in close contact with university institutes, where professors suggest talented people to them. Most employees are former undergraduate or doctoral students that were connected to Flyspy Ltd. or Sports-Pro Ltd. via their thesis before. That offers a good opportunity to get to know the person and about her/his work attitude. On the other hand, people can test whether the job fits their expectations or not. In particular, Sports-Pro Ltd. is recognized for a good working climate among programmers and gains new employees through word of mouth in the industry network. The CEO of Flyspy Ltd. additionally searches actively for qualified personnel in databases such as "Xing." Sports-Pro preselects its employees by first employing them on a service contract basis, which is also in favor for future employees as they are often university students when they first get in contact with Sports-Pro Ltd. and want to intensify their work load just after finishing their studies. As it is not that easy to find qualified personnel, both firms are looking for generalists or people experienced in the field even if they are trained in a different programming language. In order to ensure the qualification of employees, they rely on the recommendations of professors of educational institutions and universities. Sports-Pro Ltd. offers the perfect workplace for young people as working there provides a good opportunity to develop competences due to the autonomy given by the Top Management. The salary for people working there is not the main source of motivation, as it is very low in comparison to larger companies in the region. As autonomous motivation is very important for the Top Management of both firms, they are looking for people that are interested in and enthusiastic about the product and fit to the established team.

3.4.2 Induction

The new employee is shown the administrative processes, premises, and the products and soon works in smaller projects. Employees in their first weeks have enough time and do not feel any pressure. They are supported by the whole team, and also the Top Management takes a lot of time to answer their questions. At Flyspy Ltd., the new employee gets a firm presentation and scientific journals to read and can have a look into the manual of the product, but the main part is learning by doing and learning by explanations from colleagues. As it is often not possible to employ people that exactly meet the profile, they have to learn, for example, a different programming language in their induction phase. In order to show motivation, employees of Sports-Pro Ltd. at the very first stage learn the basics of the new language by themselves. Later on, they sit next to the most experienced person in this field, who acts as informal mentor even later on when the new employee pursues own projects. At the same time, they do not only

transfer the technical knowledge, but the new employee also learns about norms and values in the firm. As there is no formal induction process and written rules are missing, this form of individualized socialization is very important to ensure the internalization of processes, rules, and norms.

3.4.3 Compensation

Compensation at both firms is intransparent and depends on individual negotiation. As salary cannot be the prior factor of motivation due to resource constraints, Flyspy Ltd. builds on events to strengthen the group such as having dinner together or meets for sports activities outside the firm. Although start-ups are a very uncertain environment (high failure rate of start-ups), they are still demanded employers as they offer good working conditions and programmers know that they can easily get a job at an industrial group in case of failure.

3.4.4 Development

On the job, people develop competences by reading scientific journals or conducting the Internet, and rarely, they visit courses outside the firm. Development is closely related to solving day-to-day problems at work and not really future oriented. At Flyspy Ltd., the Top Management thinks that employees either possess creativity or not and does not think about any facilitation by workshops for example. A lot of potential stays unused as there are no efforts to think about human resource and knowledge management in a systematic way. Formal annual employee reviews are held to find out more about employees goals and interests. Development of employees, for example dissertations, is supported, but all kinds of development need to be initiated by the employee herself/himself. New knowledge is gained through supervising master thesis or following discussions on Internet blogs in the spare time. Moreover, discussions at trade fairs and scientific conferences offer room for exchange with others involved in the same industry sector to stay up to date.

3.4.5 Job Design

Both firms organize their work in projects with different staffing. Also during a project, employees can switch flexibly depending on the demand of human resources in other projects. Within the projects, decisions are made on individual basis, as Top Management is not interested in the process, but the result at the deadline. Also referring to working hours, employees decide on their own what

time they leave the office and are content with working longer hours in busy times in exchange to longer periods of compensatory time off. Autonomy rises with duration of firm membership.

The Top Management of Flyspy Ltd. wishes for independent employees that show initiative and believe in themselves and their ideas. They should be driven by the motivation to find out something new and should also take risks to achieve that. This attitude is expressed in team meetings where every argument counts no matter who brought it in. On the contrary, when looking at processed ideas, it can be seen that the CEO takes over a strong part and mostly pushes his ideas. He is the one responsible for ideas, and employees should bring them to life. Employees are often asked to participate in certain projects, but the initial idea always comes from the CEO. At Sports-Pro Ltd., on the contrary, employees get time to develop their own ideas and projects. Employees are motivated by the collaborative working environment and the involvement in different operations. Resource constraints become an advantage as work therefore is not that specialized and developers are also involved in testing which is especially in the case of Flyspy Ltd. a strong motivator as they have a physical product to test. Employees can clearly see how their work contributes to the whole and the company's success. They are also motivated because of only few formal controls. As research and development is a process that is never finished, employees need to be patient and forced by finding out something new. In particular, in the process of programming, employees of Sports-Pro Ltd. mentioned the importance of "flow," the psychological state where a person is fully focused on an activity. Being in such a state makes work going faster and therefore should not be interrupted. That is why they do not stick to working hours but to their psychological state. However, when the number of people in open-space offices increases, it becomes noisier and one gets interrupted more often. That is the reason why marketing and sales activities at Sports-Pro Ltd. are separated.

Formal meetings such as Jourfixe are planned but forgotten in the daily work of Sports-Pro Ltd., so communication suffers. Informal meetings during lunch break do insufficiently replace the formal ones. Flyspy Ltd. on the contrary uses Jourfixe for regularly informing each other about the projects.

3.5 Strengths and Weaknesses of HRM in Technology Start-Ups

Derived from the description above, it is possible to deduce strengths and weaknesses of HRM in technology start-ups (see Table 3.4). Having both in mind is in particular important when thinking about the structuring of HR activities in the growth process as the strengths should be maintained as long as possible.

Table 3.4 Strengths and weaknesses of HRM in technology start-ups

Strengths of HRM in technology start-ups	Weaknesses of HRM in technology start-ups
Flexibility	Chaos
Collaborative working environment	No formal control mechanisms
Innovative climate	No orientation through rules and structures
Informal communication	Lack of formal communication
Highly autonomously motivated employees	Top Management responsible for HR issues

3.5.1 Strengths

The strengths rely on a combination of the workforce and job design. Sustaining the job design characterized by flexibility, collaboration, innovation, and informal communication is central to attracting and maintaining the knowledge workers that are able to come up with innovative high-tech products.

- *Flexibility*: Based on a comparatively low degree of bureaucracy, HRM in technology start-ups is able to flexibly react to changing environments what is an enormous competitive advantage compared to larger organizations with a more inflexible HRM system. They are flexible due to people working on service contracts but also regarding their case-by-case decisions about training activities outside the firm. Moreover, allocating human resources internally between projects allows fast reactions.
- *Collaborative Working Environment*: Project-based working, as it is common in technology start-ups, fosters a collaborative working environment. As different competences are required for developing high-tech products, collaboration and cooperation are essential. This is enabled by a common vision based on the founder's principles.
- *Innovative climate*: Knowledge workers carry the dedication to find out something new. Combined with the vision of the founder that directs their search and the possibility to exchange ideas informally in- or outside the projects leads to an innovative climate. Moreover, a culture that sees failures as inherent in the innovation process facilitates new product development enormously.
- *Informal communication*: Based on a low degree of formal rules for communication, information can flow extremely fast in a very informal way. As technology start-ups are confronted with high environmental dynamics, this is one of the most important strengths.
- *Knowledge workers*: Such a job design fits well with the requirements of knowledge workers, and thus, they are highly autonomously motivated.

3.5.2 Weaknesses

The weaknesses are tightly coupled to the strengths and can be seen as the flip side of the coin.

- *Chaos*: Due to the flexibility of contracts, it is difficult to define the role of people working on service contracts. How much should they be integrated? Will they stay longer? Will they get a fix contract? Should collaboration with them be different from internal collaboration? Also, people switching internally between projects are problematic as it is then hard to keep everybody informed about activities in the project.
- *Control mechanisms*: Knowledge workers enjoy working autonomously, and performance is secured by clan control. However, as proper project documentation or tracking of working hours is missing, there is a certain insecurity on side of the Top Management, especially when the firm grows and keeping an overview over activities gets more difficult.
- *Structures and rules*: It is possible that the preferred autonomy and independence switch to a great burden for employees that later enter the firm as there are no rules and structures they can follow. The larger the firm gets, the more interpretations of how the daily processes should be pursued exist. This is reflected by different performance norms or understanding of communication and collaboration, which causes conflicts and insecurity.
- *Top Management as HR agent*: In technology start-ups, the Top Managers are usually not trained in HRM because they primarily enjoyed a technical education. As they focus on technology, they spend only little time and effort on HRM and on developing their skills in this field. Therefore, they often do not realize the importance of these issues and loose sight of necessary changes.

Most difficulties arise when the firm grows in employees, sales, products, or market segments, and thus, the requirements to the HRM system and the organization as a whole change. The previous strengths, which fostered organizational success and growth, can easily switch to weaknesses and endanger the survival of the firm.

3.6 Firm's Growth as Challenge for HRM

Small firms are characterized by a low level of complexity that roots in market proximity, few products, employees, rules, and formality. Challenges appear when the growth of small firms enhances complexity [24], and balancing different requirements becomes increasingly difficult. The firm is more and more confronted with various challenges [11, 25]. In the early stage, resources are moderate and thus easy to manage. Based on an increasing number of employees, products, and financial funds, allocating resources becomes more and more challenging. Therefore, more rules and processes for allocation are needed.

In the early phases, the individuals are in the foreground as they organize the main resources to survive as organization. During the growth process, the relation changes that means that individuals are more and more in the background and the organization with its structures, processes and rule becomes increasingly important.

In the following section, we deal with the challenges of growth and thereby identified necessary areas of change.

3.6.1 Processes and Rules

When the firm size is small, processes are quite easily manageable and primarily informal. As the number of products, sales, and markets increases, it becomes more difficult to manage all the processes within in the firm. Growing start-ups struggle with the rising complexity because they do not develop structures that help them to handle it. Adaption of the organizational structure is especially critical for young firms as they are most susceptible to the adverse effects of an inappropriate organizational structure as their resource base is limited and their organizational slack resources are small [24]. Technology start-ups primarily fail because of missing functional knowledge and because of not knowing how to handle internal processes. They have, for example, problems with processes such as consistent quotation processing, time recording, and paying earnings. For example, Flyspy Ltd. found itself in the situation that without major changes in the organization's structure, processes, and workplace, the higher number of employees could not be handled effectively. So, for example, handing in payslips in time becomes a challenge for the Top Management of firms that generate sophisticated technologies. Individual working hours lead to people constantly walking in and out the open-space office, which disturbs the working atmosphere.

3.6.2 Communication

A great advantage of small firms is that everybody knows about everything, as it is easy to communicate over the desks. Direct and immediate communication ensures that there are no redundancies and that time resources are well allocated. When the number of employees and projects increases, this informal way of passing on information becomes critical; it is quite challenging or even not possible that all employees get the information they need. At Flyspy Ltd., the Top Management believes that everybody should be informed about everything, but information needs to be requested. Information concerning products is given to each employee, but, for example, the entry of a new employee is not communicated at all. In both firms, there are hardly any e-mails about internal changes as written rules on communication are missing. Also, the chance to get information from informal communication decreased due to increased complexity. Project/product managers at Flyspy Ltd. should serve as information bridge between employees and the Top Management. Transfer among employees is retained by employees switching between projects. However, it takes time to get everybody at the same level of knowledge. Informal communication with the Top Management serves as a form of empowerment and is likely to reduce the motivation and commitment if it gets formalized and indirect. Moreover, it allows fast reaction, which is a major competitive advantage of small firms.

At the beginning, it is quite a lot of work to build up a fluent way of communication aside the project-based communication. However, for keeping employees motivated, a suitable and extensive communication system is very crucial.

3.6.3 Knowledge Management

Another critical aspect is documentation. At the beginning, every employee is responsible for a clearly defined field or process. Written documentation of projects is dependent on individual judgments of how much documentation is necessary. Thus, everybody documents her/his work in her/his own way. The Top Management of both firms tried to implement corporate wikis, but they are not that frequently used and updated. Although Flyspy Ltd. has suffered from the leaving of a key person at the very beginning, they were yet not able to raise awareness to use IT tools for knowledge storage. Employees share the opinion that knowledge becomes outdated very fast and that it takes too much time to keep up these systems. Therefore, it is extremely important to retain employees as long as there are no codification strategies in place. For reducing the dependence on individuals as they have enormous personalized knowledge storages, it is crucial to establish a knowledge management system that overstretches the whole organization. Limitations based on a personalized documentation system are no longer suitable for a growing organization.

Besides the formal ways of documentation, it is essential to create areas and structured ways of dividing and transferring knowledge. In small but growing firms, a possibility is to introduce Jourfixe and meetings or on a more informal way to meet for an after-work beer, reserve time for small talk, or regularly organized breakfasts at work. In growing firms, it becomes important that such activities are organized because it is quite difficult that the employees organize such project on their own.

3.6.4 Top Management

In technology start-ups, the Top Management is responsible for procuring the general requirements (e.g., acquiring the necessary resources [26]). Founders have a strong idea of what they wish to sell and roughly how to produce it. The main aim is to set up the initial goals [27] and to develop and realize a vision (e.g., [28]) through working hard instead of managing the organization or leading employees. As founders are mostly technicians without an economic education, the management tasks are mostly in the background: Their passion is the development of technical solutions and not organizational development and leadership. Employees are often asked to participate in bringing the ideas to life, but the initial stimulus

always comes from the Top Management. Hence, the firm becomes a reflection of the founders' behaviors. Based on the enormous discretion and the low level of bureaucracy [28], the Top Management leads the organization in a quite a loose, flexible, less rule- and formality-based way. In the first phase, it is even more important to bring the organization to life than to develop extensive strategic plans.

However, rising complexity leads to more organizational and less operative working activities. Structures stay basically the same as in the beginning, but they are no longer suitable. However, in most cases, the Top Management is not clear about that and acts like in the beginning. The Top Management becomes overloaded, concerning operative, coordination, and management tasks. It is no longer able to handle the firm casually and does not fully understand the organization's processes anymore [29]. As dealing with rising complexity is a central function of the Top Management and pivotal for the success or failure of a firm, the Top Management needs to develop ways of handling. The members of the Top Management need to change their roles from the founders to the managers. That means that it becomes necessary to learn delegating duties and step aside from the operative business (see Fig. 3.2). Founders need to be aware of their strength and act accordingly. They should either invest in developing their skills in strategic management and HR, employ an HR specialist or seek help from consultants.

To ensure a better communication, Top Management can seek support from lower hierarchy levels [30]. In the case of Flyspy Ltd., product managers have been installed. However, in order to guarantee their performance, training in project management is required. So thinking about formal training for the Top Management as well as for other management levels is important in the growth process. Moreover, also the willingness of the Top Management to give responsibility to the lower hierarchy level must be given. This enables a division of work and responsibility between the Top Management and the Senior Management/ project leaders and protects the Top Management from work overload.

To sum up, the challenges root in underdeveloped processes, difficulties in sharing information and knowledge, inadequate (control) systems, and lack of transparency (see also [24]). Rising complexity calls for decisions in a very early stage in order to avoid or at least mitigate these challenges: The Top Management has to strategically decide whether to stay small and serve a niche or to foster the firm's growth. Fostering growth means introducing tighter structures and raising formality while reducing employees' autonomy. Functional experiences, the founder's personality and his influence on the firm and its employees [31, 32] as
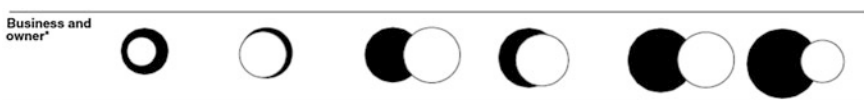

Fig. 3.2 Role of owner in the growth process [11]. The *small circle* represents the owner. *Large circle* represents business

well as the Top Managements' past job-related experience [33] strongly influence this decision. If the Top Management decides to grow, it needs to ensure changes because otherwise it is no longer possible to handle the firm effectively.

Growing start-ups are confronted with a very special situation: They are no longer small enough to manage their duties informally, and they are not large enough to have such formalized ways like a global corporation. Growing start-ups take over an intermediate position.

It is critical to the success that they formalize their processes; otherwise, they are threatened to decline as the flexibility and spontaneity that formerly brought the success now resulted in confusion, insecurity, and inefficiency. However, it is crucial to the success to be aware of not losing the incentives that are important for knowledge workers—flexibility, spontaneity, autonomy, and a collaborative working environment. However, Bacon et al.'s [34] study of UK SMEs suggested an inverse U-shaped relationship between firms' HR formality and performance. According to Bacon et al. [34], the main challenge for SMEs is to introduce formal structures but at the same time protecting the informal culture as this is the source of competitive advantage. On the other hand, formality is necessary to unfold the potential of SMEs and enable their growth.

3.7 Successful HRM in Technology Start-Ups

Based on our findings, we derived some factors that we perceive as important for successful HRM in technology start-ups. By successful, we mean that practices contribute to high-performance work systems, which are characterized by giving employees the ability, the motivation, and the opportunity to perform well (Fig. 3.3).

3.7.1 Recruiting, Development and Induction Creating the Ability for High Performance

HRM practices that contribute to support the creation and maintenance of a corporate culture and a common frame of references are the recruiting based on the fascination for the product and the fit to the established team, the individualized induction, and the project-based job design. Thinking strategically about personnel development and training activities and introducing a transparent compensation system would be crucial as well, but was neglected by our case firms.

One of the most important factors is to recruit employees that fit the firm. A technology start-up primarily needs knowledge workers that enjoy working autonomously. They need to favor working proactively and self-dependent. They should show initiative and believe in themselves and their ideas. Another
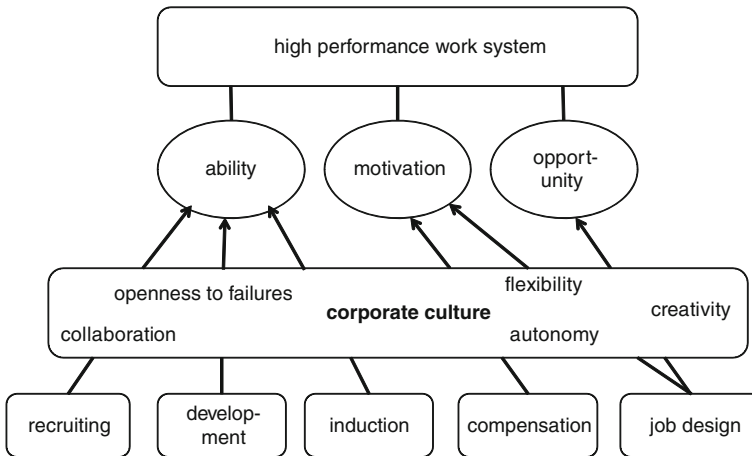
Fig. 3.3 HRM practices contributing to a high-performance work system

important aspect is being enthusiastic about the product as otherwise everybody would be working toward her/his own goal. If the employees are not enthusiastic, they will become tired in doing their work because working in technology start-ups could often be very exhausting, long-winded, and chaotic. Employees moreover need to be open for continuous development and change.

Factors that foster a successful HR system in small technology firms are as follows:

- Employees need to be

  - independent and autonomous
  - innovative and creative
  - proactive and self-dependent
  - enthusiastic about the product
  - highly committed to the firm
  - open for continuous development and change
- The Top Management needs to

  - be aware of the employees' needs
  - foster and support employees
  - provide a high level of trust to employees
  - be open for continuous development and change
- Corporate culture needs to support

  - collaboration
  - creativity
  - autonomy
  - failures
  - flexiblity

3.7.2 Job Design Providing Motivation and the Opportunity for High Performance

Employing independent, open-minded, and autonomous people requires a Top Management that provides enough autonomy to its employees. The Top Management's orientation should focus on the result, and how the employees achieve the result should be more or less in the background. The Top Management itself, however, is also strongly integrated into the operative tasks, and thus, it influences the product and organizational development through working together with the employees on current themes [30]. As knowledge is not bundled within the Top Management but employees possess specific expert knowledge that the Top Management does not necessarily need to have, focusing on fostering and supporting the employees and being aware of the their needs is an important task.

Working together in such a cooperative way without big hierarchical differences, formal rules, and strong control mechanism creates trust that employees would not abuse. At Flyspy Ltd., for example, this high level of trust becomes visible in open doors, delivering responsibility in important projects, free entry to every room, and the whole server on the PC. It is an immense challenge for Top Managements acting in that way because one sometimes might have the feeling of loosing control. However, from motivational aspects, this is very important.

For enabling to do a good job in technology start-ups, a corporate culture with shared values and norms that guide behaviors based on shared expectations [35, 36] is crucial. This culture should be characterized by trust, discipline, stretch, and support (see also [37]). Furthermore, such a corporate culture needs to assure a common frame of references that builds the framework for a common language and a high level of background knowledge (e.g., knowledge about challenges, the firm's goal, positioning of the firm) [38].

Technology start-ups need a corporate culture that supports a collaborative working environment, a creative climate, and working autonomy, which motivates the employees, especially knowledge workers. Furthermore, a positive attitude to failures is necessary because otherwise no innovative ideas can grow. Such a corporate culture supports knowledge exchange between employees and facilitates self-dependent working. Formal control and strict rules on the other side would hinder small technology firms in working successfully, as start-ups based on a commitment culture are less likely to fail than those pursuing an autocratic way [39].

3.8 Managerial Implications

As this book is aimed at practitioners and researchers, we tried to find a mix and serve both groups. Although the previous section contains many suggestions for practitioners, we wanted to summarize them additionally.

- The most important finding for technology start-ups is that it is essential to think strategically about HRM from the beginning. Introducing tighter structures and formal processes step by step is not that disruptive for employees than reacting when the firm is caught in chaos. Timing is a critical issue as too much formalization at an early stage is costly and slows down processes, and as a consequence, the firm looses its competitive advantage without profiting from specialization or economies of scale. Not only the timing but also the communication of change is crucial for employees, who are used to being engaged in decision-making. In particular, when it comes to introducing time-tracking systems, employees can easily feel a lack of trust that is why it is important to think about how to communicate such changes.

- Recruiting individuals that are highly autonomously motivated, fascinated by developing something new, dedicated to the firm and the product, and fit the team is a success factor of technology start-ups and can be easily achieved by relying on recommendations, pretesting through diploma thesis and service contracts, and having a good reputation as employer in the field. The challenge is to find employees flexible enough to perform current duties, manage multiple jobs, and take on different duties in the future as the firm grows [6]. A combination between fit to current culture and flexibility to adapt to a new one has to be considered in recruiting decisions [40].

- As good recruiting practices, we found that development and compensation do not get the attention they should. Although compensation is not the number one motivator as it is low, transparency gets an issue when the firm grows and employees are staying longer with the firm. In particular, as knowledge is stored in individuals' heads, thinking strategically about compensation to retain employees should be considered. Compensation should be seen from a total rewards' perspective, and considerations about learning opportunities should also be included in strategic planning.

- Another issue is development that should be thought about more strategically. Even if technical skills can be learned individually on the job, it is necessary to give employees that should support the Top Management in project management, HR agendas or organizational development the formal training they need to develop these skills.

- Management and leadership skills must be learned similar to technical ones. Therefore, it is crucial for the Top Management to develop these skills in trainings or give these responsibilities to a specialist. Launching a business requires different skills than managing and leading a business through changes in the growth process [41]; therefore, Top Management should admit that and seek support. Also, in that sense, network ties can help start-ups to exchange knowledge and experience about these issues.

- This is especially important as not only HR processes but also communication and cultural issues become more complex when the firm grows. However, being able to handle these internal complexities is essential to keeping up the innovative culture and being attractive to the workforce. Informality increases teamwork and relations between employees and therefore fosters motivation

[42]. Moreover, employees profit as they can negotiate work responsibilities and the form of supporting each other as well as enjoying flexible working hours [42].

To conclude HRM in a start-up means much more than being able to handle the typical HRM practices. It requires maintaining the culture, managing knowledge, and leading through change. It can therefore not be seen as only one of several responsibilities of the Top Management but must stay in the focus. However, "finding the right level of formality is both challenging and potentially beneficial" [8].

3.9   Theoretical Implications

Given the lack of literature on SMEs in general but in particular on the combination between HRM and SMEs [7], we contribute to raise awareness for this underinvestigated field. We show that HRM is not only a large firm phenomenon but crucial especially to growing start-ups. We thereby follow Heneman et al.'s [6] and Katz et al.'s [43] ideas to focus especially on growing SMEs.

Although HRM practices do not differ much from those of large firms, how they are practiced makes a big difference [34, 44, 45]. That is why we described how the traditional practices are carried out in our case firms and moreover directed attention to related fields such as knowledge management, communication, and change management as very important for HRM in SMEs.

But also regarding HRM practices in high-tech start-ups, we found differences to previous studies. For example, did Keating and Olivares [7] state the importance of in-house training, which we could not find in our case firms, where development was based on individually searching for solutions for day-to-day problems. Regarding communication, e-mails were found as being important for the daily business but not for passing on news about organizational issues from the Top Management to employees. Also, meetings bringing the whole firm together are not in the focus of the Top Management of our case firms in contrast to the findings in Irish high-tech start-ups [7]. Also, recruiting practices such as newspaper advertisements and employment agencies are not relevant in our case firms, but in line with Keating and Olivares [7] findings, referrals are very important.

Although there is research on HR practices in growing start-ups [46] or the importance of HRM in different stages of a firm's development [47] or HRM practices in growing SMEs (e.g., [48, 49]), these papers do not offer a wider understanding of HRM. Moreover, previous research in SMEs did not investigate the impact of HR practices on ability, motivation, and opportunity, which characterize high-performance work systems [50]. We fill this gap by showing how formalization can threaten motivation but how on the other hand lacking formalization can hamper opportunity. Ability is secured by recruiting and induction but later on left to the individual when it comes to further training. Therefore, the strategic component of human resource development is completely out of sight.

Even if literature states that there is no specialized function for HR in SMEs, it does not explicitly deal with the Top Managements as HR agent and the implications of that situation. Little [45] already discovered that HR practices are in nearly all cases handled by owners. However, the role of the Top Management and HRM practices of SMEs have so far been separated. We show the consequences of that by shedding light on the Top Management's lacking competences in (HR) management, and the fact that it is deeply engaged in operative activities and HR is out of the focus.

So far, the literature was dominated by dichotomies of commitment- versus control-based HR systems [50–52] and individualized versus institutionalized HR practices. Characteristics of each model can be easily found in the literature, but the way from one to the other or a mix is hardly ever mentioned. We fill this gap by showing how more control can be implemented and at the same time not loosing commitment and how institutionalized practices can complement individual practices.

The most prominent research in the field of HRM in high-tech start-ups is the one of Baron and Hannan [39] deriving 5 different HR blueprints of founders out of a sample of 200 start-ups in the Silicon Valley. They give a clear characterization of blueprints but also state that hybrid forms exist. As our case firms are hybrids between commitment and engineering blueprint, we contribute to the literature by further characterizing this hybrid type. Whereas selection in the commitment blueprint is based on cultural fit and clan control is predominant, in the engineering blueprint, selection is based on specific skills and the job is designed to offer challenging work to employees [39]. As the engineering blueprint in our case with only one founder is stronger, also the importance of HR is minor: "entrepreneurs in Engineering companies sometimes seemed to view the HR department as the people who buy the beer, chips, and dip for the Friday afternoon festivities" [39].

Moreover, we complement the literature on start-ups that is dominated by research from the United States by showing cases from the European context, where SMEs are an essential part of the economy.

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