International Journal of Innovation Management
Vol. 26, No. 1 (January 2022) 2250005 (29 pages)

DOI: 10.1142/S1363919622500050

World Scientific
www.worldscientific.com

THE EFFECTS OF HIGH-PERFORMANCE WORK SYSTEMS AND COMPETITIVENESS IN IRANIAN START-UPS: THE MEDIATING ROLE OF INNOVATION CAPABILITY MATURITY

MOHSEN SHAHRIARI*, MARYAM MAHMOUDI-MESINEH†
and ALI ZEINAL HAMADANI‡

Department of Industrial and Systems Engineering,
Isfahan University of Technology, Isfahan 15848-11888, Iran
**shahriari@iut.ac.ir*
†*maryam.mahmoudi@in.iut.ac.ir*
‡*hamadani@iut.ac.ir*

Published 10 March 2022

In today's ever-changing market, startups that can effectively respond to environmental changes and can manage unpredictable events will face intense competition. Human resources play a special role in promoting the competitiveness of startups. This study investigated the effect of high-performance work systems (HPWSs) on the competitiveness of startups through the mediating role of innovation capability maturity. The statistical population of the study consisted of Iranian startups based in Isfahan Province. Data were collected using a standard questionnaire, and the structural equation method was used to data analysis. The results showed that high-performance work systems have a positive and significant impact on the competitiveness of the studied startups through the mediating role of innovation capability maturity and about 47% of the total effect of the high-performance work system on competitiveness of them is explained indirectly by the mediating variable of innovation capability maturity.

Keywords: High-performance work systems; HRM practices; innovation capability maturity; competitiveness; startup.

Introduction

Implementing innovative processes and product development are among the key factors that lead to greater market share and a better competitive position. Over the

*Corresponding author.

years, large and small companies have employed different methods to maintain their competitive advantage in the market and have expanded their research and development (R&D) activities in order to guide their portfolio's incremental or radical innovations (Parrilli and Elola, 2012). Companies can overtake their competitors through innovative activities; because it helps them become pioneers in launching new products or services and consequently improves their productivity, customer satisfaction, and profits (Tsai and Li, 2007). The development of innovative products and processes is an advantage for companies (Baumol *et al*., 2007). In addition, launching new products and innovative ideas may bring more advantages for startups than their established competitors (Christensen, 2013; Criscuolo *et al*., 2012). Therefore, the development of startups can be an alternative for manufacturing organisations struggling to develop innovation. In developing countries such as Brazil, where only 5.7% of newly established companies introduce a new product or process nationally or internationally (IBGE, 2013), high-tech startups can greatly promote social-economic development (Dalmarco *et al*., 2017).

In recent years, the phenomenon of globalisation and other environmental changes have encouraged large business units and prominent thinkers to create global competitive advantages. In any industry, with the emergence of new competitors, organisations must cope with intense competition (Švárová and Vrchota, 2014); therefore, they need to use new technologies to manage the workforce (Hassan *et al*., 2013; Zhang and Morris, 2014). They also must adopt new approaches to organise work and employment processes (Guest, 2011). This is due to the fact that traditional human resource management practices cannot meet the needs of employees in today's dynamic market (Bashir *et al*., 2012). In this regard, Huselid (1995) argues that in today's highly competitive environment, HPWSs can take an important step towards maintaining the competitive advantage of companies by supporting human resource actions (Huselid, 1995). He also claims that these systems can enhance the productivity and efficiency of organisations by fostering their learning capabilities (Jyoti and Rani, 2017). Researchers have shown that HPWSs can increase corporate and employee performance (Yazid *et al*., 2017; Macky and Boxall, 2007). This requires organisations to recruit, retain, and effectively manage proper employees. Many scholars have assessed specific organisational practices offering several competitive advantages in HPWSs (McShane and Von Glinow, 2015; Takeuchi *et al*., 2007). The concept of competitive advantage refers to the ability of a company to use available resources in order to achieve superior performance. To eliminate competitive threats innovation is widely recognised as a key factor for success in economic development and competition between companies in various countries. In fact, the competitiveness and survival of the modern enterprise are reliant on its ability to innovate, providing a strong argument that innovation should not be apportioned to only the final levels of organisational

maturity (Hall and Vredenburg, 2004; Esterhuizen *et al*., 2011). Innovation capabilities demonstrate an organisation's ability to generate novel ideas, and the more mature these capabilities are, the higher the competitive advantage of the organisation will be (Shahriari *et al*., 2018). With innovation capability being the organisational means with which innovative outputs may be generated, Essmann (2009) points out that this innovation capability must be assessed and improved to sustain, repeat and accelerate innovative initiatives. The achieved level of maturity determines an organisation's ability to produce new ideas and generate innovations. In this respect, startups are especially important, because they are often the main source of job creation and economic growth (Baumol and Strom, 2007; Mazzarol *et al*., 1999). These newly established companies are generally based on brilliant ideas. They need high amounts of innovation and competitive advantage to succeed. The firm's capability to innovate is the most crucial factor for competitive advantage in highly turbulent market condition. Innovation capability leads organisation to develop innovations continuously to respond to the changing market environment (Slater *et al*., 2010) and its embedded with all the strategies, system and structure that support innovation in an organisation (Gloet and Samson, 2016). Innovation can only happen if the company has the capacity to innovate (Laforet, 2011). Undeniably, innovation capability is considered as the valuable assets for the firms to provide and sustain competitive advantage and in the implementation of the entire strategy. It is composed through the main process within the firm (Lawson and Samson, 2001) and cannot separate from the other practices. It is tacit and non-modifiable and closely correlated with the experimental acquirement and interior experiences (Guan and Ma, 2003). The capability of innovation is affected by innovation training, market knowledge, rationality and managing possibilities which facilitate firms to introduce new products quickly and adopt new systems rather it is important to factor for feeding the ongoing competition.

Studies have shown that many startups fail in their early stages and less than one-third of them become established companies. In addition, startups face a wide range of problems, including lack of financial resources, lack of human resources, etc. Now the question is, do startups have a chance to succeed and survive in today's dynamic environment with its wide range of problems? Since competitiveness is directly related to chances of survival (Velucchi and Viviani, 2007; Armstrong, 2013), it seems that the answer to this question can be found by reviewing the concept of competitiveness. Startups cannot wait for comprehensive hiring processes; in addition, efficient recruitment and employment of human resources is an essential part of HPWSs; therefore, these systems can create competitive advantages for startups (Bendickson *et al*., 2017). On the other hand, startups also need to accurately describe the characteristics, strengths, and weaknesses of their staff in order to evaluate their performance and develop necessary training programs. This

is also among the main goals of high-performance work systems. Bendickson *et al*. (2017) argue that startups can use HPWSs to experience higher rates of growth and survival (Bendickson *et al*., 2017). Since the main focus of high-performance work systems is on human resources and employees, and human resources have the thinking, rationality, ability to learn, and human intelligence to come up with new ideas, using high-performance work systems can lead to innovation (Shahriari *et al*., 2017) and enhance competitiveness (López-Nicolás and Meroño-Cerdán, 2011). Therefore, the use of HPWSs in startups seems to be the answer to the aforementioned question associated with startup success and survival. Based on the research literature, no attempt has so far been made to investigate the effect of HPWSs on the competitiveness of startups by considering the mediating role of innovation capabilities. Therefore, the authors tried to investigate the interaction between the use of HPWSs in startups and their innovation capabilities and competitiveness. The second section of this paper provides an overview of the research literature and presents the research hypotheses and the research model. In the third section, the research method and the data collection approach are introduced. Then, the findings are interpreted, and in the last section, the authors discuss their main findings and conclusions.

Research Background and Hypotheses

High-performance work systems

HPWS is defined as "a set of separate but interrelated human resource practices designed to improve employee skills and effort" (Takeuchi *et al*., 2007). Zacharatos *et al*. (2005) have argued that HPWSs emphasise employee empowerment through increasing information flow and decentralisation of decision-making, which results in increased employee productivity (Zacharatos *et al*., 2005). The main idea of a HPWS is to create an organisation based on employee involvement, commitment, and empowerment rather than control. In high-involvement organisations, employees hold themselves accountable for their actions and share organisational successes. They strive to learn, work hard, and participate significantly; thus, they gain authority, knowledge, and rewards to perform at the highest level (Dell'Aringa *et al*., 2003). HPWS has been defined as a set of inter-organisational human resource actions (Posthuma *et al*., 2013; Carvalho and Chambel, 2016), which according to Huselid (1995), includes comprehensive recruitment and selection of employees, motivation-based rewarding, performance management, extensive staff involvement, and staff training (Huselid, 1995). Boxall and Purcell (2003) observed that high-performance work practices are a combination of key methods,

such as more accurate selection of training systems to enhance staff competency and more comprehensive incentives (i.e., performance-based payment and internal career ladder) to increase motivation and participatory structures (i.e., self-management teams and quality circles) that improve participation opportunities and increase job security (Boxall *et al*., 2007; Macky and Boxall, 2007).

In a comprehensive definition of HPWS, Drummond and Stone (2007) argue that these systems consist of three main components:

(1) High-involvement practices including self-managing teams, quality circles, and information sharing groups.
(2) Human resource practices, including complex recruitment processes, performance evaluation, monitoring, etc.
(3) Reward and commitment practices including financial rewards, friendly policies, job rotation, and staff flexibility (Drummond and Stone, 2007).

The elements of recruitment, performance-based rewards, increased level of employee involvement, and job security have been cited in relevant definitions presented in various studies. In fact, these measures increase the knowledge, skills, opportunities, and abilities of employees, motivate them, and enable them to use these capabilities to boost organisational growth (Combs *et al*., 2006; Liu *et al*., 2007). Other benefits of HPWSs include reducing employee turnover (Jensen *et al*., 2013), increasing productivity and quality (MacDuffie, 1995), and improving service (CHUANG and Liao, 2010), safety (Zacharatos *et al*., 2005), and financial performance (Huselid, 1995). This is perhaps due to the fact that high-performance work practices (HPWPs) are different from traditional human resource management practices (Shahriari and Allameh, 2020); as previous methods focused on achieving organisational goals through hard work (Arthur, 1994), but HPWSs include the nature and degree of human resource management fit (Boxall *et al*., 2007; Wood, 1999) and a combination of human resource management practices (Mihail and Kloutsiniotis, 2016; MacDuffie, 1995). In addition, organisations can expect higher responsibility from their employees who have been trained and provided with better career opportunities (Sanders *et al*., 2019). These training programmes can improve employee performance (Tsai, 2006), increase their overall productivity and effectiveness, and consequently enhance the competitiveness and competitive advantage of organisations (López-Nicolás and Meroño-Cerdán, 2011).

Innovation capability maturity

Innovation refers to the creation or adaptation of new ideas (Damanpour and Schneider, 2006). In other words, innovation includes the revival and expansion

of products, services, and markets, development of new production methods, and establishment of new management systems (Crossan and Apaydin, 2010). Innovation has also been defined as a learning process in which companies learn and operate the design, manufacturing, and marketing of new products and services (Shahriari and Allameh, 2020). In this definition, innovation involves continuous improvements in product design and quality, changes in organisational and managerial practices, creativities in marketing, and improvements in production processes, which may be of particular importance to companies based in developing countries (Thérin, 2003). To improve their sustainability, companies must focus their activities on innovation. However, various obstacles make this process extremely difficult. For example, the development of new and sustainable products adds to the complexity of the process of developing future products, yet it serves as a potential source for creating sustainable competitive capabilities (Hall and Vredenburg, 2004). In addition, increasing demand for sustainable production and for efficient use of resources (due to resource scarcity, population growth, land scarcity, and global warming) has increased the need for innovation at the global level (Van Lancker *et al*., 2016). Innovation capability maturity is affected by market knowledge and innovation training of the organisation and can be promoted by rationality and the basic factors which drive managing of possibilities within an organisation. Innovation capability is one of the most required factors for the managers to foster. In fact, this accommodates the catalysts that encourage and accredit individuals of organisation to innovate. This will help organisations to drive superior products, services, and business model. It indicates that innovation capability drives stimulus for such activities (Esterhuizen *et al*., 2011). Several models have been developed to identify the capabilities of innovation. An Innovation Capability Maturity Model (ICMM) identifies basic capabilities of innovation and describes their impact on organisations. These models provide organisations with a suitable methodology and a systematic approach to identify the strengths and weaknesses of organisational innovation capabilities. It also presents an integrated framework for identifying continuous improvement opportunities. Like other organisational improvement models such as the EFQM (the European Foundation for Quality Management), the Six Sigma, the TQM (Total Quality Management), the theory of constraints (TOC), and the Principles of Lean, this model also plays an important role in the establishment of firms and improvement of their competitive quality (Essmann, 2009). The main purpose of an ICMM or an innovation capability maturity model is to check how an organisation develops new ideas. The achieved level of maturity determines an organisation's ability to produce new ideas and generate innovations. Innovation capability maturity models have not been extensively studied (Knoke, 2013). Meanwhile, competitive organisations must obtain

dynamic capabilities. Today's companies are constantly evolving, and this evolution sometimes goes beyond complete evolution. This change is driven by factors such as customer needs, suppliers, competition, technology, global economy, and socio-economic environment. Therefore, the perfect organisation of yesterday is not necessarily the perfect organisation of tomorrow. In this regard, maturity models focus on evolving process domains that imply the maturity (or scope) of an organisation. In other words, maturity models can describe continuous changes occurring following the introduction of an innovation (Essmann, 2009). In addition, due to constant changes in today's business environment, all organisations, especially knowledge-based companies and startups, are struggling to survive. They often use creativity and innovation to make effective changes in society and to guarantee their survival and competitiveness (Yang and Tu, 2020). Startups need to develop infrastructure and meet requirements that ensure the continuity of their creativity and innovation (Triebel *et al*., 2018). They also must establish, maintain, and strengthen strong and sustainable interactions with the external environment in order to identify and meet current market needs quickly and efficiently. Accordingly, creative startups can transform customer needs into innovative products and services and capture the market by creating a link between their creativity and market features. Therefore, innovation plays an undeniable role in the success of startups (Spender *et al*., 2017).

Competitiveness

Due to the increasing importance of competitiveness in global business interactions, this domain has been extensively studied in recent years (Porter, 1990; Momaya and Ajitabh, 2005). In today's globalised economy, only those countries and firms that have strengthened competitiveness in their domestic markets will manage to survive. The following paragraphs provide explanations on competitiveness at the national, industrial, and enterprise levels (Porter and Millar, 1985; Webster, 2002).

National competitiveness

The concept of competitiveness at the national level generally indicates the ability of a country to produce products that can satisfy customers at the international level. According to Moon *et al*. (1998), the competitiveness of a country reveals its relative competitive position (or level of economic development) in the international market (Moon *et al*., 1998). According to Menzler-Hokkanen (1995), the level of international competitiveness of an industry or firm depends on many factors on the micro and macro levels. Only a collective consideration of these factors

can reflect the dynamics of international competitiveness (Menzler-Hokkanen, 1995). Porter and Millar (1985) proposed the "National Diamond Model" based on six sources (including factor conditions, demand conditions, related and supporting industries, firm strategy, structure and rivalry, government, and chance), and applied it to the economic sectors of 10 industrialised countries (Porter and Millar, 1985). Rugman and D'Cruz (1993) developed the "Double Diamond Model" (Rugman and D'cruz, 1993). Other scholars have presented several factors (e.g., human, and physical and governmental factors) affecting national competitiveness in the form of economic development models (Zanakis and Becerra-Fernandez, 2005; Keegan, 2017).

Industry competitiveness

Buckley *et al*. (1988) argue that the competitiveness of an industry depends on the dimensions of competitive performance, competitive potential, and management process (Buckley *et al*., 1988). According to Porter (1990), two main factors affect the profitability of businesses, including the industrial structure in which the business operates and the competitive position of the business in that industry (Porter, 1990). These two strategic factors lead to the formulation and implementation of business strategies (Hax and Wilde II, 2001). The structure of an industry describes the value created by the economic activity of its members as well as members' ability to benefit from the created wealth. In fact, an industry can create more value than its rivals, if it establishes suitable interactions with national entities and properly manages its internal affairs (Lumpkin and Dess, 2003). Porter (1979) believes that the structure of an industry consists of five forces, including the intensity of competition between competitors, threats of newcomers, threats of substitute products, bargaining power of customers (buyers), and the bargaining power of suppliers. These five forces determine the attractiveness and competitiveness of industries in competitive markets (Porter, 1979).

Enterprise competitiveness

Two different schools of thought, including technology-driven and competency-driven approaches, have emerged on competitiveness over the last two decades. Based on the competency-driven approach, companies identify and control their unique skills and competencies through internal and external consolidation. Based on the IT-driven approach, technology is the basis of competitiveness, efficiency, and strategic advantage. However, the basis of the competency-driven approach is the learning organisation, which emphasises its strengths to stay in the market through benchmarking, as well as effective anticipation and response to possible

changes (Booth and Philip, 1998). Another group of researchers has focused on the relationship between competitiveness and organisational performance. Scott (1989) defines competitiveness as the ability of an entity to increase its revenues as rapidly as its competitors and to gather necessary resources for future competitions (Scott, 1989). In a more comprehensive definition, Pace and Stephan (1996) define competitiveness as the ability of an organisation to stay in business, earn return on investment, guarantee the quality, efficiency, and future jobs, and respond effectively to various changes (Akimova, 2000; Pace and Stephan, 1996).

In today's dynamic world, new startups face many problems when competing against successful rivals. Examples of these problems include limited (financial, human, hardware, administrative, etc.) resources, lack of market credibility, inadequate information about the market, etc. (Baum and Silverman, 2004). Therefore, to overcome these limitations and increase their chances of defeating their established rivals, startups need to gain competitive advantages over these entities. Examples of the advantages of startups over large companies include operating faster, changing organisational structure more quickly (to achieve desired goals), and establishing more cordial relations between team members (Kim *et al*., 2018).

HPWSs and competitiveness

Competitiveness is a prerequisite for survival in today's changing world. Scholars have so far made no attempt to investigate the effect of HPWSs on competitiveness. However, Batool *et al*. (2017) investigated the relationship between HPWSs and competitive advantage. Since there is a linkage between competitive advantage and competitiveness (Batool *et al*., 2016; Bredrup, 1995), competitiveness and HPWSs are also expected to be associated with each other. A high-performance work system provides employees with a healthy work environment. It also respects employees and encourages them to make every effort to achieve organisational goals and improve organisational performance (Kellner *et al*., 2016). In other words, a HPWS promotes staff value, skills, and consequently leads to improvements in organisational performance (Zhang and Morris, 2014), financial performance (Huselid, 1995), employee performance (Zhu *et al*., 2013), and operational performance (Kintana *et al*., 2006). Higher organisational performance implies higher level of competitiveness (Hitchens *et al*., 2005). Hassan *et al*. (2013) have shown that HPWSs can increase the loyalty, financial efficiency, and performance of employees through proper evaluation, training, and empowerment programs (Hassan *et al*., 2013). The result is lower employee turnover, greater quality and productivity (Zhang and Morris, 2014), and higher competitiveness. In addition, by engaging employees in the decision-making and career development processes, organisations provide their staff with the opportunity to develop innovative ideas in

order to improve the organisation's competitive position, increase profits, increase sales volume (market share), increase organisation's credibility, and accelerate the fulfillment of customer needs (Yasir and Majid, 2020; Mahdi *et al*., 2014). The use of performance-based rewards also ensures the recruitment and retention of highly skilled employees, which in turn improves organisational performance (Obeidat *et al*., 2016; Delaney and Huselid, 1996) and competitiveness, because valuable employees will receive fair rewards for their sincere efforts. These systems also increase employees' sense of job security, as well as their performance quality and efficiency. Therefore, it can be concluded HPWS has a synergistic effect on competitive advantage (Oladapo and Onyeaso, 2013) and competitiveness of organisations. This synergistic effect of system components also makes it difficult for competitors to copy an organisation's technology (Peters, 2014).

The first secondary hypothesis: HPWSs affect the competitiveness of startups.

Innovation capability maturity and competitiveness

Innovation can be defined as the creation, development, and implementation of novel ideas to introduce new products, processes, and strategies, or to improve existing products, processes, and strategies (Pearce II and Michael, 2006; Baron and Tang, 2011; Lopez-Cabrales *et al*., 2009). The final goal of innovation is to achieve business success and lead the market (Katz, 2006). It enables organisations to effectively respond to the changing needs of customers and improve their competitiveness (Clark and Guy, 1998). According to Hamel (2006), there is no machine to turn complex inputs into innovation, but the right components must be rationally mixed to increase the chances of an innovation to occur. Rationality and probability management increase the speed and quality of services, which in turn lead to higher organisational competitiveness (Clark and Guy, 1998). These elements can act as the facilitators of innovation capability in organisations, which enable them to achieve their desired innovation outputs (Essmann, 2009). Many scientists have so far explored various ways of achieving business innovation (Zhao and Sun, 2016). However, most of them have focused on business models that aim to achieve innovation by examining beneficial combinations of technology, knowledge, and science (Apanasovich *et al*., 2017). Accordingly, companies must develop their innovation capabilities in order to become innovative (Shahriari *et al*., 2018). They should also develop comprehensive plans to provide their staff with continuous training on innovation (Lawson and Samson, 2001). Innovation capability describes a company's ability to make continuous innovations in order to respond to specific environmental changes (Olsson *et al*., 2010; Ukko *et al*., 2016). This ability promotes competitiveness and competitive position of organisations (Clark and Guy, 1998). Knowledge has been introduced as a major driver

of innovation which enables organisations to quickly deal with uncertainty and unexpected market needs (Thérin, 2003). Companies extensively interact with their partners to acquire external knowledge. They also try to discover internal knowledge by investing heavily in internal R&D activities. Besides these two types of knowledge, the innovation process can also lead to the significant processing of internal and external knowledge to generate new ideas. In particular, knowledge-based companies must rely on external relations and networks to enhance their knowledge domains for internal knowledge and to effectively develop products or services (Wu and Hu, 2018). With the expansion of this knowledge, companies can gain a better position among their business rivals (Clark and Guy, 1998).

The second secondary hypothesis: Innovation capability maturity affects competitiveness of startups.

HPWSs and innovation capability maturity

In today's dynamic environment, innovation is crucially important for companies to defeat their main competitors (Zhao, 2005). Several scholars have so far investigated the relationship between HPWSs and innovation (Fu *et al*., 2015; Shipton *et al*., 2005; Wei *et al*., 2011). The achieved level of maturity determines an organisation's ability to produce new ideas and generate innovations. The main purpose of an ICMM is to check how an organisation develops new ideas. New ideas require human thinking, rationality, and intelligence to assess market knowledge and appropriately manage probabilities (Lin *et al*., 2012; Natalicchio *et al*., 2017); thus, human resources and their participation are of particular importance. Shahriari *et al*. (2017) showed that a HPWS indirectly affects innovation through organisational learning. Therefore, human resource management practices can be considered as major determinants of innovative corporate behaviour (Shahriari *et al*., 2017).

Companies need creative employees to produce new ideas, develop innovative career development approaches, and improve management processes (Sheehan *et al*., 2014). In this respect, employee performance management and performance-based payment can influence the attitude, capacity, and behaviour of employees, increase their sense of job security, and accelerate the development of innovative approaches aimed at improving customer satisfaction (Haneda and Ito, 2018). Also, good decisions on the forms of cooperation or the choice of cooperating partners call for the necessary skills to realise business opportunities, the ability to take calculated risks and the ability to manage possibilities. So, collaborative decision making can lead to management of possibilities. Studies also show that HPWSs improve innovative knowledge, skills, and abilities of employees through developing their expertise (Shahriari *et al*., 2017; Shahriari and Mahmoudi-Mesineh, 2021).

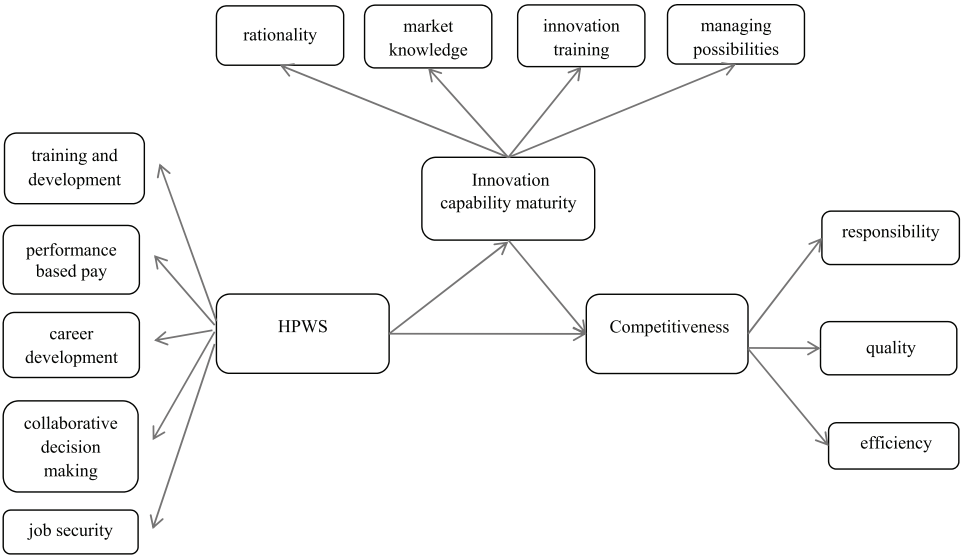

Fig. 1. Conceptual research model.

The third secondary hypothesis: HPWSs affect Innovation capability maturity of startups.

The main hypothesis: HPWSs affect the competitiveness of startups through the mediating role of innovation capability maturity.

The following conceptual research model has been designed based on the research hypotheses.

Research Method

This study aimed to investigate the effect of HPWSs on the competitiveness of startups mediated by innovation capability maturity. The study population consisted of all startups based in Isfahan Province ($N = 745$). According to Krejcie and Morgan's chart, the required number of 155 startups was randomly selected. More demographic information about the sample is shown in Table 1. To increase the accuracy of the results, 268 questionnaires were collected using cluster sampling. A 46-item questionnaire developed by Shahriari *et al*. (2017), Hill and Jones (2010), and Raffai and Szikszai (2014), was used to collect the data. The purpose of using this questionnaire was to measure the variables of HPWS, competitiveness, and innovation capability maturity. The obtained data were analysed by SmartPLS 2.0 and SPSS 22.

Data Analysis

Table 1. Descriptive statistics.

	Characteristics	Frequency	Percent
		Employees characteristics	
Age	Below 25	46	17.16%
	More than 25–40	185	69%
	More than 40	37	13.84%
Gender	Male	97	36.19%
	Female	171	63.81%
Education	Diploma and Under Diploma	5	2%
	Associate	11	4%
	Bachelor	91	34%
	Master	144	53.73%
	PhD	17	6.27%
Employee work experience	Below 1 year	70	26.11%
	More than 1–3 years	83	31%
	More than 3 years	115	42.89%
		Startup companies characteristics	
Field of company	Machinery & equipment	56	20.89%
	Power & electronics	19	7%
	Metal & mineral	26	9.7%
	Food & agriculture	28	10.45%
	Medical & pharmaceutical	16	2.23%
	Information Technology	83	30.97%
	Transportation	27	10.07%
	Other	13	8.69%
Company experience	1–5	123	45.9%
	More than 5–10	99	36.94%
	More than 10	46	17.16%
Number of employment	1–10	139	51.78%
	More than 10	129	48.13%

As mentioned, the structural equation method was used in the present study to test research hypotheses. Convergent validity, diagnostic validity, and reliability of the construct, as well as Cronbach's alpha, were used to calculate the internal consistency (reliability) of the questionnaire. After confirming the validity and

reliability of the data collection tools, the research model was fitted to test the research hypotheses.

Validity and reliability of research variables

The standard questionnaire was first translated into Persian, and necessary corrections were made based on expert opinions. The strength of the relationship between a latent variable and a manifest variable is determined using factor loading (range: 0–1). Factor loadings < 0.3 indicate a weak relationship; those between 0.3 and 0.6 are acceptable, and those ≥ 0.6 are highly desirable. As shown in Table 2, all factor loadings are greater than 0.5; thus, the research model has an acceptable reliability.

Table 2. Factor loadings and research variables.

	Question	Factor loading	*T*-Value		Question	Factor loading	*T*-Value
Training and development	q01	0.639	14.849		q24	0.867	69.356
	q02	0.865	48.096		q25	0.815	50.32
	q03	0.707	18.263	Efficiency	q26	0.774	18.982
	q04	0.907	74.617		q27	0.807	22.321
Performance based pay	q05	0.941	102.018		q28	0.846	30.003
	q06	0.807	36.365		q29	0.727	12.909
	q07	0.954	142.409	Market knowledge	q30	0.759	19.207
	q08	0.935	120.98		q31	0.899	53.758
Career development	q09	0.824	35.726		q32	0.644	11.514
	q10	0.776	31.985		q33	0.91	68.485
	q11	0.85	53.387	Innovation training	q34	0.894	67.169
Collaborative decision making	q12	0.67	16.593		q35	0.869	36.309
	q13	0.846	37.5	Managing possibilities	q36	0.701	14.314
	q14	0.716	19.556		q37	0.888	72.497
	q15	0.884	52.602		q38	0.732	18.104
Job security	q16	0.871	44.485		q39	0.699	15.918
	q17	0.883	46.902		q40	0.864	61.124
Responsibility	q18	0.941	100.938		q41	0.67	9.988
	q19	0.817	38.809		q42	0.764	21.496
	q20	0.955	139.942	Rationality	q43	0.676	2.024
	q21	0.93	98.179		q44	0.606	11.77
Quality	q22	0.847	49.634		q45	0.787	3.317
	q23	0.821	39.057		q46	0.795	3.126

Cronbach's alpha (acceptable value: > 0.7), composite reliability (acceptable value: > 0.7), and average variance extracted (AVE) (acceptable value: > 0.5) were also performed in SmartPLS to assess the reliability of the variables. Table 3 shows that the research variables have desirable reliability and convergent validity.

Cronbach's alpha coefficients of all variables are greater than 0.7; therefore, their reliability is confirmed. AVE values are also greater than 0.5, which indicates suitable convergent validity of all research variables.

Discriminant validity (Fornell–Larcker Criterion)

Discriminant (divergent) validity compares the indicators of one construct with those of other constructs existing in the research model. To calculate discriminant validity, a matrix is formed in which the values along the diagonal are the square root of the AVE values of the constructs, and the lower and upper values of the diagonal indicate the correlation between each construct and other constructs. This designed matrix is shown in Table 4.

Based on the above matrix, the square root of each AVE along the diagonal is greater than the correlation between its construct and other research constructs.

Findings

The relationship between the research variables in each hypothesis was tested using the partial least squares (PLS) technique. The measurement model (the relationship

Table 3. Reliability and convergent validity of research variables.

Variables	Cronbach's alpha	CR	AVE
Career development	0.752	0.858	0.668
Job security	0.700	0.870	0.769
Market knowledge	0.819	0.883	0.657
Managing possibilities	0.878	0.907	0.583
Collaborative decision making	0.784	0.863	0.615
Efficiency	0.798	0.869	0.624
Performance based pay	0.930	0.951	0.830
Quality	0.858	0.904	0.702
Rationality	0.704	0.810	0.519
Responsibility	0.931	0.952	0.832
Training and development	0.787	0.865	0.620
Innovation training	0.715	0.875	0.778

Table 4. Discriminant validity matrix.

	Career development	Job security	Market knowledge	Managing possibilities	Collaborative decision making	Efficiency	Performance based pay	Quality	Rationality	Responsibility	Training and development	Innovation training
Career development	0.817											
Job security	0.421	0.877										
Market knowledge	0.483	0.439	0.81									
Managing possibilities	0.451	0.246	0.25	0.764								
Collaborative decision making	0.368	0.53	0.289	0.25	0.784							
Efficiency	0.225	0.215	0.22	0.059	0.028	0.79						
Performance based pay	0.759	0.416	0.468	0.381	0.352	0.179	0.911					
Quality	0.483	0.232	0.387	0.379	0.183	0.23	0.411	0.838				
Rationality	0.15	−0.007	−0.029	0.228	0.127	0.096	0.167	0.168	0.721			
Responsibility	0.4	0.212	0.316	0.288	0.173	0.163	0.457	0.699	0.256	0.912		
Training and development	0.624	0.285	0.386	0.38	0.653	0.032	0.559	0.35	0.187	0.27	0.787	
Innovation training	0.499	0.607	0.591	0.279	0.275	0.299	0.478	0.403	−0.031	0.381	0.388	0.882

between the manifest and latent variables) and the path model (the relationship between the latent variables) are depicted in the general research model (Fig. 2). Bootstrapping was also used by calculating *t*-statistics to measure the significance of the path coefficients (Fig. 3).

- The first secondary hypothesis: HPWSs affect the competitiveness of startups.

According to Table 5, the variable of HPWS has a direct effect of 0.313 on competitiveness, and the respective *P*-value (2.460) is greater than 1.96 (the critical value of *t*-statistics at the 5% error level); therefore, the first secondary hypothesis is confirmed at 95% confidence level, and HPWSs have a significant positive effect on competitiveness.

- The second secondary hypothesis: Innovation capability maturity affects the competitiveness of startups.

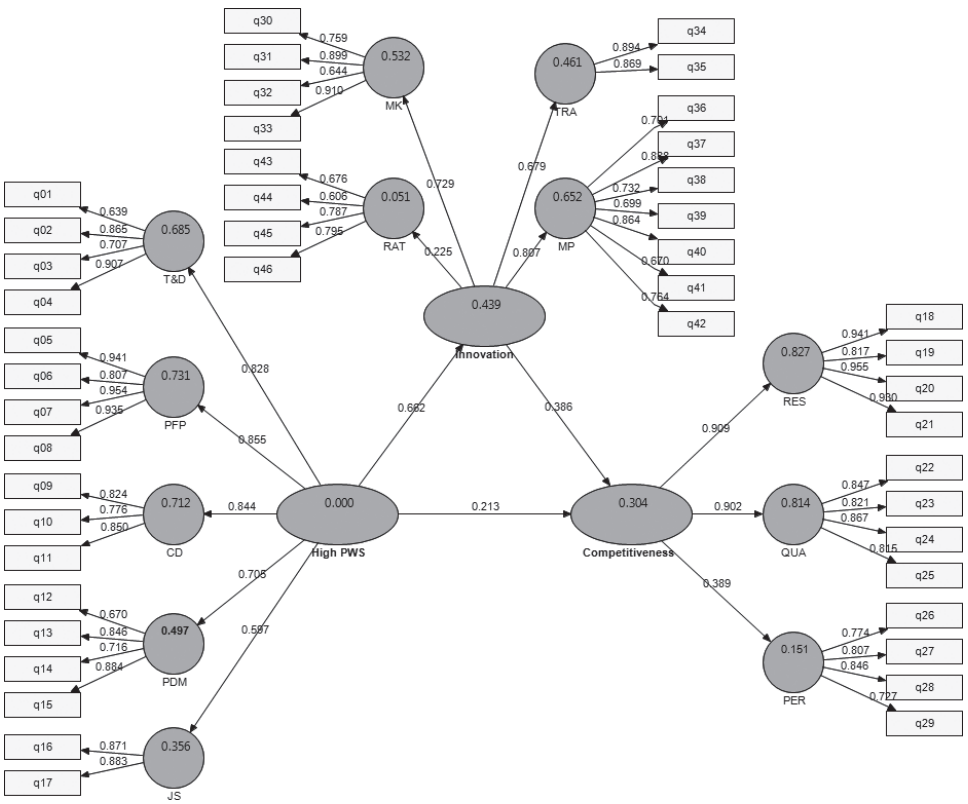

Fig. 2. PLS technique results.

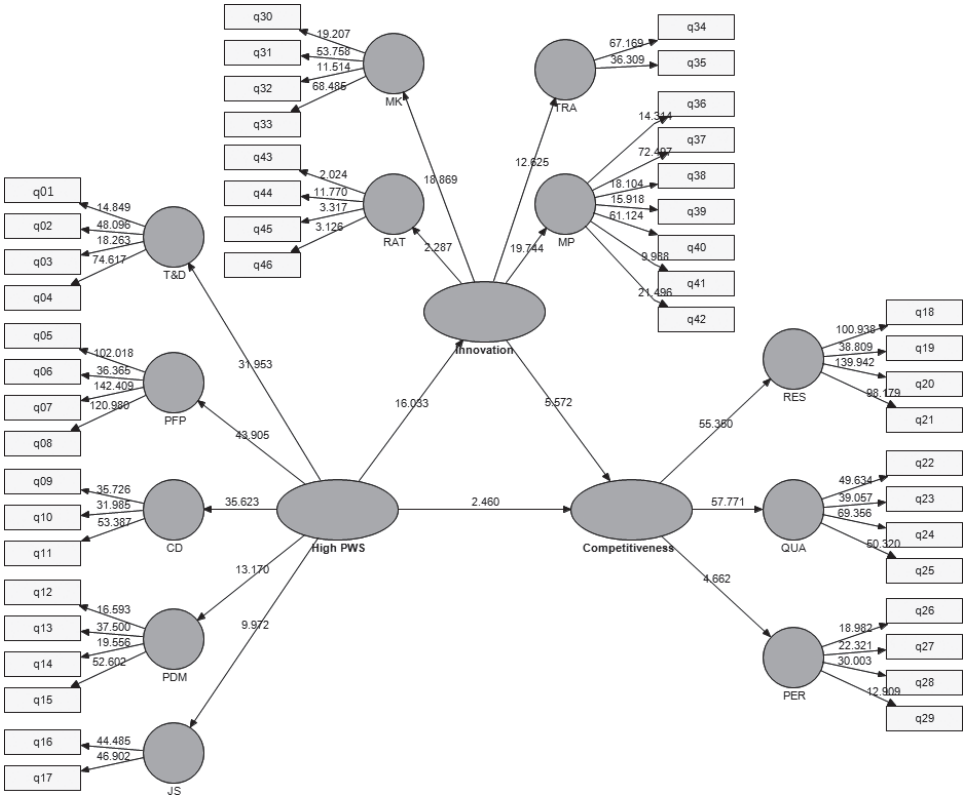

Fig. 3. Bootstrapping technique results.

According to Table 5, the variable of innovation capability maturity has an effect of 0.386 on competitiveness, and the respective *P*-value (5.572) is greater than 1.96; therefore, the third secondary hypothesis is confirmed at 95% confidence level, and innovation capability maturity has a significant positive effect on the competitiveness of startups.

- The third secondary hypothesis: HPWSs affect Innovation capability maturity of startups.

According to Table 5, the variable of HPWS has an effect of 0.662 on innovation capability maturity, and the respective *P*-value (16.033) is greater than 1.96; therefore, the second secondary hypothesis is confirmed at 95% confidence level, and HPWSs have a significant positive effect on innovation capability maturity.

- The main hypothesis: HPWSs affect the competitiveness of startups through the mediating role of innovation capability maturity.

Table 5. Path coefficients.

Direction	*T*-Value	Total effect
Competitiveness → efficiency	4.662	0.389
Competitiveness → quality	57.771	0.902
Competitiveness → responsibility	55.350	0.909
hpws → career development	35.623	0.844
hpws → job security	9.972	0.597
hpws → collaborative decision making	13.170	0.705
hpws → performance based pay	43.905	0.855
hpws → training and development	31.953	0.828
Innovation capability maturity → market knowledge	18.869	0.729
Innovation capability maturity → managing possibilities	19.744	0.807
Innovation capability maturity → rationality	2.287	0.225
Innovation capability maturity → innovation training	12.625	0.679
hpws → innovation capability maturity	16.033	0.662
hpws → rationality	2.258	0.149
hpws → market knowledge	11.192	0.483
hpws → managing possibilities	11.453	0.535
hpws → innovation training	8.787	0.450
hpws → competitiveness	7.448	0.469
hpws → efficiency	3.610	0.182
hpws → responsibility	7.401	0.427
hpws → quality	7.343	0.423
Innovation capability maturity → competitiveness	5.572	0.386
Innovation capability maturity → efficiency	3.745	0.150
Innovation capability maturity → quality	5.420	0.348
Innovation capability maturity → responsibility	5.442	0.351

To confirm the role of the mediating variable, there must be a significant direct path between the independent and dependent variables, and the respective secondary path should also be significant.

Direct path:
HPWS has a direct effect of 0.213 on competitiveness, and the respective *P*-value (2.460) is greater than 1.96; therefore, the observed effect is significant.

Secondary path:
(1) HPWS has an effect of 0.662 on innovation capability maturity, and the respective *P*-value (16.033) is greater than 1.96; therefore, the observed effect is significant.

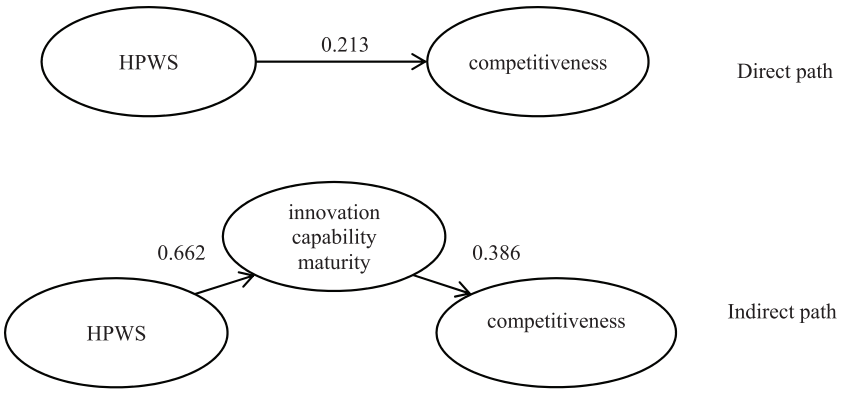

Fig. 4. Total effect result.

(2) Innovation capability maturity has an effect of 0.386 on competitiveness, and the respective *P*-value (5.572) is greater than 1.96; therefore, the observed effect is significant.

Figure 4 shows the total effect of HPWS on competitiveness at the presence of the mediating variable.

Thus;

Indirect Effect = $0.662 \times 0.386 = 0.255$,
Direct Effect = 0.213,
Total Effect = $0.213 + (0.662 \times 0.386) = 0.469$.

Since the indirect effect is greater than the direct effect of HPWS on competitiveness, it is concluded that HPWS has a significant indirect effect on competitiveness through the mediating role of innovation capability maturity.

As shown in Table 5, HPWS has a total effect of 0.469 on competitiveness through the mediating role of innovation capability maturity, and the respective *P*-value (7.448) is greater than 2.58 (the critical value of *t*-statistics at the 1% error level); therefore, the main hypothesis is confirmed at 99% confidence level, and HPWSs significantly affect the competitiveness of startups through the mediating role of innovation capability maturity.

Discussion

To eliminate competitive threats, innovation is widely recognised as a key factor for success in economic development and competition between companies in various countries. In fact, the competitiveness and survival of the modern enterprise

are reliant on its ability to innovate, providing a strong argument that innovation should not be apportioned to only the final levels of organisational maturity (Hall and Vredenburg, 2004; Esterhuizen *et al*., 2011). In this paper, the authors tried to investigate the interaction between the use of HPWSs in startups and their innovation capabilities and competitiveness. The results showed that high-performance work systems have a positive and significant impact on the competitiveness of the studied startups through the mediating role of innovation capability maturity and about 47% of the total effect of the high-performance work system on competitiveness of them is explained indirectly by the mediating variable of innovation capability maturity. The first hypothesis of study was confirmed that the impact of HPWS on innovation capability maturity in startups in developing countries is strongly emphasised. Previous studies show that HPWSs improve innovative knowledge, skills, and abilities of employees through developing their expertise (Shahriari *et al*., 2017; Shahriari and Mahmoudi-Mesineh, 2021). These abilities are drivers for enhancing the innovation capability maturity of an organisation. By developing human resources, HPWSs prepare the ground for the emergence of new ideas and innovations. In light of the assumptions of the dynamic capabilities concept, internal resources and competencies are insufficient to achieve a competitive advantage. They only create the innovative potential necessary to create innovative solutions (Brzeziński, Stanisławski, 2013). This potential affects the innovation capability, but it is not the only factor influencing innovative changes introduced in organisations. Several scholars (e.g., Shahriari *et al*., 2018; Wei *et al*., 2011; Fu *et al*., 2015) have investigated the effect of HPWSs on innovation but the effect of HPWSs on innovation capability maturity has not been explored so far. In this study, this hypothesis was tested in Iranian startups and the results were consistent with the literature. Furthermore, innovation increases an organisation's ability to respond more quickly and efficiently to the dynamic needs of customers, as well as their ability to survive in today's competitive environment. Many researchers (e.g., Clark and Guy, 1998; Zhao and Sun, 2016) have investigated the effect of innovation on competitiveness. This hypothesis was also tested in the present study as the second hypothesis and the results were in line with the findings of previous studies. Considering the relationship between HPWSs and innovation capability maturity, and the relationship between innovation capability maturity and organisational competitiveness, the authors also investigated the relationship between HPWSs and competitiveness as the third hypothesis. The results were in line with the findings of previous studies. By employing high performance work systems as an efficient human resource system, we can expect higher competitiveness through its striking impacts on efficiency of employees and promoting their innovation capabilities.

This was the first study to test and confirm this hypothesis in Iranian startups. Finally, the authors confirmed the validity of the final model.

Conclusion

In this paper, the impact of HPWSs on innovation strategy of knowledge-based Iranian companies was investigated with mediating role of entrepreneurial orientation for the first time. The results showed that high-performance work systems have a positive and significant impact on the competitiveness of the studied startups through the mediating role of innovation capability maturity. The present findings can help startup managers move towards success by creating competitive advantage and securing their position among serious competitors. The following suggestions are provided for various businesses, including startups, to benefit from high-performance work systems. In order to properly establish a HPWS, the management must focus on developing creative abilities through extensive job training, ICT-based training, etc. Performance-based reward systems can also motivate employees and encourage them to achieve higher levels of performance. In addition, employee incentive systems can improve employee performance by encouraging them to produce novel organisational development ideas. Management should also empower and motivate employees through decentralisation of power at the highest levels, participatory decision-making, and effective feedback systems. These measures will create a sense of belonging to the organisation in employees and will lead to higher employee performance. Gradual promotion of the culture of knowledge also helps organisations increase their employees' competencies. The aforementioned measures would lead to continuous performance improvement, greater organisational performance, and higher competitive position. Startups are expected to increase their chances of success and improve their competitiveness through adopting these suggestions, establishing high-performance work systems, and increasing their innovation capabilities.

The existence of potentially inaccurate or careless responses to the questionnaire items, and restriction of the study population to certain businesses based in a specific area (Isfahan, Iran) were among the limitations of this study. Therefore, researchers are suggested to test the aforementioned hypotheses in other countries with different cultural, economic, and social conditions. In addition, a larger sample of people with higher levels of expertise can be studied in the future to increase the accuracy of data.

References

Akimova, I. (2000). Development of market orientation and competitiveness of Ukrainian firms. *European Journal of Marketing*, 34(9–10), 1128–1148.

Apanasovich, N, H Alcalde-Heras and MD Parrilli (2017). A new approach to business innovation modes: The 'Research, Technology and Human Resource Management

(RTH) model' in the ICT sector in Belarus. *European Planning Studies*, 25, 1976–2000.

Armstrong, CE (2013). Competence or flexibility? Survival and growth implications of competitive strategy preferences among small US businesses. *Journal of Strategy and Management*, 6(4), 377–398.

Arthur, JB (1994). Effects of human resource systems on manufacturing performance and turnover. *Academy of Management Journal*, 37, 670–687.

Baron, RA and J Tang (2011). The role of entrepreneurs in firm-level innovation: Joint effects of positive affect, creativity, and environmental dynamism. *Journal of Business Venturing*, 26, 49–60.

Bashir, M, L Jianqiao, F Ghazanfar and M Abrar (2012). The effect of perception of existence of HPWS on employee's organizational commitment: A test of social exchange relationship and contingency perspective to implement HPWS in universities of China and Pakistan. *Advances in Asian Social Science*, 1, 87–98.

Batool, S, S Rahman and N Akhtar (2016). Relationship of management-rated high performance work system and competitive advantage: Mediating role of collective human capital. *Abasyn University Journal of Social Sciences*, 9, 176–188.

Baum, JA and BS Silverman (2004). Picking winners or building them? Alliance, intellectual, and human capital as selection criteria in venture financing and performance of biotechnology startups. *Journal of Business Venturing*, 19, 411–436.

Baumol, W and R Strom (2007). Entrepreneurship and economic growth. *Strategic Entrepreneurship Journal*, 1(3–4), 233–237.

Baumol, WJ, RE Litan and CJ Schramm (2007). *Good Capitalism, Bad Capitalism, and the Economics of Growth and Prosperity*. New Haven: Yale University Press.

Bendickson, J, J Muldoon, E Liguori and C Midgett (2017). High performance work systems: A necessity for startups. *Journal of Small Business Strategy*, 27(2), 1–12.

Booth, ME and G Philip (1998). Technology, competencies, and competitiveness: The case for reconfigurable and flexible strategies. *Journal of Business Research*, 41, 29–40.

Boxall, P., Purcell, J., & Wright, P. (2008). Scope, analysis, and significance. *The Oxford handbook of human resource management*.

Bredrup, H. (1995). Competitiveness and competitive advantage. In *Performance Management* (pp. 43–60). Springer, Dordrecht.

Buckley, PJ, CL Pass and K Prescott (1988). Measures of international competitiveness: A critical survey. *Journal of Marketing Management*, 4, 175–200.

Carvalho, VS and MJ Chambel (2016). Perceived high-performance work systems and subjective well-being: Work-to-family balance and well-being at work as mediators. *Journal of Career Development*, 43, 116–129.

Christensen, CM (2013). *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail*. Haravrd: Harvard Business Review Press.

Chuang, CH and H Liao (2010). Strategic human resource management in service context: Taking care of business by taking care of employees and customers. *Personnel Psychology*, 63, 153–196.

Clark, J and K Guy (1998). Innovation and competitiveness: A review: Practitioners' forum. *Technology Analysis & Strategic Management*, 10, 363–395.

Combs, J, Y Liu, A Hall and D Ketchen (2006). How much do high-performance work practices matter? A meta-analysis of their effects on organizational performance. *Personnel Psychology*, 59, 501–528.

Criscuolo, P, N Nicolaou and A Salter (2012). The elixir (or burden) of youth? Exploring differences in innovation between start-ups and established firms. *Research Policy*, 41, 319–333.

Crossan, MM and M Apaydin (2010). A multi-dimensional framework of organizational innovation: A systematic review of the literature. *Journal of Management Studies*, 47, 1154–1191.

Dalmarco, G, AE Maehler, M Trevisan and JM Schiavini (2017). The use of knowledge management practices by Brazilian startup companies. *RAI Revista de Administração e Inovação*, 14, 226–234.

Damanpour, F and M Schneider (2006). Phases of the adoption of innovation in organisations: Effects of environment, organization and top managers 1. *British Journal of Management*, 17, 215–236.

Delaney, JT and MA Huselid (1996). The impact of human resource management practices on perceptions of organizational performance. *Academy of Management Journal*, 39, 949–969.

Dell'Aringa, C, P Ghinetti and C Lucifora (2003). High performance work systems, industrial relations and pay settings in Europe. Institute of the Economics of the Enterprise and of Work, Catholic Sacred Heart University, Milan.

Drummond, I and I Stone (2007). Exploring the potential of high performance work systems in SMEs. *Employee Relations*, 29(2), 192–207.

Essmann, HE (2009). *Toward Innovation Capability Maturity*. Stellenbosch: University of Stellenbosch.

Esterhuizen, D, C Schutte and A Du Toit (2011). Enhancing innovation capability maturity through knowledge conversion. *Acta Commercii*, 11, 211–231.

Fu, N, PC Flood, J Bosak, T Morris and P O'Regan (2015). How do high performance work systems influence organizational innovation in professional service firms? *Employee Relations*, 37(2), 209–231.

Gloet, M and D Samson (2016). Knowledge management and systematic innovation capability. *International Journal of Knowledge Management (IJKM)*, 12, 54–72.

Guan, J and N Ma (2003). Innovative capability and export performance of Chinese firms. *Technovation*, 23, 737–747.

Guest, DE (2011). Human resource management and performance: Still searching for some answers. *Human Resource Management Journal*, 21, 3–13.

Hall, J and H Vredenburg (2004). *Introduction: Sustainable Development Innovation and Competitive Advantage: Implications for Business, Policy and Management Education*. Routledge: Taylor & Francis.

Haneda, S and K Ito (2018). Organizational and human resource management and innovation: Which management practices are linked to product and/or process innovation? *Research Policy*, 47, 194–208.

Hassan, MU, MS Nawaz, G Abbas and MI Sajid (2013). Impact of high performance work practices on employee loyalty and financial performance through mediation of employee satisfaction: An empirical evidence from the financial sector of Pakistan. *Middle-East Journal of Scientific Research*, 16, 1037–1046.

Hax, A and D Wilde II (2001). The Delta Model—discovering new sources of profitability in a networked economy. *European Management Journal*, 19, 379–391.

Hitchens, D, S Thankappan, M Trainor, J Clausen and B De Marchi (2005). Environmental performance, competitiveness and management of small businesses in Europe. *Tijdschrift Voor Economische en Sociale Geografie*, 96, 541–557.

Huselid, MA (1995). The impact of human resource management practices on turnover, productivity, and corporate financial performance. *Academy of Management Journal*, 38, 635–672.

Ibge, IBDGEE (2013). *Pesquisa Deinova¸Cão Tecnológica*. Rio de Janeiro: IBGE.

Jensen, JM, PC Patel and JG Messersmith (2013). High-performance work systems and job control: Consequences for anxiety, role overload, and turnover intentions. *Journal of Management*, 39, 1699–1724.

Jyoti, J and A Rani (2017). High performance work system and organisational performance: Role of knowledge management. *Personnel Review*, 46(8), 1770–1795

Katz, A (2006). The potential demise of another natural monopoly: New technologies and the administration of performing rights. *Journal of Competition Law and Economics*, 2, 245–284.

Keegan, WJ (2017). *Global Marketing Management*. Pearson India.

Kellner, A, K Townsend, A Wilkinson, D Greenfield and S Lawrence (2016). The message and the messenger. *Personnel Review*, 45(6), 1240–1258.

Kim, B, H Kim and Y Jeon (2018). Critical success factors of a design startup business. *Sustainability*, 10, 2981.

Kintana, ML, AU Alonso and CG Olaverri (2006). High-performance work systems and firms' operational performance: The moderating role of technology. *The International Journal of Human Resource Management*, 17, 70–85.

Knoke, B (2013). A short paper on innovation capability maturity within collaborations. NGEBIS Short Papers, pp. 7–11.

Laforet, S (2011). A framework of organisational innovation and outcomes in SMEs. *International Journal of Entrepreneurial Behavior & Research*, 17(4), 380–408.

Lawson, B and D Samson (2001). Developing innovation capability in organisations: A dynamic capabilities approach. *International Journal of Innovation Management*, 5, 377–400.

Lin, RJ, RH Che and CY Ting (2012). Turning knowledge management into innovation in the hightech industry. *Industrial Management & Data Systems*, 112(1), 42–63.

Liu, S-S, T-T Liu and X-Y Liu (2007). Study on the relationship between human resource management system and organizational performance of high-tech company. *Studies in Science of Science*, 25(4), 764–771.

López-Nicolás, C and ÁL Meroño-Cerdán (2011). Strategic knowledge management, innovation and performance. *International Journal of Information Management*, 31, 502–509.

Lopez-Cabrales, A, A Pérez-Luño and RV Cabrera (2009). Knowledge as a mediator between HRM practices and innovative activity. *Human Resource Management: Published in Cooperation with the School of Business Administration, The University of Michigan and in alliance with the Society of Human Resources Management*, 48, 485–503.

Lumpkin, D and G Dess (2003). *Dirección Estratégica*. España: Editorial McGraw-Hill.

Macduffie, JP (1995). Human resource bundles and manufacturing performance: Organizational logic and flexible production systems in the world auto industry. *Ilr Review*, 48, 197–221.

Macky, K and P Boxall (2007). The relationship between 'high-performance work practices' and employee attitudes: An investigation of additive and interaction effects. *The International Journal of Human Resource Management*, 18, 537–567.

Mahdi, SM, J Liao, S Muhammad and H Nader (2014). The impact of high performance work system (HPWS) on employee productivity as related to organizational identity and job engagement. *European Journal of Business and Management*, 6, 1–24.

Mazzarol, T, T Volery, N Doss and V Thein (1999). Factors influencing small business start-ups. *International Journal of Entrepreneurial Behavior & Research*, 5(2), 48–93.

Mcshane, SL and MA Von Glinow (2015). *Organizational Behavior 7/e*. New York: McGraw-Hill Education.

Menzler–Hokkanen, L (1995). Multinational enterprises and technology transfer. *International Journal of Technology Management*, 10, 293–310.

Mihail, DM and PV Kloutsiniotis (2016). The effects of high-performance work systems on hospital employees' work-related well-being: Evidence from Greece. *European Management Journal*, 34, 424–438.

Momaya, K and A Ajitabh (2005). Technology management and competitiveness: Is there any relationship? *International Journal of Technology Transfer and Commercialisation*, 4, 518–524.

Moon, HC, AM Rugman and A Verbeke (1998). A generalized double diamond approach to the global competitiveness of Korea and Singapore. *International Business Review*, 7, 135–150.

Natalicchio, A, L Ardito, T Savino and V Albino (2017). Managing knowledge assets for open innovation: A systematic literature review. *Journal of Knowledge Management*, 21(6), 1362–1383.

Obeidat, SM, R Mitchell and M Bray (2016). The link between high performance work practices and organizational performance. *Employee Relations*, 38(4), 578–595.

Oladapo, V and G Onyeaso (2013). An empirical investigation of sub dimensions of high performance work systems that predict organizational innovation. *International Journal of Management and Marketing Research*, 6, 67–79.

Olsson, A, C Wadell, P Odenrick and MN Bergendahl (2010). An action learning method for increased innovation capability in organisations. *Action Learning: Research and Practice*, 7, 167–179.

Pace, RW and EG Stephan (1996). Paradigms of competitiveness. Competitiveness Review: *An International Business Journal*, 6(1), 8–13.

Parrilli, MD and A Elola (2012). The strength of science and technology drivers for SME innovation. *Small Business Economics*, 39, 897–907.

Pearce II, JA and SC Michael (2006). Strategies to prevent economic recessions from causing business failure. *Business Horizons*, 49, 201–209.

Peters, M (2014). Perceptions of innovation focused HRM and its impact on employee outcomes and organizational innovation in technology firms. University of Twente.

Porter, M (1979). How competitive forces shape strategy. *Harvard Business Review*, 57, 137–145.

Porter, ME (1990). *The Competitive Advantage of Nations: With a New Introduction*. Free Pr.

Porter, ME and VE Millar (1985). How information gives you competitive advantage. Harvard Business Review Reprint Service.

Posthuma, RA, MC Campion, M Masimova and MA Campion (2013). A high performance work practices taxonomy: Integrating the literature and directing future research. *Journal of Management*, 39, 1184–1220.

Rugman, AM and JR D'Cruz (1993). The "double diamond" model of international competitiveness: The Canadian experience. *MIR: Management International Review*, 17–39.

Sanders, K, H Yang and X Li (2019). Quality enhancement or cost reduction? The influence of high-performance work systems and power distance orientation on employee human resource attributions. *The International Journal of Human Resource Management*, 1–28.

Scott, B. R. (1989). Competitiveness: self-help for a worsening problem. *Harvard Business Revie*w, 67(4), 115-121

Shahriari, M and SM Allameh (2020). Organizational culture and organizational learning: Does high performance work systems mediate? *Journal of Workplace Learning*, 32, 583–597.

Shahriari, M, M Abzari, AN Isfahani and M Kianpour (2018). The effect of high performance work systems on radical innovation in knowledge-based companies through moderating role of innovation capabilities. *International Journal of Business Excellence*, 16, 269–285.

Shahriari, M, M Abzari, A Nasr Isfahani and M Kianpour (2017). Learning, innovation and high performance in knowledge-based firms. *Human Systems Management*, 36, 285–295.

Shahriari, M and M Mahmoudi-Mesineh (2021). High-performance work systems, entrepreneurial orientation, and innovation strategy in developing countries. *International Journal of Innovation Management*, 2150090.

Sheehan, M, TN Garavan and R Carbery (2014). Innovation and human resource development (HRD). *European Journal of Training and Development*, 38(1–2), 2–14.

Shipton, H, D Fay, M West, M Patterson and K Birdi (2005). Managing people to promote innovation. *Creativity and Innovation Management*, 14, 118–128.

Slater, SF, GTM Hult and EM Olson (2010). Factors influencing the relative importance of marketing strategy creativity and marketing strategy implementation effectiveness. *Industrial Marketing Management*, 39, 551–559.

Spender, J-C, V Corvello, M Grimaldi and P Rippa (2017). Startups and open innovation: A review of the literature. *European Journal of Innovation Management*, 20(1), 4–30.

Švárová, M and J Vrchota (2014). Influence of competitive advantage on formulation business strategy. *Procedia Economics and Finance*, 12, 687–694.

Takeuchi, R, DP Lepak, H Wang and K Takeuchi (2007). An empirical examination of the mechanisms mediating between high-performance work systems and the performance of Japanese organisations. *Journal of Applied Psychology*, 92, 1069.

Thérin, F (2003). Learning, strategy and innovation: A literature review and research proposal. *Innovation*, 5, 79–85.

Triebel, C, C Schikora, R Graske and S Sopper (2018). Failure in startup companies: Why failure is a part of founding. In *Strategies in Failure Management*. New York: Springer, Cham, 121–140.

Tsai, C-J (2006). High performance work systems and organizational performance: An empirical study of Taiwan's semiconductor design firms. *The International Journal of Human Resource Management*, 17, 1512–1530.

Tsai, M-T and Y-H Li (2007). Knowledge creation process in new venture strategy and performance. *Journal of Business Research*, 60, 371–381.

Ukko, J, M Saunila, S Parjanen, T Rantala, J Salminen, S Pekkola and M Mäkimattila (2016). Effectiveness of innovation capability development methods. *Innovation*, 18, 513–535.

van Lancker, J, E Wauters and G van Huylenbroeck (2016). Managing innovation in the bioeconomy: An open innovation perspective. *Biomass and Bioenergy*, 90, 60–69.

Velucchi, M and A Viviani (2007). Firm's survival and competitiveness: A case study in Tuscany. *Statistica Applicata*, 19, 325–342.

Webster, FE (2002). *Market-driven Management: How to Define, Develop, and Deliver Customer Value*. New York: John Wiley & Sons.

Wei, L-Q, J Liu and NC Herndon (2011). SHRM and product innovation: Testing the moderating effects of organizational culture and structure in Chinese firms. *The International Journal of Human Resource Management*, 22, 19–33.

Wood, S (1999). Human resource management and performance. *International Journal of Management Reviews*, 1, 367–413.

Wu, L and Y-P Hu (2018). Open innovation based knowledge management implementation: A mediating role of knowledge management design. *Journal of Knowledge Management*, 22(8), 1736–1756.

Yang, S and C Tu (2020). Capital and new product quality in high-tech startups—an examination in two environmental contexts. *Innovation*, 22, 39–55.

Yasir, M and A Majid (2020). High-involvement HRM practices and innovative work behavior among production-line workers: Mediating role of employee's functional flexibility. *Employee Relations: The International Journal*.

Yazid, Z. N. A., Yahya, W. K., Ishak, M., & Achim, N. (2017). High performance work system (HPWS) and organizational performance: the mediating role of employee attitude. In *Intervarsities Multidisciplinary International Conference 2017 (IMICO 2017)*.

Zacharatos, A, J Barling and RD Iverson (2005). High-performance work systems and occupational safety. *Journal of Applied Psychology*, 90, 77.

Zanakis, SH and I Becerra-Fernandez (2005). Competitiveness of nations: A knowledge discovery examination. *European Journal of Operational Research*, 166, 185–211.

Zhang, B and JL Morris (2014). High-performance work systems and organizational performance: Testing the mediation role of employee outcomes using evidence from PR China. *The International Journal of Human Resource Management*, 25, 68–90.

Zhao, F (2005). Exploring the synergy between entrepreneurship and innovation. *International Journal of Entrepreneurial Behavior & Research*, 11(1), 25–41.

Zhao, X and B Sun (2016). The influence of Chinese environmental regulation on corporation innovation and competitiveness. *Journal of Cleaner Production*, 112, 1528–1536.

Zhu, X, H Zhou and L Kong (2013). Effects of high performance work systems on employee performance: Psychological contract breach as mediator. *International Academic Workshop on Social Science* (IAW-SC-13), 2013. Atlantis Press.