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Acronyms and Abbreviations

COP	Community of practice
KBO	Knowledge-based organisation
KIF	Knowledge-intensive firm
KIO	Knowledge-intensive organisation
KM	Knowledge management
KS	Knowledge structure
LLL	Lifelong learning
SEWP	Self employed without personnel
SPSS	Statistical package for the social sciences

Introduction

The past decades have brought major changes to our modern society. Globalization, Europeanization, secularization, individualization, commercialization, flexibilization, rapid technological developments; these are but examples of a range of well known concepts that are repeatedly being used. Literature mentions a range of terms that reveal different points of view on society's status, amongst others the post-industrial society (Bell, 1976), risk society (Cohen, 1997), the information society (Masuda, 1980), the post-modern society (Kumar, 2009), and the network society (Castells, 2011). In addition, a variety of conceptions of our century's economy exist, including the service economy (Buera & Kaboski, 2009) and the knowledge economy (Cooke & Leydesdorff, 2006) or knowledge-based economy (Cooke & Leydesdorff, 2006; David & Foray, 2002).

Next to the literature on definitions and conceptions of today's society, many other books and articles have been published, describing societal developments on topics such as technology, family structures, governmental operations, work relations and work forms. New work forms have come into existence and have expanded. As Wallace (2003) points out, "flexibility is often attributed to the extent of de-regulation or 'a-typical' work". Examples of these new work forms characterized by flexibility are part-time contracts, short-term contracts, or self-employment. One group that scores high in terms of flexibility and which is growing substantially is the group of self employed without personnel (**SEWP**s). In 1996 the number of SEWPs was nearly 400 thousand in the Netherlands; by the end of 2014 this number exceeded 800 thousand, approaching 12% of the labour force (CBS StatLine, 2015).

This rather undefined group that lies somewhere in between employers and employees and is forming less and less an exception on the labour market inspires the emergence of questions concerning for instance the responsibilities, obligations and rights of both employers and employees. Moreover, SEWPs incite discussions on the nature and future of work; what is understood as work, where and when to work, and how to secure your position on the labour market? As both the economy and the nature of work are changing, the demands that workers are faced with subsequently change too. For the present master thesis the concept of a knowledge-based economy will be taken as a starting point. What exactly is knowledge and what is a knowledge-based economy? What is the role of knowledge in such an economy and how does it relate to work? How do SEWPs cope with our 21st century knowledge-based economy and the demands that follow from this?

As Kefela (2010) points out, rapid technological developments demand skilled labour across a variety of sectors and intellectual capital has increased as a major economic asset. Moreover, the emergence of a knowledge-based economy has led to a renewed version of workplace literacy, leading to changing relationships between employers and employees. "The traditional pledge where employees expect a stable or lifelong employment will no longer apply" (p. 68). SEWPs, forming a pre-eminent group for representing changing employer-employee relationships, having to secure their own employment, thus form an excellent basis for a discussion on work in a knowledge-based economy. The question that presents itself here is how SEWPs manage to function sustainably in this economy.

Theory

Research by Åstebro, Chen and Thompson (2011) indicates that people with a history of unemployment or job hopping (across both employers and occupations) are more likely to become self employed, and people who experience a mismatch in terms of skills and level of education needed for the job are even more so. There appear to be two gross groups of SEWPs: those that feel 'pushed' into becoming an SEWP as a result of a mismatch between supply and demand in the aftermath of the economic crisis, and those who were unhappy as a wage worker and experienced organisational rigmarole to limit development of creativity and talent (KIZO, 2014). This information provides an insight in people's motivation and predictors for becoming self employed. Yet, many SEWPs return to being a wage worker (Posthumus & Wilthagen, 2010), for which low success levels can be seen as one cause. Several studies have been performed in order to research what determines entrepreneurial success (e.g. Zhao, Seibert & Lumpkin, 2010; Baum & Locke, 2004). Most focus on 'entrepreneurial' or personality traits, though not only are personality traits found to be stable and uninfluenced by employment-related events, they are insignificant for economic decisions and achieved outcomes (Cobb-Clark & Schurer, 2012). The present research focuses on investigating the role that knowledge plays for SEWPs' success; something for which it is assumed a person can exercise more influence on by making conscious choices.

This part will contain a short discussion of the literature and theories that will be used in the present master thesis to form a sound theoretical basis for the research on SEWPs in a knowledge-based economy. This discussion will exist of several 'layers' of literature, moving from the general to the specific. First, literature (re)defining, discussing and categorizing knowledge will be presented. Next, today's relevance of knowledge will be discussed at the level of the economy, organizations and individual workers (especially SEWPs). Subsequently, knowledge acquisition will be considered, including the role of lifelong learning (LLL), formal and informal learning methods, and social networks. Throughout the chapter a link to the position of the SEWP will be made, eventually leading to the formulation of hypotheses and a more specific research question.

1 Conceptualising Knowledge

For extensively using a concept a thorough understanding of that concept is needed. Therefore an attempt is made at providing a far-reaching explanation of knowledge as a concept in this first paragraph. The definition of knowledge is elaborated on first, a clarification of knowledge is provided by categorization thereafter, creating a description which is both abstract and practical in order to make it more suitable for application.

1.1 What is Knowledge?

The organisation of knowledge according to principles may vary widely from one domain to another, and perhaps a universal knowledge system, consisting of a set of rules and regulations on which to build all knowledge on does not exist (Schank & Abelson, 2013). For this reason, 'What is knowledge?' is a complicated and rather philosophical question, with many plausible answers.

Although it might be impossible to generate a universally accepted answer, it is possible to assemble and summarize theories on knowledge into a coherent understanding and explanation of the concept. An attempt at this will follow below.

What becomes clear from reviewing literature dealing with 'knowledge' as a concept, is that authors often attribute a meaning to the concept not in isolation but in combination with another term. Examples of this are "Knowledge Structure (KS) level" (Schank & Abelson, 2013), "scientific knowledge" (Popper, 2014; Knorr-Cetina, 1981), and "personal knowledge" (Polanyi, 2012). Schank and Abelson (2013) deal with knowledge at a "*Knowledge Structure (**KS**) level*" (p. 4): a conceptual unit "concerned with the intentional and contextual connections between events, especially as they occur in human purposive action sequences" (p. 4). They integrate the fields of psychology and artificial intelligence, focussing on "verbally expressible knowledge" (p. 5), thereby linking knowledge to linguistics. In this form, knowledge is related to semantics, the decoding of language and memory.

Popper's (2014) 'falsification theory' is build upon his ideas concerning knowledge progress: the development and growth of '*scientific knowledge*'. The continuous process of searching for better solutions to our problems, and accompanying constant refutation of theories is what takes us closer to the truth. This is how people learn from their mistakes, resulting into knowledge progress. Knorr-Cetina (2013) too discusses 'scientific knowledge' and like Popper (2014) is sceptic about the extent to which it can be assumed to represent reality. However unlike Popper, Knorr-Cetina does not state that what is perceived as 'knowledge' represents what comes closest to our perceptions of the reality at that moment, but that it is a construction of things that *are*. In contrast to the dominant idea of consisting of pre-existing facts, knowledge is much more fabricated, according to Knorr-Cetina.

Polanyi (2012) rejects the ideal of knowledge being scientifically detached and argues for a modification of the concept of knowing into something that requires skill. He argues "skilful knowing and doing is performed by subordinating a set of particulars, as clues or tools, to the shaping of a skilful achievement, whether practical or theoretical". Consequently, '*personal knowledge*' involves the idea that understanding is intrinsically linked to personal participation; this does however not make understanding subjective. Khine (2008) focuses on individuals' active role too by discussing '*personal epistemology*': what individuals think validates as knowledge and how it takes form, how knowledge can be acquired, and how it is constructed and can be evaluated. He repeatedly underlines the role of culture for personal epistemology; it plays a highly determining role in individuals' approach to knowledge and eventually on the way that they learn.

Wang and Noe (2009) and David and Foray (2002) make use of another strategy for explaining 'knowledge': differentiating it from another concept, in this case information. Wang and Noe found existing literature shows no consensus on the distinction between *knowledge* and *information*. Sometimes knowledge is described as information that is justified by one's belief. They define knowledge as "information processed by individuals including ideas, facts, expertise, and judgments relevant for individual, team, and organizational performance" (p. 117), thereby agreeing with the alternative idea that the terms can be used interchangeably. David and Foray disagree and argue knowledge and information are two separate concepts. They state knowledge "empowers its possessors with the capacity for intellectual or manual action" (p. 12), and therefore is a form of cognitive capacity. Information however "takes the shape of structured and formatted data-sets that remain passive and inert until used by those with the knowledge needed to interpret and process them"

(p. 12). What information *is,* is thus objective and impersonal; what knowledge *is*, is not. The reproduction of knowledge and information differs significantly; knowledge is much harder to specify and transfer. Fritsch and Kauffeld-Monz (2010) support their convictions of information and knowledge as two separate things and knowledge being harder to access, which they motivate by stating that "in contrast to information— knowledge may be of a tacit nature (i.e., not codified), highly context specific, and may require certain capabilities in order to be absorbed" (p. 21). The distinction between tacit and codified is explained in the next sub-paragraph.

The conclusion that can be drawn is that knowledge is concerned with links and connections between events and concepts to make sense of the world around us, which takes form in accordance with certain rules, is highly dependent not only on the context in which it is used but on the person using it as well, and which requires human action. As will become clear from subsequent paragraphs, it is essential to distinguish knowledge from information. For this reason the definition of knowledge as provided by David and Foray (2002) is adopted. For the purpose of the present research it seems relevant to include less abstract descriptions of knowledge as well, making it better suited for practical use and analysis, which is done in the following sub-paragraph.

1.2 From the Abstract to the Concrete: Forms and Categories of Knowledge

In this section 'knowledge' is understood by categorization, with the advantage that it becomes somewhat more practical and therefore easier to apply to real life situations. Literature portrays distinctions between a range of knowledge categories. The most often used and accepted differentiation is between tacit and explicit or codified knowledge. Collins (2010) argues *tacit knowledge* cannot be made explicit, but ought to be understood without explanation. *Explicit knowledge* can be seen as knowledge that can be studied, for instance from reading books; whereas tacit knowledge is rather related to practice and experience. Skills are argued to be a form of tacit knowledge (Foray & Lundfall, 1998); the same applies to principles and methods of interpretation which enable intelligent communication (Polanyi, 1985). Collins divides tacit knowledge further into *relational*, *somatic* and *collective* tacit knowledge. Relational tacit knowledge is concerned with social life, somatic tacit knowledge with the body and the brain and collective tacit knowledge with human society. Generally all three are involved when learning something new. According to Collins all explicit knowledge rests on tacit knowledge. Nonaka and Takeuchi (1995) however argue knowledge is generated in four ways: 1) tacit knowledge generates net tacit knowledge by socialisation, 2) explicit knowledge generates new explicit knowledge by combination, 3) tacit knowledge generates new explicit knowledge by externalization, and 4) explicit knowledge generates new tacit knowledge by internalization. David and Foray (2002) make a similar distinction, between *codified knowledge* and *tacit knowledge*. The prior is defined as "so articulated and clarified that it can be expressed in a particular language and recorded on a particular medium" (p. 13). It enables isolation, classification and combining of knowledge, thereby contributing to memorisation, communication and learning. Additionally, it is unrelated to the individual and the memory and communication capacity created is not dependent on persons either, thus involving "exteriorisation" (p. 13). Its disadvantage is that it leads to the mutilation of knowledge since codified knowledge never fully captures the original knowledge. Especially for complex knowledge, reproduction in the form of codified knowledge will prove unsuitable.

Gutstein (2012) argues for considerable different forms of knowledge: *community*, *critical* and *classical*. Community knowledge refers to the knowledge of individuals and a community that is present in everyday life (e.g. an understanding of life and society). Critical knowledge is "knowledge about the sociopolitical conditions of one's immediate and broader existence" (p. 301) (e.g. the economical and political roots of social phenomena). Classical knowledge includes formal, abstract knowledge which is often learned in an educational institutional setting. Linking Gutstein to Collins (2010) and David and Foray (2002), community and critical knowledge can be perceived as different forms of tacit knowledge; classical knowledge as equal to explicit or codified knowledge.

Another categorization of knowledge involves distinguishing between *know-what*, *know-why*, *know-how* and *know-who* (Foray & Lundvall, 1998). These refer to: knowledge about facts; "scientific knowledge of principles and laws of motion in nature, in the human mind, and in society" (p. 116); skills; and "a mix of different kind of skills, including what might be characterized as social skills" (p. 116) accordingly. Know-what or "declarative" (Borgatti & Cross, 2003, p. 432) knowledge is similar to information, and is especially relevant for experts (e.g. lawyers, doctors). Since know-why knowledge enables technological development and diminishes errors within processes, this type of knowledge is produced and reproduced in specialized organisations such as universities. Know-how or "procedural" (Borgatti & Cross, p. 432) knowledge "is typically the kind of knowledge developed and kept within the borders of the individual firm" (Foray & Lundvall, p. 116), however a combination of specialisation and co-operation between organisations takes place when the complexity of this kind of knowledge tends to increase. Know-who includes knowledge of who knows what and how to, and therefore involves the creation of social ties – or 'networking' in popular terms – in order to exchange relevant information. Due to increased division of labour this form of knowledge has become increasingly vital. Know-what and know-why can be learnt by reading, attending classes and accessing databases (codified/explicit), whereas know-how and know-who are the kinds of knowledge that can be mastered by practicing (tacit). Siemens (2005) adds a fifth type to this categorization, called '*know-where*': "the understanding of where to find knowledge needed" (p. 4).

Anderson et al. (2001) define four categories: *factual*, *conceptual*, *procedural* and *metacognitive* knowledge. The first refers to very specific bits of information (i.e. facts), and includes 'knowledge of terminology' and 'knowledge of specific details and elements'. More general knowledge of theories, concepts, principles or models and the relationships between these is understood as conceptual knowledge. Subcategories are 'knowledge of classifications and categories', 'knowledge of principles and organization', and 'knowledge of theories, models and structures'. Procedural knowledge describes the knowledge of how to do something, which can differ from routines to solving new problems. Its three subcategories are 'knowledge of subject specific skills and algorithm ', 'knowledge of subject-specific techniques and methods' and 'knowledge of criteria for determining when to use appropriate procedures'. Knowledge about cognition is called metacognitive knowledge. It describes how one thinks about thinking and learning, is related to self-regulation and consciousness, and therefore more personal of nature. Flavell (1979) proposed the categories of 'knowledge of strategy', 'knowledge of cognitive tasks', and 'knowledge of person variables', jointly forming metacognitive knowledge. See Figure 1 on the next page for an overview of these categories and subcategories based on Anderson et al. (2001).

All these (sub-)categories of knowledge are quite extensive, but can prove to be helpful for comparison and analysis. The classification according to codified/explicit and tacit knowledge will be used as a basis for the understanding of knowledge in concrete terms, as this categorization is most widely accepted, very clear and relatively easy to apply. Nonetheless, this categorization is very general and little elusive. On the other extreme is the classification according to Anderson et al. (2001), which is very all-encompassing but simultaneously is unnecessarily complicated and includes non-exclusive categories. The classification by Foray and Lundvall (1998), combined with the extra category added by Siemens (2005), are seen as better match for the purposes of the present study. The result is a distinction between explicit knowledge, including know-what and know-why, and tacit knowledge, including know-how, know-who, and know-where. An overview of this new categorization can be found in Figure 2 below.

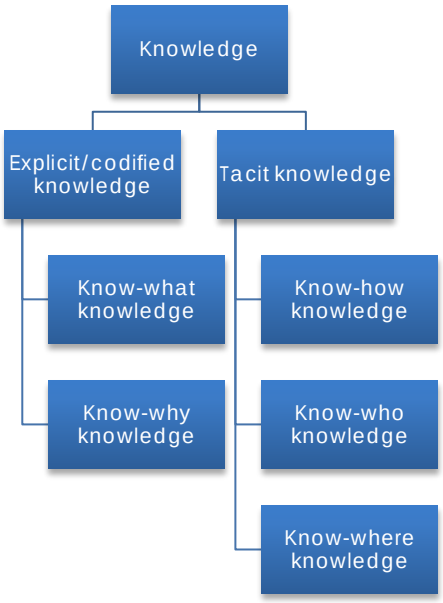

Figure 1. Categorization of knowledge based on Collins (2010), David and Foray (2002), Foray and Lundvall (1998), and Siemens (2005).

Based on literature on what knowledge is and what forms of knowledge can be distinguished, it is hypothesised that information can be compared to explicit/codified knowledge and is included in the more comprising concept of knowledge, the acquisition of which moves beyond formal learning techniques and involves human action. Now knowledge as central concept is thoroughly discussed, its role for present day economy, organizations and individual workers (SEWPs in particular) will be examined.

2 The Relevance of Knowledge in the 21st Century Work Context

2.1 Knowledge at Macro Level: The Knowledge-based Economy

Cooke and Leydesdorff (2006) distinguish between 'knowledge economy' and 'knowledge-based economy'. The first is considered the older version, originating in the 1950s and focusing on the

composition of the labour force. The latter "has added the structural aspects of technological trajectories and regimes from a systems perspective" (p. 5). Moreover, they show that using knowledge as economic factor is not new, however the labelling of an economic system based on knowledge is. Additionally, they introduce a "Triple Helix model" (p. 10) according to which a knowledge-based economy is founded on the following three components: "(1) the knowledge-producing sector (science), (2) the market, and (3) governments" (p. 10). Close cooperation between these is argued to be vital for economic prosperity. Olssen and Peters (2005) recognize the economic importance of higher education systems, by stating that universities are a key spill behind the knowledge economy. Therefore, they encourage higher education institutions to link with industry and business too. Peters (2010) characterizes present economy alternatively by distinguishing three discourses: the 'learning economy', the 'creative economy' and the 'open-knowledge economy' (p. 67). The 'learning economy' is based on the combined forces of information and knowledge, new social media, and larger computer networking and connectivity, that have led to an increased relevance of human capital, mode of social production and highlighting of learning processes. The focus is thus on the capacity to learn and learning processes that lead to the production of knowledge. The 'creative economy' focuses on the role that creative industries and organisations play in generating cultural goods and services. Creativity, design and innovation are believed to be at the heart of the global knowledge economy. Last, the 'open-knowledge economy' refers to an economy in which consumers can have access to an abundance of knowledge which forms an (online) public platform. Both Cooke and Leydesdorff's and Peters' characterization are believed to be valid analyses of the knowledge-based economy, which are simply based on alternative points of view.

Morel, Palier and Palme (2012) recognize that in the knowledge-based economy "knowledge is considered as the driver of productivity and economic growth" (p. 1). David and Foray (2002) explain that knowledge has always been crucial for economic growth and development, but the speed at which it is fostered and amassed is now accelerating immensely and will most probably lose value in short amounts of time. Knowledge has also become fragmented; a result of increasing divisions of labour and specialisation. The disadvantage is that the knowledge and the answers in order to solve specific problems can be available, but possibly remain unnoticed because of a lack of an integrated view. An indicator of knowledge-based economy is increased proliferation of jobs in the deduction, incorporation and transmission of knowledge and information. Moreover, the need for innovation has increased as it becomes the mere option for survival and prosperity in competitive and globalised economies. The authors mention that in sectors in which there is a strong relation between science and technology, the development of knowledge happens fast. The scientific, technical and business professions are identified as the ones with the highest level of knowledge-intensive communities.

Literature shows the 'knowledge-based economy' as accurate description for present day economy, with as distinguishing feature the fact that knowledge is no longer just an economic factor, but that it functions as the foundation for the entire economic system. Knowledge in a knowledge-based economy, accelerating and losing value quickly with the help of especially science and technology, forms the prime source for economic growth. The next sub-paragraph will deal with knowledge at a mezzo level, discussing the relation between knowledge and work.

2.2 Knowledge at Mezzo Level: Knowledge Intensity and Management at Work

The present paragraph will zoom in on the relevance and use of knowledge within organisations. As Bose and Thomas (2007) note, company value used to be created in industrial sectors, but in the new economy the application of knowledge is the primary source for value creation. The relevance of 'intellectual capital' is ever increasing, especially in the form of technology, skills and expertise.

Literature shows 'knowledge management' (**KM**) has become an essential organisational strategic activity (e.g. Gordon & Grant, 2013; Makani & Marche, 2010; Bose & Thomas, 2007), in the Western world initially focussing primarily on explicit knowledge but increasingly on tacit knowledge too (Preece, 2004). Makani and Marche's (2010) review of literature on KM shows a great disparity of what is understood as a KIO. 'Knowledge-intensive organisation' (**KIO**), 'knowledge-intensive firm' (**KIF**), and 'knowledge-based organisation' (**KBO**) appear to refer to the same kind of organisations. However, the definition that is used by various authors – that is, if they apply a definition at all – varies widely. Bose and Thomas (2007) focus on the term KBOs, and explain they can be characterized by their use of knowledge as a factor of production and competition. Makani and Marche concentrate on the concept of KIOs, and identify the 'worker dimension' (representing variations from workers' use of 'familiar/experience knowledge' to 'esoteric/novel knowledge') and the 'organisational/unit dimension' (referring to the extent to which knowledge is used and produced throughout the organisation), on which to base organisation analysis. Based on these two dimensions, four levels of KIOs can be distinguished: "unit-oriented, expert-driven firms; unit-oriented, innovation driven organizations; organizationally oriented, expert-driven firms; and organizationally oriented, innovation driven firms" (p. 273). Examples matching these levels are law firms, advertising firms, investment companies and business management consulting firms. At the end, the authors stress that the appropriate focus in KIOs is not on knowledge or knowledge workers, but on "the management of expertise" (p. 275). Being an organisation making extensive use of knowledge (i.e. KIOs) thus automatically involves the need to manage this knowledge (i.e. KM). In addition, they note that for KIOs knowledge is both input and output. However, the production of knowledge remains a "'black-box' activity that is difficult if not impossible to manage as a process" (Davenport in Makani & Marche, 2010, p. 275).

Based on the above discussed literature it can be concluded that organisations in a knowledge-based economy take on different shapes based on their knowledge management, which can be understood as the activity by which organisations strategically control the creation and use of knowledge and the delivery of knowledge as a (service) product. Constant factors across these organisations are intensive use of knowledge (as both input and output), resulting in the generation of value and strategic creation of competitive advantage. The relevance and use of knowledge at macro and mezzo level has been discussed so far; the function of knowledge at the level of the individual worker will be considered below.

2.3 Knowledge at Micro Level: SEWPs as One Person KIOs

In this sub-paragraph the role of knowledge at the most specific level will be discussed; the level of the individual worker, and the SEWP in particular. By now it has become clear that knowledge has become the basis for the total economic system, and the primary source of organisations for value

creation and survival. Consequently, the individual worker in a knowledge-based economy cannot get around knowledge as main asset for functioning in a job. As noted before, jobs are increasingly characterized by and created in light of the creation, integration and spreading of knowledge (David & Foray, 2002). Individuals' capacity to learn and produce knowledge has gained increased relevance (Peters, 2010). Far-reaching division of labour and specialisation have led to fragmentation of knowledge, and knowledge accelerates and loses value rapidly (David & Foray). Based on Peters and David and Foray, individuals thus need to be able to both acquire and generate specific knowledge and to keep it up to date. This is supported by Morel, Pallier and Palme (2012) who argue that "the knowledge-based economy (...) rests on a skilled and flexible labour force, which can easily adapt to the constantly changing needs of the economy but also be the motor of these changes" (p. 1). To conclude, the intensive use, transmission, creation and updating of knowledge have become key tasks for workers in a knowledge-based economy. The sub-section below connects the relevance of knowledge at all three levels.

2.4 Connecting Macro, Mezzo and Micro Levels' use of Knowledge

Literature shows knowledge as foundation of the whole economy, as main asset for value creation, competitive advantage and survival for organisations, and as central factor for an individual's career seen as jobs are increasingly characterized by a curriculum based on knowledge. Organizations need to effectively manage their knowledge. Individuals are demanded to be skilled and flexible, and to easily adapt to knowledge and changing needs of the economy, and simultaneously be the spill behind those changes and the generation of knowledge. SEWPs, fulfilling a position somewhere in between employers and employees, are reasoned to need to meet all of these demands in order to both function well as workers and to ensure their enterprises' survival. Therefore, it is hypothesised SEWPs can be viewed as a mix of 'employable workers as economic nomads' and KIOs consisting of one person, who both need to continuously update their knowledge and manage this knowledge successfully. According to the 'Triple Helix model', the economy flourishes most when the knowledge-producing sector, the market and governments closely cooperate. SEWPs – as part of the components of both the knowledge-producing sector and the market – are to date however not on optimal terms with governments. The reason for this is their exclusion from collective agreements in case of occupational disability or unemployment, pension systems and the financial reimbursement of schooling, and limited compensation for these, whereby the government insufficiently supports SEWPs' risk management (Posthumus & Wilthagen, 2010). Facilitating similar arrangements for SEWPs "not only prevents that the sometimes big income insecurity of this group will be limited, but will simultaneously contribute to greater dynamics on the labour market and a higher level of labour participation" (ibid., p. 35, translated). The failing of the government to sufficiently include SEWPs and treat them equally thus ultimately impedes economic prosperity. The extensive demands that SEWPs are faced with in combination with limited support, place them in a strenuous position for securing success and survival. The relevance of knowledge at the level of the economy, organizations and the individual worker (including SEWPs) has been thoroughly discussed. The next paragraph presents methods for the acquisition of knowledge.

3 The Acquisition of Knowledge; Learning and Storing

Joia and Lemos (2010) argue that tacit knowledge can be acquired "through inner individual processes such as experience, reflection, internalisation and individual talent" (p. 412) and therefore is determined by the personal component. The organisational component is argued to facilitate spreading tacit knowledge. It is hypothesised that for SEWPs a combination of the personal and the organisational component is in place; consequently SEWPs are reasoned to be involved in both the acquisition and spreading of tacit knowledge. Since the focus of the present research is on knowledge acquisition that is subject to personal influences of SEWPs, this section concentrates on active knowledge *acquisition* methods at the level of the individual. First, the ever increasing relevance of lifelong learning will be stressed and explained. What follows is a discussion of the ways that knowledge can actively be acquired. The relation between social networks and knowledge acquisition will be clarified in the last subsection.

3.1 Lifelong Learning (LLL)

In this section, the significance of lifelong learning (**LLL**) will be discussed. LLL can be defined as "a process through which the individual continues to engage in education and/or training throughout the life course" (Avis, Fisher & Thompson, 2014, p. 8). It mostly refers to learning that takes place outside of the education system, and therefore often occurs in the absence of a teacher or instructor.

Siemens (2005) commented on the connection between learning and work life in the knowledge-based economy by stating that "learning is a continual process, lasting for a lifetime. Learning and work related activities are no longer separate. In many situations, they are the same." (p. 3). Or in other words: working to learn, learning to work (Felstead, Fuller, Jewson & Unwin, 2011). Field (2000) too acknowledges the relevance of LLL and tresses that it is globally supported and integrated by policymakers. He highlights that individuals need to involve themselves in a process of permanent education; updating knowledge and social capital is a major goal. People need to be mobile, flexible and reflexive all at once, and thus be able to easily adjust to trends and fashion. Field refers to these principles with the concept of 'employable workers as economic nomads'. Not only is the relevance of LLL supported by policymakers, teachers have fully accepted the need for LLL as well, Livingstone (2010) notes. However, he argues that the institutional context in which they operate is not well equipped to this. Siemens supports this statement by concluding that "the field of education has been slow to recognize both the impact of new learning tools and the environmental changes in what it means to learn" (p. 9). Livingstone's and Siemens' statements would imply that individuals on the labour market can rely on traditional educational systems less and less but are rendered to depend on personal learning capacity, initiatives and investments.

Siemens (2005) considers behaviourism, cognitivism and constructivism outdated epistemologies and proposes 'connectivism' as new epistemology for the 21st century: "the integration of principles explored by chaos, network, and complexity and self-organization theories" (p. 5). An important principle of connectivism is that "nurturing and maintaining connections is needed to facilitate continual learning" (p. 5), whereby Siemens stresses the relevance of LLL and the need for the formation of connections between both sets of information and others actors to facilitate this. Siemens describes

the process of learning ("actionable knowledge" p. 5) and knowledge development as follows: "Personal knowledge is comprised of a network, which feeds into organizations and institutions, which in turn feed back into the network, and then continue to provide learning to individual". Learning, both by organisations and individuals, is thus a process for which the individual is the starting point and social networks function as mediators between organisations and individuals. Social networks thus seem especially relevant for SEWPs, as both learning and knowledge managing individuals and organisations. For this reason it is hypothesized that SEWPs who make extensive use of their social network are more successful.

This support for LLL aligns with previously discussed literature on the knowledge-based economy and the demands for workers that come along with it. Just as any other actor on the labour market, SEWPs need to invest in LLL. The need to be flexible and reflexive in relation to knowledge has become a given for knowledge-based economy workers, for which traditional formal educational settings appear to be increasingly less suited as source, and personal initiatives and investments increasingly vital. Investment in a social network appears especially relevant for SEWPs in order to ensure optimal functioning as individual worker and organisation. Social networks will be further discussed in the following section.

3.2 *Social Networks*

In the knowledge-based economy social networks have become a valuable ingredient for knowledge acquisition, management and even *storage*. This is demonstrated by the following quotes:

> We can no longer personally experience and acquire learning that we need to act. We derive our competence from forming connections. (Siemens, 2005, p. 6)

> Experience has long been considered the best teacher of knowledge. Since we cannot experience everything, other people's experiences, and hence other people, become the surrogate for knowledge. 'I store my knowledge in my friends' is an axiom for collecting knowledge through collecting people. (Stephenson in Siemens, 2005, p. 6)

Borgatti and Cross (2003) have argued that social ties are relevant for "acquiring information, learning how to do one's work, and collectively solving complex cognitive tasks" (p. 433). Based on a variety of sources Fritsch and Kauffeld-Monz (2010) conclude that in order for innovation to take place and to reach organisational continuity, access to external knowledge is required. In other words, social networks are pertinent when discussing accessing knowledge. Below a discussion of social networks and their link to knowledge acquisition will take place. As mentioned before, know-who involves the creation of social ties in order to exchange relevant information (Foray & Lundvall, 1998). Therefore, this section will also discuss knowledge exchange within social networks.

Wasserman and Faust (1994) have stated that "a social network consists of a finite set or sets of actors and the relation or relations defined on them" (p. 20). Another less specific definition of social networks is given by Petróczi, Nepusz and Bazsó (2007), who interpret them as "collections of human

communities" (p. 39) (either offline/real or online/virtual). Wasserman and Faust, Petróczi, Nepusz and Bazsó, and Fritsch and Kauffeld-Monz (2010) have all attempted to propose suitable characterizations of social networks. The way these authors typify social networks can however be criticized on the basis of the non-exclusivity and complicatedness for measurement of their characteristics. Moreover, they are socio-centric network descriptions, whereas for the present research the focus is on ego-centric networks. Another categorization that is used by many (e.g. Curran & Saguy, 2001; Phelps, 2010; Stokes, 1985) which is accessible and better testable exists of the following elements: network *size*, network *composition* and network *density* (percentage of possible inter-relationships in the network that actually exist).

Burt (2000) makes a distinction between three kinds of network structures. *Clique networks* are "small, dense, non-hierarchical networks associated with leisure activities, the lack of social capital, and poor manager performance" (p. 407), and are associated with below-rate performance. "Large, sparse, non-hierarchical networks rich in opportunities to broker connections across structural holes [(i.e. unconnected actors)]" (p. 407) are referred to as *entrepreneurial* or *broker networks*. These are associated with more creativity and innovation, better work evaluation, early promotion, and higher salary. Based on the notion that SEWPs can be viewed as a form of entrepreneurs and that these networks are associated with more creativity and innovation, SEWPs are assumed to be represented by this network structure, and to be most successful if their network comes close to this description. Since SEWPs have no superiors in their profession, hierarchy is assumed not to apply to them. Therefore, it is hypothesised that SEWPs with a network that is large and low in density are most successful. The third, *hierarchical networks*, are "large, sparse networks anchored on a central contact" (p. 407). Higher performance by people that are not yet fully accepted in the network is characteristic of this network structure. Preece (2004) uses the term "community of practice (**COP**)" (p. 294) to refer to networks of people which aim at learning by sharing knowledge – both explicit and tacit – and experiences. The term is usually associated with a professional or work context. She argues that the ties between members of a COP are weak and hierarchy is limited or absent, creating a less formal environment, paving the way for the exchange of especially tacit knowledge. A comparison between COPs and entrepreneurial or broker networks (Burt, 2000) can be made, based on their low hierarchy levels and association with non-leisure activities. Fritsch and Kauffeld-Monz (2010) conclude that strong ties are more beneficial than weak ones for the exchange of knowledge and information. This is in contrast with Preece (2004), however in accordance with Hansen (1999) who argues strong ties are important for tacit and complex knowledge transferral. Therefore, tie strength is hypothesised to be positively associated with amount of knowledge exchanged, and consequently with the possession of knowledge.

Network cohesion – "overall connectedness of network members" (Fritsch & Kauffeld-Monz, 2010, p. 31), equal to network density – proved to be positively associated with the extent of exchanged *information*. The association with *knowledge* exchange however was ambiguous. It is therefore hypothesised that higher network density leads to more codified knowledge exchange, but does not influence the extent of tacit knowledge exchange. Furthermore, information and knowledge exchange were not influenced by heterogeneity in terms of competences and resources of network members. David and Foray (2002) mention that reproduction of tacit knowledge takes place trough a "master-apprentice" (p. 13) system or interpersonal contact with members with the same professional

background. The 'master-apprentice' system is discussed by Foray and Lundvall (1998) too, who argued it applies to know-how knowledge, earlier identified as a form of tacit knowledge. Although SEWPs have no direct superior colleagues, their networks can exist of many others with superior knowledge. Based on the above it is hypothesised that SEWPs who have a network with a high number of people with superior knowledge in their area of expertise possess more tacit knowledge, but possess an equal amount of codified/explicit knowledge as SEWPs with a homogeneous social network in terms of knowledge possession.

A couple of conclusions can be drawn from this paragraph on social networks. First, social networks can be characterized by their size, composition and density. Next, in the knowledge-based economy social networks – both real life and virtual – have become crucial for acquiring and storing knowledge, and organisational survival and innovation, making them especially relevant for SEWPs. The network of this group is believed to have an entrepreneurial/broker network structure; large, sparse, non-hierarchical networks with many opportunities to create network ties. It is hypothesised that when a network is characterized by weak ties, the SEWP learns the most from his/her network and experiences more knowledge exchange, and therefore possesses more knowledge. Knowledge exchange and consequently possession is hypothesised to increase by tie strength as well. Moreover, it is theorised that higher network density leads to more exchange of codified knowledge but not of tacit knowledge. Last, SEWPs with many people with superior knowledge in their network are believed to possess more tacit knowledge but no more codified/explicit knowledge than people with similar knowledge levels. As discussed before, social networks perform a mediating role, and therefore cannot be the starting point for learning. Personal knowledge acquisition methods are believed to take on this role, and will therefore be discussed next.

3.3 Personal Knowledge Acquisition Methods

Kefela (2010) summarizes in an accurate and concise manner what much literature is stating on the relation between the knowledge-based society and education:

> A flexible education system underpins the knowledge economy. That system begins with basic education that provides the foundation for learning; continues with secondary and tertiary education that develops core skills (including technical skills) and encourages creative and critical thinking for problem solving and innovation; and extends into a lifelong learning system that extends from early childhood to retirement. (p. 70)

For a knowledge-based economy education thus continues to serve as an important foundation. However, with two important developments: 1) the education system, in order to facilitate flexibility at all economic levels, needs to be flexible as well; and 2) it has become to form a constant factor throughout people's lives. As concluded before, traditional educational systems (alone) presently appear to be insufficiently equipped for knowledge acquisition. Forman (2012) detects little clarity on the optimal acquisition of knowledge and states one can no longer speak of disciplinarity. With disciplinarity he refers to "an abstract noun referring to a cultural ideal, to a set of presuppositions about

where the value of knowledge lies and what sorts of knowledge possess highest value, about the morally charged behavioural norms that producers and curators of knowledge must satisfy, and about the proper embodiments of knowledge in formal institutions" (p. 59). In other words, interdisciplinarity of knowledge means that it has become rather unclear what sort of knowledge is most valuable and thus ought to be acquired, and how this should be done. A presentation of knowledge acquisition methods follows below.

Livingstone (2010) aims to answer the question "What are the actual learning responses of adults to the demands of work in contemporary advanced market societies?" (p. 1). He distinguishes four forms of learning (both explicit and tacit knowledge): "informal training, self-directed informal learning, initial formal schooling and further or continuing adult education" (p. 2). *Informal education* (or: informal training) involves the kind of training that is provided by individuals who take the personal initiative to instruct others, with absence of "sustained reference to a pre-established curriculum in more incidental or spontaneous situations" (p. 2). Examples of this form of learning are assisting others in acquiring job skills or in community development activities. *Initial formal schooling* includes the education that people are continuously enrolled in from early childhood to tertiary levels (thus kindergarten, high school, university etc.). *Further or continuing adult education* refers to an array of additional educational programmes, courses and workshops that take place in an institutional setting (e.g. school, work-place, community centre). "All other forms of explicit or tacit learning in which we engage either individually or collectively without direct reliance on a teacher/mentor or an externally organized curriculum" (p. 2) are to be understood as self-directed or collective informal learning. Formal learning includes initial formal schooling and further adult education; informal learning consists of informal training and self-directed informal learning. Results of surveys discussed show that adults find self-directed informal learning more important and invest more time in it than further formal education. As mentioned earlier, the professional setting does not provide a sufficient replacement for a previous lack of (higher) school-based learning (Skule, 2004). Adults thus seem to recognize that losing out in the school-based learning environment involves being a "loser" (Skule, 2004, p. 12) later on in a work setting, and are forced to take responsibility and show personal initiative. Based on the results from other surveys that show adults prefer to invest in self-directed informal learning more than further adult education, it is assumed that SEWP do so too.

What becomes clear is that the methods for the acquisition of knowledge are rich. Although the participation of workers in knowledge acquisition is clear by now, the optimal practice of this is very much under discussion and open for interpretation. It is theorised that a professional's optimal learning strategy is to obtain a high level of initial formal schooling, and to continue to invest in informal training and self-directed informal training more than further adult education. In the following and this chapter's last paragraph the theory will be reflected on as to reformulate the central and secondary research questions, to further structure the research.

4 Redefining research purposes

What has become clear from investigating present day's role of knowledge is that knowledge has come to form the basis for the total of economic systems, the main organisational source for survival and the creation of value and competition, and forms the foundation for job tasks and qualifications,

causing knowledge to form a red line throughout a person's career. The effect for SEWPs is that they are positioned somewhere in between 'employable workers as economic nomads' and one person KIOs. This research's focus was formulated as examining the role that knowledge plays for SEWPs' success. As has been pointed out by Forman (2012), disciplinarity is increasingly lacking when the acquisition and value of knowledge are concerned. It is clear by now that knowledge is crucial to the economy, organisations, and individual workers. However, there is neither consensus on the value of knowledge and the relevance of types of knowledge, nor on how knowledge ought to be used, produced or mastered. In other words, to a certain extent the knowledge-based economy is deficient in transparency of success factors. How do SEWPs function successfully in a knowledge-based economy, considering this lack of transparency of success factors when knowledge is concerned? Can this be explained by looking at interdisciplinarity? Based on these dilemmas, the central research question is redefined as follows: "How can differences in success of SEWPs in a knowledge-based economy be explained on the basis of their acquisition and possession of knowledge?" An answer to this question ought to provide SEWPs ground for comparison with their peers, stimulate optimal acquisition and possession of knowledge by SEWPs and contribute to optimisation of the knowledge-based economy. The sub-questions that follow from this are: 'What kind of knowledge do SEWPs possess, and to what extent do differences in knowledge possession influence differences in SEWPs' level of success?', 'What kind of methods do SEWPs use for the acquisition of knowledge, and to what extent do differences in knowledge acquisition influence differences in SEWPs' level of success?', and 'How do SEWPs knowledge acquisition methods influence the knowledge they possess?'. Based on the theoretical chapter, a number of hypotheses will be tested:

- H1a An increase in the possession of both explicit/codified knowledge and tacit knowledge increases the level of success.
- H1b An increase in investment in both initial formal schooling and further adult education leads to an increase in the possession of explicit/codified knowledge.
- H1c An increase in investment in both informal training and self-directed informal learning leads to an increase in the possession of tacit knowledge.
- H2a An increase in investment in initial formal schooling, further adult education, informal training and self-directed informal learning increases the level of success.
- H2b A lower level of initial formal schooling cannot be compensated for by other knowledge acquisition methods to reach a higher level of success.
- H2c An increase in investments in informal training and self-directed informal training increases the level of success more than an increase in further adult education does.
- H3a An increase in network size increases the level of success.
- H3b A decrease in network density increases the level of success.
- H3c An increase in network density increases the amount of explicit/codified knowledge possessed, but does not influence the amount of tacit knowledge possessed.
- H3d An increase in the ratio of strong ties within a network increases the possession of knowledge.
- H3e A higher number of people within a social network with superior knowledge in an person's area of expertise increases the amount of tacit knowledge possessed, but does not influence the amount of explicit/codified knowledge possessed.

In addition, SEWPs' perception of the relevance of the possession and acquisition of knowledge for their level of success was included, in order to test whether their perceptions are in accordance with the research findings.

The methodological chapter that follows will provide further information on the methods for measuring the variables and testing of the hypotheses formulated above.

Methods

1 Population and sample

The research population contains all Dutch SEWPs, which is over 800 thousand. The sample exists of … A total of … SEWPs participated in the research, with a response rate of … percent.

2 Research methods

A self-monitored questionnaire was both posted online and printed for completion. The questionnaire consisted mainly of closed questions, but included some open ended questions as well. Question topics included amongst others demographics, knowledge possession, investments in knowledge acquisition, social networks and success. The full questionnaire can be found in Appendix A. Data from the survey were processed using the statistical software IBM **SPSS** Statistics (version 20). For analysis of the results basic descriptive analyses were performed, as well as multiple regression analyses, and factor analyses. Some variables were calculated as an average of a certain number of values; these averages were calculated with the use of Microsoft Excel, and inserted in a SPSS document thereafter.

3 Measurement of Variables

3.1 Dependent Variable: Success

The purpose of the present study is to examine to what extent the kind of knowledge that SEWPs possess and the ways in which they acquire knowledge can explain differences in success. The dependent variable for the present research is thus 'success'. Since SEWPs are a mix of knowledge workers and one person KIOs, SEWPs' success is measured by both business performance and employee performance. Level of success is calculated as an average of organisational performance score and employee performance score.

Organisational Performance

Zhao, Seibert, and Lumpkin (2010) argue indicators for entrepreneurial firm performance can be summarized in the categories of profitability and operational effectiveness, and use composite indicators to assess them jointly. Makhbul and Hasun (2011) based questions related to entrepreneurial success on financial performance, revenue growth, return on sales (ROS) and assets (ROA), customers' satisfaction, and productivity. Some use firm size as one indicator of success (e.g. Frese et al., 2007). Unger, Rauch, Frese & Rosenbusch, 2011) focus on size, growth and profitability; Dickson, Solomon and Weaver (2008) focus on growth and profitability too but add innovation instead of size. Both size based on number of employees and number of clients are believed unsuited for measuring SEWPs success. An SEWP is per definition operating individually; and some SEWPs can thrive with less clients, and an increase in the number of clients might be impossible depending on an SEWP's occupation. These studies combine findings from sizeable numbers of other studies and but do not provide useable

descriptions for measurement. Powell and Eddleston (2013) make use of economic measures of success in the form of business performance and growth in employment. To measure business performance the authors use a self-report measure of performance compared to competitors based on multiple indicators of business success, for they provide more information and control for differences in performance which are the effect of differences in industry. The authors asked entrepreneurs to rate their business's performance on a 7-point scale (1 = much worse than competitors, 4 = about the same as competitors, 7 = much better than competitors) on "growth in sales, growth in profitability, return on equity, return on assets, profit margin on sales, and the ability to fund growth from profit" (p. 268). Business performance score was then based on an average of these six separate scores. This kind of measurement was found to show convergent validity to actual sales growth (Ling & Kellermans, 2010). Therefore, this measurement of business performance is adopted.

Employee Performance

Tsui, Pearce, Porter, and Tripoli (1997) measured employee performance by performance on chore tasks (quantity, quality, efficiency, ability, judgment, accuracy, job knowledge, and creativity), performance on activities other than chore tasks (i.e. "citizenship behavior", p. 1103) directed at organizational improvement, and chances that an employee would leave the firm ("dependable continuance", p. 1104). Walumbwa, Mayer, Wang, Wang, Workman and Christensen (2011) measured employee performance as employee task performance and used 11 items of Tsui, Pearce, Porter, and Tripoli (1997). Similarly, a selection of Tsui et al.'s performance items were used and adjusted for the purpose of the present research. The authors used a 7-point response scale (1 = strongly disagree / unsatisfactory, 7 = strongly agree / excellent), however these questions were answered by superiors. For the purpose of the present study the same 7-point scale (1 = much worse than competitors, 4 = about the same as competitors, 7 = much better than competitors) that was used for business performance was used, and employee performance was phrased as "work performance".

3.2 Independent Variables

Knowledge Acquisition

As seen in the previous chapter, knowledge acquisition can occur according to four methods: initial formal schooling, further adult education, informal training and self-directed informal learning (Livingstone, 2010). These constitute the four variables of knowledge acquisition. Survey questions on knowledge acquisition were based on a Canadian national survey of the SSHRC Research Network on the Changing Nature of Work and Lifelong Learning (WALL) (2014), as referred to by Livingstone. The research network refers to the four learning methods as formal schooling, further or continuing adult education, informal education or training and non-taught self-directed or collective informal learning, which equal the ones named by Livingstone. Questions on participation and investments in formal learning (section 6 and 9) and informal learning (sections 12-15) of the WALL survey were used as a basis. Investment in initial formal schooling is measured as highest level of education obtained, adjusted to Dutch educational levels. Further adult education is measured as level of education obtained after the start of a career; other courses earning a credit towards a diploma, degree, certificate or license; and any other formal non-credit courses, workshops or organised lessons. Informal training was measured as

informal education or training. Last, self-directed informal learning was measured as non-taught self-directed or collective informal learning. Investment in knowledge acquisition was indicated for each of the knowledge acquisition methods separately by participation (yes/no), duration (months or weeks), time investment (hours per week), and financial investment (euro's), for the past 12 months.

Knowledge Possession

The possession of knowledge was measured based on the knowledge categories from Figure 1 of the previous chapter, which was based on Collins (2010), David and Foray (2002), Foray and Lundvall (1998), and Siemens (2005). The variables are accordingly: codified/explicit knowledge including know-what and know-why; and tacit knowledge including know-how, know-who, and know-where. The phrasing of questions was based on section 10 (self-perceived level of skills) of the WALL survey (SSHRC, 2014). Measurement was based on the same 5-point scale, but with reversed values so a higher score indicates more possession of knowledge (1 = fairly poor, 2 = somewhat below average, 3 = average, 4 = good, 5 = excellent).

Social Network

Social network is measure by network size, composition and density. Measurement of these variables is based on Stokes (1985). Network size is measured by Stokes by asking respondents to list the initials of people who are important in their lives and with whom they have contact at least once a month. For this study, SEWPs were asked to indicate the number of people instead of listing initials. Network composition refers to the size of a certain group of people as part of the total social network, and depends on the research topic. Stokes measured network composition as the percentage of family members within a network. For the purpose of this research, composition is measured in two separate ways: as the ratio of contacts with superior knowledge (composition1), and the ratio of strong ties (composition2). Superior knowledge is measured based on Borgatti and Cross (2013), by asking SEWPs to name the number of people within their social network who have more expertise in areas that are important in the kind of work they do. Gilbert and Karahalios (2009) identified seven dimensions of tie strength: "intensity, intimacy, duration, reciprocal services, structural, emotional support and social distance" (p. 3). To measure the number of strong ties, SEWPs were asked to indicate the number of people within their social network which score high on these dimensions separately. The number of strong ties is then calculated as the average of seven scores. Network density is measured by asking how many people in an SEWP's network he/she believes have contact with each other at least once a month. Density is then computed by dividing this estimation by the number of possible ties.

3.3 Control Variables

Initial Formal Schooling

In order to examine whether a lower level of or lack of initial formal schooling cannot be compensated for by other knowledge acquisition methods to reach a higher level of success, this variable was not merely used as independent variable but as control variable too. In this way the influence of the remaining three knowledge acquisition methods on the level of success was tested, whilst the level of formal education was controlled for.

Demographics

In order to gain information on a SEWP's background demographic variables were included: age, gender, SEWP work tenure, work hours, industrial branch, scope of operation, sector and educational level prerequisite for the job. Age was measured in years, SEWP work tenure in years and months, and work hours in hours per week, based on section 2 of the WALL survey (SSHRC, 2014). Industrial branch was based on categories of the CBS (Central Bureau of Statistics, 2015), and include: agriculture, forestry and fishery; mineral industry, industry and energy; building industry; trade, transport and hotel and catering industry; information and communication; financial services; real estate; corporate services; public management; education; healthcare and wellbeing; culture, recreation and other services. Scope of operation was based on Sadikoglu and Zehir (2010, p. 19). Operation scopes were regional, national, international and global. Sectors consisted of private, non-profit, public, government owned, and federal, provincial or municipal, based on variable S17_3 of the WALL survey (SSHRC, 2014). Educational level prerequisite for the job was based on variable S19_3 of the same survey.

SEWPs' relevance perception

A total of four questions were included to measure SEWPs' perceptions of the relevance of the possession and acquisition of knowledge for their organisational performance and employee performance, or in other words their success. SEWPs were asked to rate the relevance of each of the five categories of knowledge possession and the relevance of each of the four knowledge acquisition methods. Relevance for organisational performance was phrased as "helping an SEWP improve his/her business"; relevance for employee performance was formulated as "helping an SEWP doing his/her job better". This phrasing is based on the WALL survey (SSHRC, 2014), and the ways in which organisational and employee performance were measured based on Powell and Eddleston (2013) and Tsui, Pearce, Porter, and Tripoli (1997). Measurement was based on a 5-point Likert scale (1 = not relevant, 3 = fairly relevant, 5 = very relevant). The average of these scores was then calculated to compute SEWPs' relevance perception as the following four variables: perceived relevance of knowledge possession for organisational performance, perceived relevance of knowledge possession for employee performance, perceived relevance of knowledge acquisition for organisational performance, and perceived relevance of knowledge acquisition for employee performance.

View Appendix B for an extended overview of all variables used, and their accompanying values and indicators.

Results

Discussion

Limitations of the research

With regards to the measuring of social networks:

http://ajae.oxfordjournals.org.proxy.library.uu.nl/content/95/2/353

Measuring Social Networks' Effects on Agricultural Technology Adoption.

Conclusions

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Appendix A: Questionnaire

Appendix B: Variables, values and indicators

Variable	Values	Indicator(s)	Source(s)	Question
Dependent variables				
Success				
Organisational performance	Average of 7-point Likert scale scores (1 = much worse than competitors, 4 = about the same as competitors, 7 = much better than competitors) on 'business performance'	– Growth in sales – Growth in profitability – Return on equity – Return on assets – Profit margin on sales – Ability to fund growth from profit	Powell & Eddleston (2013)	45
Employee performance	Average of 7-point Likert scale scores (1 = much less likely than competitors / much worse than competitors, 4 = About the same as competitors, 7 = much more likely than competitors / much better than competitors) on 'work performance'	– Dependable continuance (46a) – Performance on citizenship behaviour (46b) – Performance on chore tasks (46c)	Tsui, Pearce, Porter, & Tripoli (1997)	46
Independent variables				
Knowledge possession				
Possession of Know-what	5-point Likert scale score (1 = fairly poor, 2 = somewhat below average, 3 = average, 4 = good, 5 = excellent)	Knowledge about facts.	Foray & Lundvall (1998); (SSHRC, 2014)	38a
Possession of Know-why	Idem	Scientific knowledge of principles and laws of motion in nature, in the human mind, and in society.	Foray & Lundvall (1998); (SSHRC, 2014)	38b
Possession of Know-how	Idem	Skills – the capability to do something.	Foray & Lundvall (1998); (SSHRC, 2014)	38c
Possession of Know-who	Idem	Knowledge of who knows what and how to do what.	Foray & Lundvall (1998); (SSHRC, 2014)	38d
Possession of Know-where	Idem	Understanding of where to find knowledge needed.	Siemens (2005); (SSHRC, 2014)	38e
Investment in initial formal schooling				
Participation in initial formal schooling	– No school – Elementary – High school: Lower vocational	Highest level of education obtained before the start of an SEWP's adult	(SSHRC, 2014)	11

	education – High school: Senior general secondary education – High school: Pre-university education – Intermediate vocational education – Higher vocational education – University: undergraduate – University: graduate – PhD	career.		
Duration initial formal schooling	Years and months	How long it took an SEWP to finish all levels.	n/a	12
Time investment in non-credit courses	Hours per week	Counting time in class, and doing homework and course assignments.	(SSHRC, 2014)	13
Financial investment in initial formal education	Euro's	Money spent on the financing of initial formal education.	(SSHRC, 2014)	14
Investment in further adult education				
Participation in further formal schooling	– No school – Elementary – High school: Lower vocational education – High school: Senior general secondary education – High school: Pre-university education – Intermediate vocational education – Higher vocational education – University: undergraduate – University: graduate – PhD	Education obtained after the start of an adult career.	(SSHRC, 2014)	16
Duration further formal schooling	Months	Enrolment during the past 12 months	n/a	17
Time investment in credit courses	Hours per week	Counting time in class, and doing homework and course assignments.	(SSHRC, 2014)	18
Participation in credit education	– Yes, namely: (…) – No	Taking or have been taking courses during the past 12 months earning a credit towards a	(SSHRC, 2014)	19

		diploma, degree, certificate or license.		
Duration credit courses	Weeks	Course enrolment during the past 12 months.	(SSHRC, 2014)	20
Time investment in credit courses	Hours per week	Counting time in class, and doing homework and course assignments.	(SSHRC, 2014)	21
Financial investment in further adult education	Euro's	Money spent on the financing of credit courses during the past 12 months.	(SSHRC, 2014)	22
Participation in non-credit education	– Yes, namely: – Private lessons – Correspondence course – Workshops, seminars – Independent study program – Other: ... – No	Participation in formal courses, workshops, or organised lessons.	(SSHRC, 2014)	23
Non-credit education topic	Open ended question	n/a	n/a	24
Duration non-credit courses	Weeks	Course enrolment during the past 12 months	(SSHRC, 2014)	25
Time investment in non-credit courses	Hours per week	Counting time in class, and doing homework and course assignments.	(SSHRC, 2014)	26
Financial investment in non-credit courses	Euro's	Money spent on the financing of non-credit courses during the past 12 months.	(SSHRC, 2014)	27
Investment in informal training				
Participation in informal training	Varying topics	Learning about a topic or improving a skill.	(SSHRC, 2014)	29
Participation in self-directed informal learning	Varying topics	Learning about a topic or improving a skill.	(SSHRC, 2014)	29
Duration informal training	Weeks	How long training obtained.	(SSHRC, 2014)	30
Time investment in informal training	Hours per week	How many hours this amounted to.	(SSHRC, 2014)	31
Financial investment in informal training	Euro's	Money spent on the financing of informal learning during the past 12 months.		32
Duration self-directed informal learning	Weeks	How long learning done.	(SSHRC, 2014)	34
Time investment in self-directed informal learning	Hours per week	How many hours this amounted to.	(SSHRC, 2014)	35
Financial investment	Euro's	Money spent on the		36

in self-directed informal learning		financing of self-directed informal learning during the past 12 months.		
Social network				
Network size	Number of people	Number of people who are important in an SEWP's live and with whom he/she has contact at least once a month.	Stokes (1985)	41
Network composition 1	Ratio of contacts within the social network with superior knowledge.	Higher *value* of social network actors; more expertise in areas that are important in the kind of work an SEWP does.	Stokes (1985); Borgatti &Cross (2003)	42
Network composition 2	Ratio of strong ties within the social network.	High scores on indicators of tie strength: – Intensity (very regular contact) – Intimacy (intimate contact) – Duration (known for a long time) – Reciprocal services (regular exchange of services) – Structural (much in common: interests, personal profile) – Emotional support (emotional support experienced) – Social distance (much in common: age, number of occupations, formal education, religious orientation, political affiliation)	Stokes (1985); Gilbert & Urbana-Champaign (2009)	43
Network density	Ratio of number of ties in relation to number of possible ties.	Contacts within a SEWP's social network he/she believes have contact with each other at least once a month.	Stokes (1985)	44
Control variables				
Demographics				
Age	Years	n/a	n/a	3

Gender	– Male – Female – Other	n/a	n/a	4
SEWP work tenure	Years and months	n/a	n/a	5
Work hours	Hours per week	n/a	n/a	6
Industrial branch	– Agriculture, forestry and fishery – Mineral industry, industry and energy – Building industry – Trade, transport and hotel and catering industry – Information and communication – Financial services – Real estate – Corporate services – Public management – Education – Healthcare and wellbeing – Culture, recreation and other services	n/a	CBS (2015)	7
Scope of operation	– Regional – National – International – Global	n/a	Sadikoglu & Zehir (2010)	8
Sector	– Private company – Non-profit organisation – Public sector – Government owned company – Federal, provincial or municipal ministry/agency	n/a	(SSHRC, 2014)	9
Educational prerequisite	– No school – Elementary – High school: Lower vocational education – High school: Senior general secondary education – High school: Pre-university education – Intermediate vocational education – Higher vocational education – University: undergraduate	n/a	(SSHRC, 2014)	10

	– University: graduate – PhD			
SEWPs' relevance perception				
Knowledge relevance for employee performance	SEWP's perception measured on a 5-point Likert scale (1 = not relevant, 3 = fairly relevant, 5 = very relevant)	Average of relevance of know-what, know-why, know-how, know-who and know-where in helping an SEWP improve his/her business.	Foray & Lundvall (1998); Siemens (2005); (SSHRC, 2014)	39
Knowledge relevance for organisational performance	Idem	Average of relevance of know-what, know-why, know-how, know-who and know-where in helping an SEWP do his/her job better.	Foray & Lundvall (1998); Siemens (2005); (SSHRC, 2014)	40
Acquisition relevance for employee performance	Idem	Average of relevance of initial formal education, further adult education, informal training and self-directed informal training in helping an SEWP improve his/her business.	Livingstone (2010); (SSHRC, 2014)	15, 28, 29 & 33
Acquisition relevance for organisational performance	Idem	Average of relevance of initial formal education, further adult education, informal training and self-directed informal training in helping an SEWP do his/her job better.	Livingstone (2010); (SSHRC, 2014)	15, 28, 29 & 33