Assessing regional digital competence: Digital futures and strategic planning implications

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Abstract

Understanding strategic decisions aimed at addressing regional economic issues is of increasing interest among scholars and policy makers today. Thus, studies that proffer effective strategies to address digital futures concerns from social and policy perspectives are timely. In light of this, this research uses strengths, weaknesses, opportunities and threats (SWOT) analysis tool to frame a regional strategy for digital futures to enhance place-specific digital connectivity and socio-economic progress. Focus group discussions and a structured questionnaire were conducted to examine a SWOT for a digital economy strategy in the Southern Downs Region in Queensland, Australia. The findings show that while the proposed regional strategies for digital futures are susceptible to internal and external forces, strategic planning makes them manageable. The study's findings also reveal that adaptive strategic planning can help regulate the effects of internal and external factors that shape individual and organisational responses to digital transformation, and that these factors promote regional competitiveness.

Introduction

Much of the innovation-led development literature favours a 'techno-optimist' approach to regional competitiveness and advancement, but technological readiness and adoption in regional areas often is still lagging (Alam and Shahiduzzaman, 2014). As a result, scholars are showing increasing interest in understanding strategic planning approaches that solve regional development concerns (Bentley and Pugalis, 2014; Rickman and Rickman, 2011), particularly those that are technology-related (Erdiaw-Kwasie and Alam, 2016). For example, scholars have applied strategic planning techniques to business analysis (Erdiaw-Kwasie, 2016; Kalkan and Bozkurt, 2013), land use and urban development (Cobbinah, 2017; McFarland, 2015), environmental and ecological analysis (Balsiger and Debarbieux, 2011; Tedsen and Kraemer, 2013), spatial data analysis (Acheampong et al., 2017; Amoateng et al., 2017) and policy analysis (Erdiaw-Kwasie et al., 2016; Hovik and Hanssen, 2015). However, even though strategic planning has been used extensively in other fields of study, both at micro and macro scales (Dyson, 2004; Roberts and Stimson, 1998), not much is known about regional digital strategies towards proactive responses to rapid technological changes.

According to Řehoř (2015), the primary aim of strategic planning is to bring an organization into balance with the external environment and to maintain that balance over time. This balance often is realised by evaluating new programs and services with the intent of maximizing performance. The strengths, weaknesses, opportunities and threats (SWOT) analysis is a precursor to strategic planning and ensures that an assessment is made with a critical perspective (Guirado et al., 2017; Carpenter, 2006). Elsewhere the SWOT analysis is

perceived as a preliminary decision-making tool that sets the stage for adjustments to maintain optimal function (Gibis et al., 2001).

Given the speed of rapid technological developments and the demand for ubiquitous and more responsive digital ecosystems, there is an increasing need for effective strategic decisions to guide digital futures strategies (Alam and Imran, 2015; Malecki, 2010). Among the challenges faced by a regional digital competence strategy is the rising uncertainty surrounding its overall environment, including economic, political, social, technological and environmental factors. According to Schwenker and Wulf (2013), underestimating this uncertainty can be hazardous. To these authors, at worst it may lead to strategies that are unable to protect against threats, and at best it may lead to strategies that ignore the potential opportunities inherent in uncertainty. This implies that, traditional policies are not enough in themselves to win in the digital age. New regional strategic planning approaches that pay significant attention to both the internal and external contexts are necessary, particularly the way of life of its users (Erdiaw-Kwasie and Alam, 2016; Murthy, 2008). It is in this context that strategic planning is suggested as an extended tool for regional development in this digital age.

The objectives of this research are to understand how rural and regional areas are positioned for digital competence from a holistic strategic planning perspective, to discover barriers to digital competency and to develop strategy for strengthening digital futures in the region. In this study, the term 'regional' refers to non-metropolitan regions. In the study context, the regions comprise an extremely diverse area ranging from coastal settlements or inland towns to the sparsely populated, hot and dry outback (AIHW, 2006). In Australia, two-thirds of the total population lives in major cities and the remaining one-third lives in regional, rural and remote locations (Baxter et al. 2011). Although there are distinctions between the three terms,

in this study we used 'regional' to refer to non-metropolitan regions in general. In terms of digital competence, this paper defines it as the capacity and capability of different stakeholders to embrace the emerging technologies. Accordingly, access to and engagement with digital technology are vital to communities and businesses in regional areas. The Southern Downs Region, south west of Brisbane in Queensland, Australia is used as a case study, given the increasing concerns about the region's technological readiness measured in terms of access to telecommunication services, household Internet connections and technology-based economic activities. This research is expected to contribute to a better understanding of digital futures strategies at the local level to promote regional competitiveness.

The organization of this paper is begins with an introduction section, and then followed by section 2 that provides a theoretical background to the study, and sheds light on the case study. Section 3 discusses the methodology and data, section 4 presents and discusses the study findings, and section 5 provides the conclusions.

Theoretical Background

Overview of underpinning theories

Several theories are used in information technology research (Wade, 2009), but the central focus of this section will be on theories about technology orientation and adoption. The concept of individual technology acceptance was introduced into the information technology literature by Davis (1986) with his Technology Acceptance Model (TAM) which has been subject to theoretical development subsequently (Venkatesh and Davis, 2000). At the firm level, most studies on technology adoption are derived from theories such as the resource-based view of the firm (Barney, 1991), diffusion of innovation (Rogers, 1995) and the

technology, organization and environment (TOE) framework (Tornatzky and Fleischer 1990). At the individual level, theories like the theory of reasoned action (Fishbein and Ajzen, 1975), the TAM (Davis, 1989) and the theory of planned behaviour (Ajzen, 1991) have been used widely in recent studies (Kim and Crowston, 2011; Lai, 2017; Oliveira et al., 2011; Tarhini et al., 2015). Also, novel theories that are partially based on TAM have been developed to explain individual technology usage behaviour, including the unified theory of acceptance and use of technology (UTAUT), social cognitive theory (Bandura, 1986), and the model of adoption and technology in households (MATH) (Venkatesh et al., 2003; Brown and Venkatesh, 2005). For the purposes of this study, we focus on theories at the individual level. To this end, this paper focuses on the social cognitive theory and the UTAUT because they are the theories at the individual level that can help to explore user perceptions and to understand the internal and external factors involved in promoting the effective orientation, adoption and utilization of technologies.

Conceptual framework

The study began with formulation of a framework for digital orientation and adoption research. Ravitch and Riggan (2011) described a conceptual framework primarily as a conception of what is out there that a researcher plans to study, and of what is going on with these things and why – a tentative theory of the phenomena yet to be investigated. The function of a conceptual tool is to inform the rest of the research design, which can help to assess and refine research goals, develop realistic and relevant research questions, select appropriate methods and identify potential validity threats to the research (Maxwell, 2012).

To ensure that the study conceptual framework is as logical as possible, the researchers integrated different theoretical approaches and lines of investigation that had not yet been

connected. Many sources were discovered as the search criteria expanded in developing this framework (Figure 1), although one of the shortcomings of the domain as a whole was that there was insufficient clarity on the established factors that shape regional digital competence strategies. Thus, social cognitive theory and UTAUT were adopted to help develop a strategy framework to guide this study.

Social cognitive theory is concerned with the process of knowledge acquisition or learning. This theory is based on the idea that people learn by observing others, with the environment, behaviour and cognition as the chief factors influencing development in a reciprocal triadic relationship. Bandura (1986) shows that the observed behaviour of an individual is influenced by three basic determinants, which are personal, behavioural and environmental.

UTAUT was developed in an attempt to unify eight distinct, but similar, theories that explain technology acceptance. The authors included constructs from the theory of reasoned action (Fishbein and Ajzen, 1975), the TAM (Davis, 1989), the TAM 2 (Venkatesh and Davis, 2000), the motivational model (Vallerand, 1997), the theory of planned behaviour (Ajzen, 1991), the combined TAM and theory of planned behaviour (Taylor and Todd, 1995), the model of PC utilisation (Thompson et al., 1991), innovation diffusion theory (Rogers, 1995) and social cognitive theory (Bandura, 1986). According to the UTAUT theory, four core constructs – performance expectancy, effort expectancy, social influence and facilitating conditions – are direct determinants of behavioural intention and, ultimately, of behaviour. In turn, these constrcuts are moderated by gender, age, experience and voluntariness of use (Venkatesh et al., 2003). The purpose of formulating UTAUT was to integrate the fragmented theory and research on individual acceptance of information technology into a unified theoretical model (Venkatesh et al., 2003). As this conceptual framework intends to explore the internal and external factors that influence digital adoption, it seems reasonable to assume

that the UTAUT construct can be used as a benchmark to guide the investigation of the digital adoption aspect of the study.

Figure 1: Framework to guide digital orientation and adoption research.
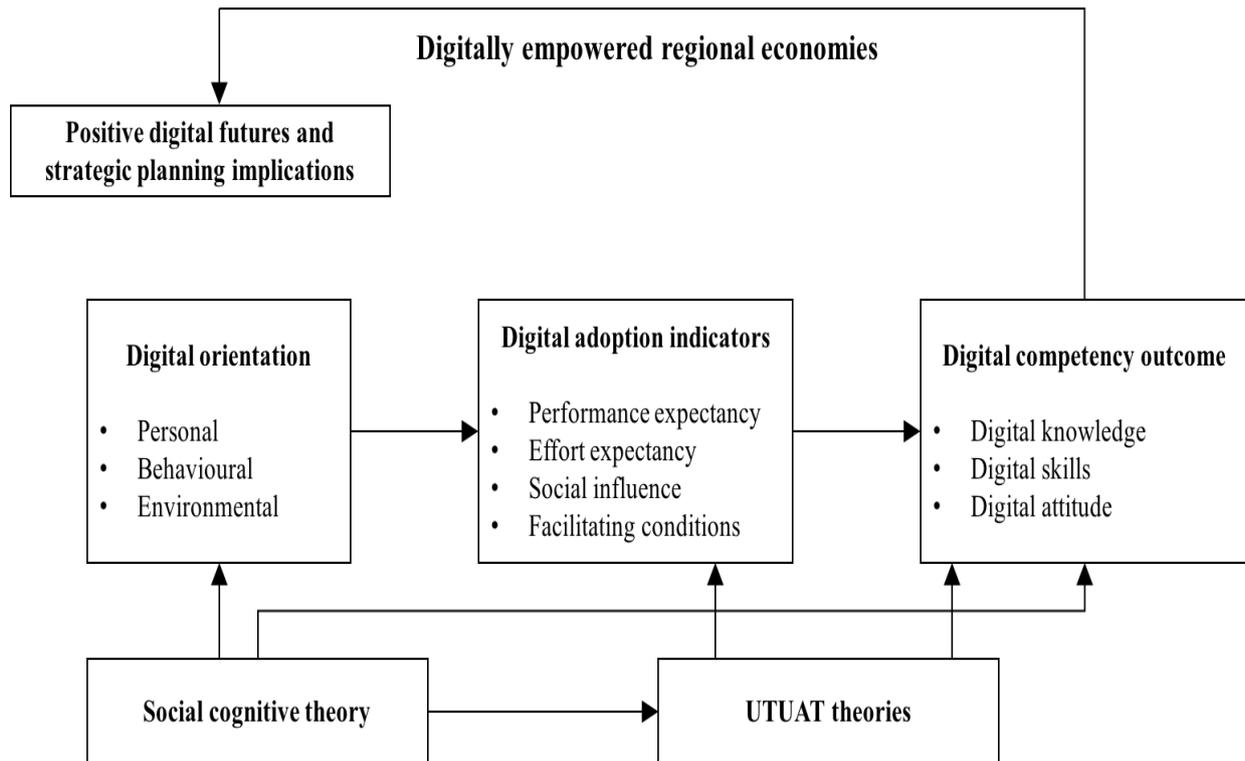
This paper indicates that the relationship between the proposed conceptual framework and the analytical framework (i.e., SWOT analysis) used in this study is significant. The conceptual framework aimed to identify relevant data that can inform a rigorous SWOT analysis. In this study, the key variables in the framework for digital orientation and adoption research were used to develop the focus group discussion (FGD) outline and the Likert scale survey instrument, which constituted the baseline data for the SWOT analysis.

Overview of digital competence: Focus on digital orientation and adoption

In the proliferation of literature on digital access (Dixon et al., 2014; Terry and Gomez, 2010), recent findings show that digital access and usage does not necessarily lead to the development of, or improvement in, advanced digital competence (Hargittai, 2010; Van Deursen et al., 2011). Ferrari (2012) argues that being digitally competent means having the ability to understand media (as most media have been or are being digitalized), to search for information, to be critical about what is retrieved (given the wide uptake of the Internet) and to be able to communicate with others using a variety of digital tools and applications (e.g., mobile phones and the Internet). According to Ala-Mutka (2011), digital competence can be broadly defined as the confident, critical and creative use of information and communication technologies (ICTs) to achieve goals related to work, employability, learning, leisure, inclusion and/or participation in society. In spite of digital competence being perceived as a prerequisite element which, as such, enables the acquisition of other key competences, the literature shows that not all groups of people or businesses have enough interest, confidence, support or opportunity to begin developing digital competence (Lindmark, 2008; van Deursen et al., 2010). In a recent study in another local government area of Queensland, Alam and Mamun (2017) found a positive but non-significant impact of households' Internet access on labour force participation. In the Alam and Mamun study, the authors further highlighted the need for developing a critical mass in realising the benefits of the diffusion of digital technologies, including the broadband Internet in rural and regional areas. According to Van Duersen (2010), the term digital competency is critical for regional economies, but empirical research remains limited.

We explore the concept of digital orientation. Conceivably, one might begin to understand the digital orientation phenomenon by asking a more basic question: 'What is orientation?'. The Merriam-Webster Online Dictionary defines orientation as 'a usually general or lasting

direction of thought, inclination, or interest' (www.merriam-webster.com). Digital orientation appears to be an emerging theme in research into digital futures. The application of the term 'orientation' in business research is increasingly evident (Narver and Slater, 1990). For instance, customer orientation is defined as an approach to sales and customer relations in which staff focus on helping customers to meet their long-term needs and wants. Here, management and employees align their individual and team objectives around satisfying and retaining customers (Hastings and Saren, 2003). Also, in the field of entrepreneurship, entrepreneur orientation is defined as the entrepreneurial strategy-making processes that key decision makers use to enact their firm's organizational purpose, sustain its vision and create competitive advantage(s) (Covin and Lumkin, 2011). Adapting this shared knowledge, digital orientation is defined as the general or lasting direction of thought, inclination or interest leading to a digitally enabled life and a continued embracing of digital transformations. It has much more depth than just a willingness or capacity to use a computer.

The notions of digital orientation and digital strategy success are not new. In attempting to understand the underlying factors that affect digital habitats in communities, Wenger et al. (2009) expressed the view that the creation of digital attitudes and awareness is complex, and that it compounds the whole orientation processes. These authors further argued that the strength of the relationship between communities and their willingness to embrace any digital initiative depended on the characteristics of their external and internal environments. Alam and Imran (2015) adopted a holistic approach that encompassed an examination of refugee migrants' online practices and information-seeking behaviour, and concluded that successful digital orientation practices go beyond the physical access to the users' ability to pay for the services. Adding to this, a recent empirical study by Erdiaw-Kwasie and Alam (2016) situated the digital divide debate within the frameworks of regional partnerships and

development and found that digital orientation strategies and programs should be context-specific.

Generally, there is a universal agreement that digital adoption occurs when individuals decide that a given technological innovation has utility and can add value to their activities if that innovation is somehow incorporated into those activities (Gagnon et al., 2012; Yusif et al., 2016). Digital adoption reflects the extent to which digital technologies are available and adopted by all key stakeholders in an economy including businesses, people and governments (World Bank, 2016). However, characterizing the adoption of digital technologies and services in every aspect of human life has incorporated dimensions that render the issue more complex than was perceived previously. These days it is recognised that both the depth and breadth of usage vary widely between different users, and that successful adoption may take many different forms (Oliveira and Martins, 2011; Wade, 2009). Consequently, it is evident that much theoretical work to date has focused on understanding the cognitive, affective and contextual factors that influence potential users' decision-making processes (Oliveira and Martins, 2011; Venkatesh et al., 2003).

This paper therefore posits that digital competency outcomes are best conceptualised within the frameworks of digital orientation and adoption. In many past studies, digital orientation has been perceived as a sub-component of digital adoption and, therefore, theoretical understanding of the former is limited (Gaffney, 2010; Hsieh et al., 2006). This paper proposes that, although digital orientation and adoption are interlinked, each process is influenced by different constructs and factors. Given that the digital orientation phase is much focused on creating awareness about the technology and its benefits, the paper posits that such orientation processes are largely influenced by the notion of social cognitive theory. On the other hand, the digital adoption refers to users' decisions to acquire and use the

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technology and, therefore, the paper establishes that the adoption process is more influenced by the UTAUT construct.

Description of the study area

The Southern Downs Region (SDR) is a local government area located in southwest Queensland, Australia on the border with New South Wales (Figure 2). The region covers an area of 7,120 km^2 and had a population of 35,738 in 2015 – 48.97% males and 51.03% females (SDRC, 2015). The Indigenous population was 3.3%, which is above the overall average of 2.5% Indigenous people in Australia. The median age of people in the region was 42 years: children aged 0–14 years were 20.6% of the population and 19.1% of the population were people aged 65 years and over. Of the total population, 26.4% of the people were attending an educational institution in 2011 compared with more than 30% in Australia. More profoundly, the attendance rate at a tertiary or technical institution in the SDR was about 12% as compared with about 21% in Australia (ABS, 2013b).

Figure 2: Map of the Southern Downs Regional Council area
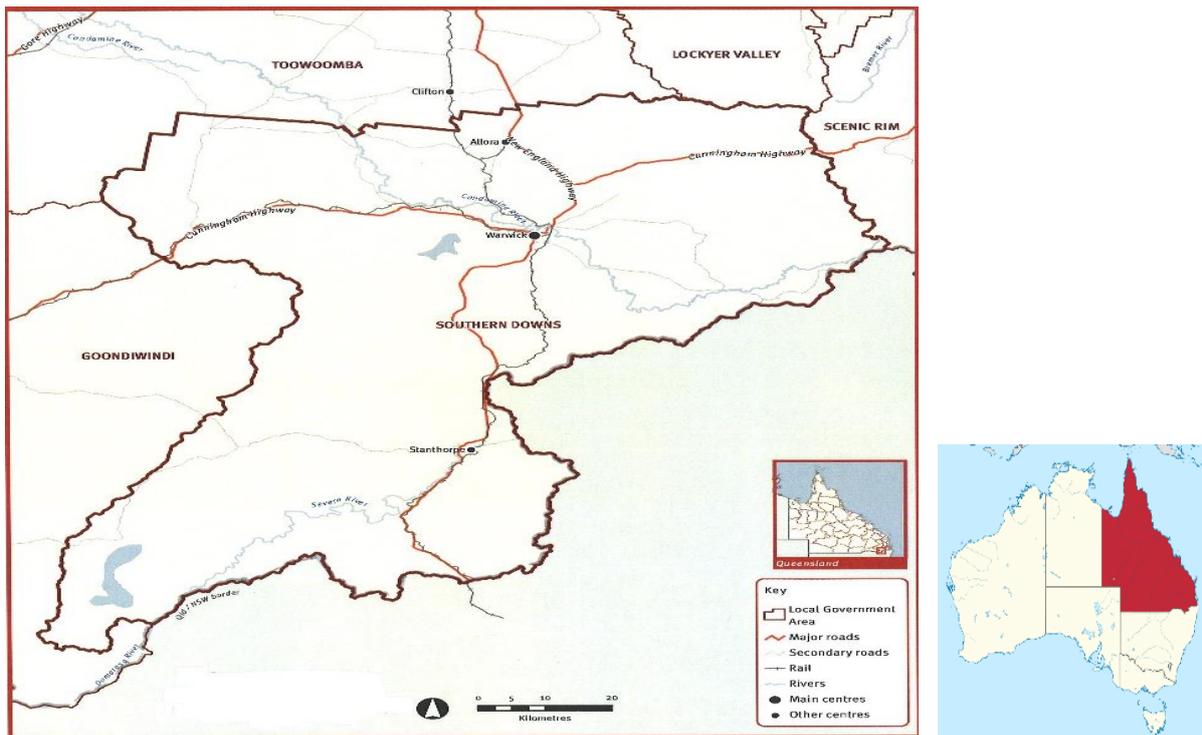
Source: Queensland Government, 2011

The region is predominantly an agricultural area. The major industries of employment include agriculture, forestry and fishing, manufacturing, retail trade, accommodation and food, education and health care services. The region is a net exporter of agricultural products, including grains, horticulture, fruits and vegetables and livestock products (SDRC, 2015). Improving the business diversity in the area as well as fostering economic growth and productivity in the digital age remain keys to the regional agenda.

Despite the enormous contributions of Warwick and Stanthorpe, the two major town centres, to the overall local economy, digital connectivity returns remain a challenge in the region, particularly in its rural and remote locations. Despite recent developments in the rollout of the National Broadband Network, reports of various projects indicate that key sectors of these towns, such as small businesses, tourism and services, continue to suffer the consequences of 'black holes' (WDN, 2016). Overall, the region is lagging behind in technological readiness

measured in terms of access to telecommunication services, household Internet connection and technology-based economic activity. In the Census for 2011 only 65.6% of the households in the region had an Internet connection, including 57.6% with a broadband connection (ABS, 2011). Vast rural and remote areas are serviced with wireless, satellite and mobile Internet where speed and reliability are a great issue. Businesses and the tourism industry in the SDR recorded low revenues and tourist numbers over the years before the introduction of broadband in 2015 (WDN, 2016). However, despite the positive impacts recorded by local businesses and households after their connection to the National Broadband Network, the digital futures goal of the SDR to build a digital economy continues to suffer from policy challenges. Among these policy challenges are the uncertainties associated with upgrading the current NBN service in the region, particularly with the decision-making and implementation phases of the high-speed broadband service.

Research Method

This research uses SWOT analysis. From a methodological point of view, a sequential mixed-method approach was used for the study – data was collected using focus group discussions and a survey questionnaire, which are detailed below.

SWOT analysis is used to identify and prioritise key internal (strengths and weaknesses) and external (opportunities and threats) factors both at micro and macro levels. These inputs can be used to streamline the prioritized development issues and interventions before they are programed for implementation. In this study, SWOT analysis is used to explore the experiences of people with digital initiatives; the challenges they face in accessing digital resources and the opportunities to realize their personal and collective goals. In doing this, the internal factors evaluation (IFE) matrix and external factors evaluation (EFE) matrix were adopted as the strategy formulation tools for the analysis. IFE and EFE tools aid formulation

of effective strategies that describe how opportunities and threats of external environment faced by an organization or region can be tailored to its strengths and weaknesses (David, 2011; Ommani, 2011). Based on the authors' own experiences with the region and expert views (i.e., local government officials, industry experts and local community group representatives) revealed during focus group discussions, semi-structured interviews and a literature review, this research strives to discover barriers to digital competencies and to develop strategies to strengthen the digital future of the region.

The researchers began with two focus group discussions in the SDR, which were guided by a set of open-ended questions. Focus group participants were recruited by the researchers with the assistance of the Southern Downs Regional Council. Prior to the focus groups, preliminary discussions were held with the participants by the research team using a PowerPoint presentation. An experienced researcher facilitated the focus group discussions as the moderator. The two focus group discussions were conducted concurrently, with eleven participants in one and eight participants in the other. Both were held at the Council's premises in Warwick and Stanthorpe. Each focus group discussion was conducted for 50 minutes. An experienced researcher was engaged as a note-taker for each group. The focus group discussions revealed the baseline variables that were used to prepare the study questionnaire.

Consequently, a structured questionnaire interview was held with 95 respondents who had expressed their views on key strategic issues that had positive and negative impacts on digital futures goals in the region. The researchers approached the study participants in person at their home, workplace or farm. The researchers' close interaction with the participants added to the credibility of the study, given that the participants were more open during the discussion period.

The issues and topics raised in the focus group sessions were then analysed and grouped under the SWOT variables. These generated findings that were presented in the form of a Likert-scale to the interview respondents. The questionnaire group was asked to rate each grouped variable on the basis whether the factor represented a major weakness (rating = 1), a minor weakness (rating = 2), a minor strength (rating = 3) or a major strength (rating = 4). The same procedure was followed for the opportunity and threat constructs. The respondents' ratings indicated their perception of how effectively the region's current strategies were in responding to the factor variables.

A SWOT matrix based on the respondents' ratings was used to organise the issues into external and internal factors. In creating IFE and EFE, each key factor was assigned a weight ranging from 0.0 (low importance) to 1.0 (high importance). The number indicates how important the factor is in the scenario under consideration. The sum of all the weights must equal 1.0. The ratings in IFE refer to how strong or weak each factor is the case under study. The numbers range from 4 to 1, where 4 means a major strength, 3 a minor strength, 2 a minor weakness and 1 a major weakness. Strengths can only receive ratings of 3 and 4, and weaknesses 2 and 1. On the other hand, the ratings in the external matrix referred to how effectively the region's current strategy responds to the opportunities and threats. The numbers range from 4 to 1, where 4 means a superior response, 3 an above average response, 2 an average response and 1 a poor response. Ratings, as well as weights, are assigned subjectively to each factor based on obtained responses.

Participants' overview

The research aims to describe and explain the underlying factors that affect digital competence, particularly barriers, with regards to its contextual condition, action and

outcome rather than explaining variance using independent and dependent variables. Thus, in this study the researchers aimed to describe, interpret, analyse and understand the factors from a regional community perspective.

The criteria for inclusion were based on a need for each participant to conform to the research ethics and a willingness on their part to share their experience and knowledge. Several potential participants were rejected on the grounds that they did not satisfy the criteria. Heterogeneity among participants was ensured in terms of their broader occupation. The diversity of the participants was maintained in terms of age, occupation, educational level and income.

Results and Discussion

Socio-economic profile of participants

The demographic information of the participants showed that males were in the majority (62%). In terms of occupation, the survey data showed that the largest proportion of the participants (55%) was employed in local government occupations, while the smallest groups were retirees and those who were volunteers. Table 1 presents a description of the study participants.

Table 1: Demographic profile of the questionnaire respondents.

	Frequency	%
Gender		
Male	59	62
Female	36	38
Occupation		
Government	52	55
Other private	10	10
Agriculture	14	15
Volunteer	5	5
Student	9	10
Retired	5	5
Education level		

Primary school	6	7
High school	20	21
Trade/certificate/diploma	25	26
Tertiary	44	46
Age group (years)		
Below 20	7	7
21–30	11	12
31–40	14	15
41–50	35	36
51–60	24	25
More than 60	4	4
Household income level – gross per year		
$0–$41,599	13	14
$41,600–$103,999	71	75
$104,000–$149,999	8	8
$150,000 or more	3	3
Monthly spending on Internet		
Less than $30	3	3
$30–$49	5	5
$50–$79	52	55
$80–$99	35	37

To ensure a proper understanding of the digital futures for profiling regional economies, the study results indicate that issues like digital orientation, adoption and usage are critical. Each issue was captured in the interview instrument. For instance, whereas the three determinants (personal, behavioural and the environment) were clearly identified as broad themes for discussion in the digital orientation context under the SWOT analysis, constructs like performance expectancy, effort expectancy, social influence and facilitating conditions guided that of the digital adoption and usage (Table 2).

The internal factors evaluation (IFE) matrix together with the external factors evaluation (EFE) matrix, as shown in Tables 2 and 3, are strategy formulation tools. These were used to evaluate the performance of the digital ecosystem within the Stanthorpe and Warwick areas by identifying internal strengths and weaknesses, as well as external opportunities and threats.

Internal factors evaluation matrix

In response to the question about the strengths and weakness of case regions in terms of the digital futures strategy, the participants' diverse views were evaluated using the IFE matrix.

Table 2: The internal factors evaluation matrix.

		Internal factors	Weight	Rating	Weighted Score
Strengths	S_{o1}	Community is receptive to digital futures	0.10	4	0.40
	S_{o2}	Some local organizations are already providing online training programs to members	0.20	4	0.80
	S_{a1}	Good past experience with technology among local residents	0.10	3	0.30
	S_{a2}	Some small businesses have already started using ICT resources for service delivery	0.20	4	0.80
		Total	*0.60*		*2.30*
Weaknesses	W_{o1}	Lack of awareness about the risks as well as the benefits of digital technologies	0.10	2	0.20
	W_{o2}	Poor infrastructure and logistics	0.40	2	0.80
	W_{a1}	Lack of knowledge on how to use the technology	0.20	1	0.20
	W_{a2}	Digital facility threshold standards promote monopoly due to fewer choices for customers	0.30	2	0.60
	W_{a3}	Uncertainty regarding the monetary return from further investment in ICT	0.40	2	0.80
		Total	*1.40*		*2.60*
		Total weighted score	*2.00*		*4.90*

The location of these communities as well as the good experiences of local residents with digital technology recorded weighted scores of 0.40 and 0.30, respectively. A significant number of respondents suggested that the role of positive attitudes of community-based organisations and small businesses towards digital technologies was a key, scoring the highest weighted score of 0.80. According to respondents, local organisations such as the Chamber of Commerce, the Granite Belt Wine Tourism, the Wine College and community groups present substantial strength in using the digital resources, and are currently working co-operatively.

> *The benefits of the ongoing online training by local community groups are immense at the hospital. Look, we can now communicate with medical experts*

online. We don't need to go to Brisbane to consult specialist doctors every time …
it saves our time and money as we don't need to visit them in person.
(Respondent 7)

To the focus group participants, these organisations are positioned to play a strategic role in the digital futures of the region alongside the Southern Downs Regional Council. They felt that the advantage of digital technology would help them to create stronger community links with greater outreach to people and business groups. The study results show that a collaborative approach among local groups, businesses and public institutions is critical in order for local communities to ensure they stimulate, create, express and interact well with digital technology and resources. Previous studies have mentioned that to ensure greater participation in the online environment and the digital economy, with its promise of improved access to business and employment opportunities, health, education and government services, the role of civil societies is equally important as that of business and local government (Erdiaw-Kwasie and Alam, 2016; Hanna, 2016).

Some participants, particularly students, acknowledged that, through positive experiences shared with their peers, they did not need to go to libraries due to the availability of resources online. To them, this opportunity not only saves them time and resources but also enhances their engagement with the technology.

The significance of using ICT resources is extremely strong in schools and colleges. We hear our friends share their experience with using digital resources and achieving better outcomes, and this shared experience boosts people's interests in using digital technologies in our assignments and studies.
(Respondent 8)

Similarly, older people admitted that videos of colleagues' experiences shared during a past digital education program sponsored by the Council helped to ignite their interest in learning how to use it. Many of the older participants indicated that the use of digital technology had made their lives easier, as they could perform activities such as on-line shopping, knowledge gathering, networking and medical consultation from home. A participant stated that:

My children have told me about the Internet and social media all the time but I had always thought it was mainly for the younger generation, not us. That particular video changed my thinking, seeing people of my age sharing their

experiences. I've learned so much and gained so much…although it is sometimes expensive. (Respondent 13)

The research findings provide insights into the importance of peer networks and support (for the general community as well as for school students) in using the technology for learning and communicating. Similarly, in the matter of telehealth, the study outcomes suggest an increasing need for peer networks where people can share their experiences and render support to help enhance efforts towards integrating the appropriate use of such technology into the lives of older adults (Yusif et al., 2016; Higgins et al., 2012).

The participants identified diverse key weaknesses of the community's access to digital resources. Limited knowledge about the use of ICT resources and the risks associated with them were weaknesses but were not too significant as they recorded a 0.20 weighting. However, factors like low monetary return from further investment in ICTs and poor infrastructure and logistics were ranked as the most critical, as each recorded a weighted score of 0.80. For example, the study participants described poor infrastructure as the 'granite shell'. A significant number of the participants shared stories of how the disconnection of optical fibres from the tower has rendered the success of technology-intensive initiatives in the region elusive, ephemeral or excessively costly. They believed success could be achieved through a 'proper' connection of the optical fibres with the tower, and by doing so deliver higher quality, greater value or more reliable outputs.

> *…the whole story boils down to the source, which is, the quality of the digital connection. People don't use it because it is bloody slow. (Respondent 11)*

This discouragement could be a key barrier to the ease of adoption that can often lead to increasing individual digital orientation and was reflected in a number of comments by participants from both individual and commercial perspectives.

Complicating matters further, the small population in the region gives residents fewer options in terms of service providers locally. The study revealed that a monopoly has developed in the region, following the general logic that service providers prefer to invest in areas where they can earn the highest returns, and also where households are able to afford these services. In an attempt to understand whether the use of the services by local businesses helps to subsidise the household cost for ICT resources, the interview results revealed that a few large

companies in the region are not enough for service providers to enjoy such a luxury. The participants argued that small businesses, particularly in agriculture and tourism, are still faced with digital challenges, as they do not have the financial capacity and technical know-how to run their enterprises on online channels.

> *...our small population size does not help us to enjoy the luxuries that come with a good Internet service. (Respondent 3)*

The study provided evidence that residents in less populated areas faced higher costs for telecommunication services and will continue to do so, at least for the foreseeable future. In practice, this has meant that regions with small populations have fewer customers to share in the cost of the central office switches, loop maintenance and other common components of the local telecommunications network. This contributes to internal constraints to reaping the full benefits of access to digital resources. This finding is in line with Stenberg's (2006) conclusion that the pattern of economies of scale for the current technology in rural areas renders service providers to spend more per customer for service provision and maintenance and hence higher cost of operation in such regions.

Although local SDR businesses are using ICT more in their operations, their overall attitude towards these resources was that they were impeded greatly by low investment returns. Despite the promise of significant benefits from ICT investments, it was observed that the reality has often been disappointing for many such businesses. Many local business ICT investments have not met functionality expectations, have been delivered much later than scheduled, and have largely inflated the operational budget.

External factors evaluation matrix

The EFE matrix result reveals that apart from the presence of well-developed digitally connected regions in the major towns such as Warwick and Stanthorpe, the increase in digital business and improved digital consciousness among external local groups are great opportunities, recording weighted score of 0.80, 0.30 and 0.40, respectively.

Table 3: The external factors evaluation matrix.

		External factors	Weight	Rating	Weighted Score
Opportunities	O_{o1}	Growing digital consciousness among local	0.10	4	0.40

			Weight	Rating	Score
		groups and NGOs through external training			
	O_{o2}	Increasing percentage of surrounding businesses with specialised ICT knowledge and skills	0.10	3	0.30
	O_{a1}	Presence of well-enabled digital towns to enhance positive digital attitude	0.20	4	0.80
	O_{a2}	Mining and hospitality tourism can reach a big audience and clientele	0.20	4	0.80
		Total	*0.60*		*2.30*
Threats	T_{o1}	Low mobile broadband penetration	0.20	1	0.20
	T_{o2}	The timing of the infrastructure rollout as other communities will get the head start before Stanthorpe has the chance	0.20	1	0.20
	T_{o3}	High prices for digital connection	0.30	2	0.60
	T_{a1}	Health research findings on computer usage	0.40	2	0.80
	T_{a2}	Pressure from external competition	0.50	2	1.00
	T_{a3}	Uncertainty remains regarding the actual implementation of National Broadband Network in this area	0.30	2	1.00
		Total	*1.90*		*3.80*
		Total weighted score	*2.50*		*6.10*

With the presence of active digital towns near the case study region, several study participants argued that there is more likely to be a positive trickling-down effect to their own communities. For them, improved digital connections in their region could strengthen the business relations between these towns and within the region, as well as integrating acquired knowledge and skills into their own business practices. One way in which businesses are able to cope and function successfully in their local environment is by utilising ICTs to extend their 'reach' and to work across broader geographies. This finding is supported by those of Herslund (2012) on creative industries.

Adding to that, the results showed that the presence of fast-growing mining and tourism industries in and around the case communities can serve as great opportunities for an industry-cluster through effective regional planning. The respondents argued that economic activities such as tourism draw population to a particular place, which can help attract large investment in digital products due to the demands of the tourists. However, the respondents again illustrated how investments in ICT infrastructure and products are essential for the destinations and for the businesses to support tourism visitation and experiences.

One issue that dominated discussion on threats was the high cost of introducing the technology as well as the ongoing innovation of technological resources. The participants added that because of its high cost, technology has been viewed as a major contributor to increasing conflict between local community leaders, who were attempting to ensure the best service for their communities, and service providers, who were concerned with strategies of cost-containment. It was also evident that the constantly emerging innovations quickly make the technology obsolete. Thus, the large gap in performance is typically a consequence of the lack of cost-effective technology.

Also, competition from businesses outside the SDR that have a high level of digital knowledge and skills pose a significant threat to local businesses, in terms of production and their ability to use digital technology in their operations. Some participants presumed and explained that local small business entrepreneurs are facing increasing competition from online shopping. They stated that customers and buyers were purchasing online from extended supply chains, which deprives the local, independent small businesses of diverse advantages ranging from profit making to public reputation. Currently, local businesses cannot compete with big companies. This ultimately drives away local businesses and can intensify unemployment problems for rural communities. Therefore:

> *...local businesses are not competitive enough to cope with pressures from surrounding businesses who are well versed with digital technology. (Respondent 14)*

> *Why waste time at local shops when you can do your shopping 24 hours a day to get stuff from anywhere in the world? (Respondent 21)*

In addition, health issues associated with computer usage were of great concern to the participants. A significant number indicated that national research findings on the effects on the health of children of excessive digital technology use remains a big obstacle to the promotion of digital technology among locals. To many participants, the recorded outcomes of such national and regional studies showing physical and mental health problems, including eyesight problems, headaches, poor eating habits, tiredness, aggression and sleeping problems, worsens the perception of many residents about the Internet, particularly among

older people. The by-product of a digital future could be a deterioration of children's health, especially as they spend extended time using technology. Two participants commented:

> *The biggest issue is kids' attraction to Facebook. It encourages them to stay at home and sitting around, it's unhealthy. Ultimately, it will cost the community millions in terms of health. (Respondent 31)*
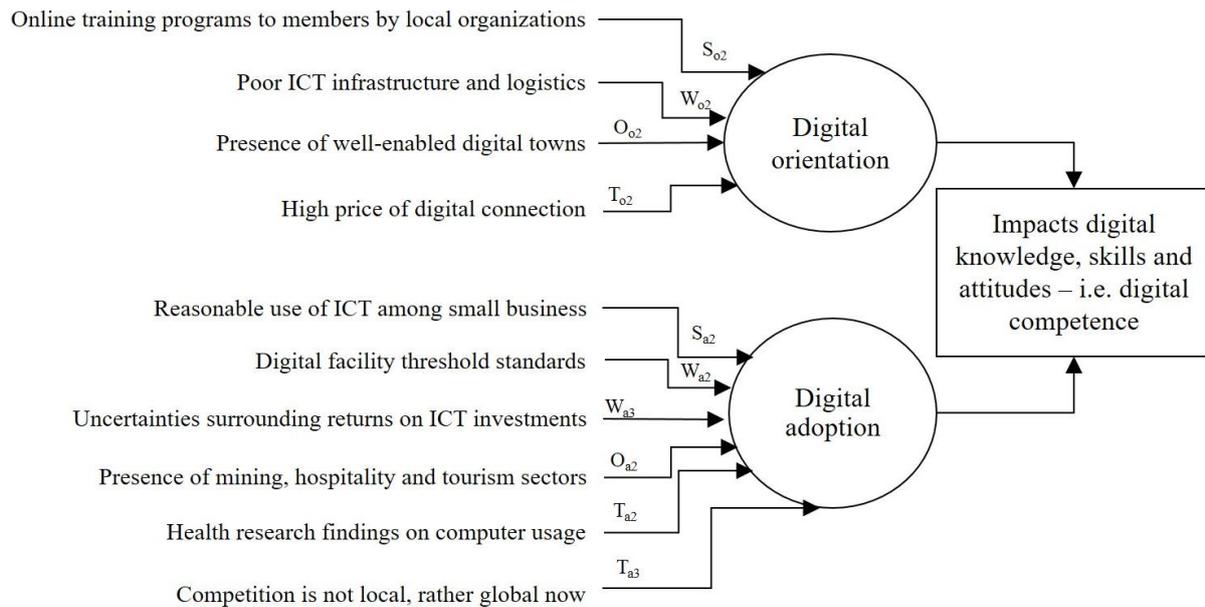
> *We've all heard of research on how the use of computers affects the health of our children and this might have discouraged some of the older generation from getting online. (Respondent 19)*

Some participants mentioned other health threats that affect young adults. For instance, the issue of multi-tasking was raised regularly. According to the participants, digital technology is intrusive and creates information overload. The study results show that participants felt that the way people are interacting with the technology makes it difficult for the users to concentrate and increases users' stress levels. This appears to be another barrier to adoption.

Digital futures and strategic planning implications

The proposed digital futures strategy for regional economies, as shown in Figure 3, recognises the variety of internal and external forces with which a regional economy is confronted. These forces may constitute potential stimulants but may also be potential obstacles to economic development goals. While Figure 2 conceptually shows that similar but separate, enabling and inhibiting factors influence digital orientation and adoption processes, Figure 3 identifies these factors in specific case studies. The proposed digital futures strategy framework can help identify, prioritise and build on the strengths, eliminate the weaknesses, exploit the opportunities and/or counter the threats in order to help strengthen digital futures strategic planning at the regional scale. Hence, the study's strategy framework aims to serve as an important baseline for the formulation of successful digital futures strategies.

Figure 3: A digital futures strategy for regional economies.

Online training programs to members by local organizations ——— S_{o2}

Poor ICT infrastructure and logistics ——— W_{o2}

Presence of well-enabled digital towns ——— O_{o2} ———> **Digital orientation**

High price of digital connection ——— T_{o2}

Impacts digital knowledge, skills and attitudes – i.e. digital competence

Reasonable use of ICT among small business ——— S_{a2}

Digital facility threshold standards ——— W_{a2}

Uncertainties surrounding returns on ICT investments ——— W_{a3}

Presence of mining, hospitality and tourism sectors ——— O_{a2} ———> **Digital adoption**

Health research findings on computer usage ——— T_{a2}

Competition is not local, rather global now ——— T_{a3}

Based on the results of the SWOT analysis, digital orientation and adoption factors were prioritised to help formulate digital futures strategies that can influence regional economies. The digital futures strategy framework establishes that before strategic planning can be done and effective long and short-term strategies pursued, it is imperative to identify the internal capabilities as well as the competitive environment of the regional economy. Unlike other studies, this research argues that digital competence is apparently impossible without special attention to both the digital orientation and the adoption processes. The study findings establish that apart from the digital orientation and adoption processes being influenced by different factors, these two go hand-in-hand to foster digital competence. The ultimate argument is that to achieve effective regional economic strategic planning, a shift towards a more robust digital futures strategy is necessary. This should leverage the strengths and limit the weaknesses of both the digital orientation and digital adoption of technology by regional populations.

Again, the ability of regional economies to change quickly and to reconfigure strategically is crucial to their success in achieving sustainable digital futures. Given the unpredictable environments in which digital initiatives thrive in regional economies, strategic flexibility should be a fundamental element of planning for strengthening digital futures at the regional level.

Conclusion

This article has presented a quantitative SWOT analysis, which empirically aims to explore the factors that can inform better strategic planning for digital futures in regional economies. This paper identified SWOT variables, and ranked, rated and prioritised these variables using a SWOT matrix approach. Using the quantitatively evaluated SWOT factors, a strategic planning framework for strengthening digital futures goals in regional economies is presented in this paper.

The findings of this research contribute to our understanding of more than just the process of identifying the strengths, weaknesses, opportunities and threats before proceeding to the formulation of long and short-term strategies. By ranking and prioritising the SWOT variables, the study helps to provide a foundation for the formulation of a successful digital futures strategy based on the region's competitive advantages and digital competence. From this result, it is clearly understood that both digital orientation variables and adoption variables are required simultaneously for increased digital competence in regional economies.

Based on the results, the identified strategies play a vital role in enhancing digital competency in digital futures strategies. The SWOT analysis provided information that is useful in matching a region's resources and capabilities to the competitive environment in which it operates and is, therefore, an important contribution to the strategic planning process at the local level. By summarizing and connecting the most influential SWOT variables, the study offers a digital futures strategy for strengthening a regional economy.

The theoretical contribution of the study is the proof of a concept for using the well-known SWOT matrix tool to identify and to examine digital orientation and adoption variables to provide suggestions to increase competency in digital futures research for regional economies. However, as the digital futures strategy planning procedures can be complicated by numerous criteria and interdependencies, and through conflicting priorities among the stakeholders, the utilization of conventional SWOT analysis has become insufficient. The authors believe that a follow-up study using a more advanced SWOT analysis technique such as an analytic network process, which measures and takes into account the possible dependency among the factors would be of value to building on these findings, which can

help inform more robust digital futures strategies. Such data would be useful for other regional economies seeking to align their digital futures strategy with the knowledge provided by an analysis of their response to digital resources.

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