

Sustainable competitive advantage in entrepreneurial software firms in Pakistan: Establishing a conceptual research framework

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ABSTRACT

Software firms are expanding within increasingly-competitive domestic and global marketplaces. Registered software firms in Pakistan seek new ways to better compete and remain as sustainable competitive entities. Such firms operate entrepreneurially, and remain subject to dynamic digital and globally-emerging changes. A literature review establishes constructs, conceptual relational hypothesis pathways, and an overall (testable) research framework for software firms in Pakistan. The framework is likely useful when modelling for improvements contributing towards sustainable competitive advantage shifts.

Keywords: Entrepreneurial orientation, knowledge creation, absorptive capabilities, competencies, sustainable competitive advantage, software development.

INTRODUCTION

Achieving long term 'sustainable competitive advantage is becoming harder within software industry in Pakistan as the number of new SECP registered software firms continues to increase (*source* <https://moitt.gov.pk/>) from 395 in 2014 to 581 in 2016 to 1452 in 2018 to 2826 in 2020. Currently there are over 3000 software firms registered. Pakistan software firms create useable code and coding products across software technologies, new initiatives, distributive solutions, and new software. However they also face direct and indirect competitive pressures from freelancing software developers with Pakistan being the third most popular freelancing software country, and ranking fourth in global freelancer growth (*source* <https://moitt.gov.pk/>). Thus, although the software industry remains a sizeable, highly competitive, and profitable business domain it remains under cost constraint pressures, Pakistan software firms remain in continual pursuit of sustainable competitive advantage solutions.

The State Bank of Pakistan says Pakistan currently exports over \$700M worth of software products. In FY2019- 20 Pakistan software firms generated \$831M in revenue this grew to \$1.9B during FY2020-21. In FY2020-21 software imports and local development of software for domestic totalled \$1.2B. Currently the industry generates around \$3.5B in revenue (USA International Trade Administration website). However forty five per cent of their projects has delivered below target sales returns. This was partly due to COVID-19 restrictions necessitating reducing software completions, and in some cases, partly due to firm shutdowns and consequent lost business opportunities. Today yet another software firm sales complication is the external requirement to deliver additional democratized connectivities capabilities, and further global universal system functionalities.

Pakistan's software sector has a mix of local application developers, freelancers, and IT firms working primarily in domestic and corporate applications developments. Most high-end companies focus on enterprise resource management and customized solutions for specific firm or industrial sectors. However, some local companies and freelancers are focused in the online social media space working particularly in the 3G and 4G domain to deliver consumer applications based on Android or Apple platforms, website development, e-wallets/payments, e-commerce, and online gaming. Foreign software firms engage either local distributors or their own technical/developer/support teams (Pakistan - Country Commercial Guide, Computer Software (2022)).

Pakistan government levels prioritize growing the IT and software industry. They offer incentives including incentives include: (1) 100% equity ownership, (2) IT exports revenue income tax exemptions, (3) 100% profit repatriation, (4) tax break for venture capital funds (before June 2024), (5) 30% accelerated depreciation on computer equipment, (6) State Bank of Pakistan (SBP) permission for banks to open Internet Merchant Accounts, (7) availability of instant, reliable, and high-speed internet connectivities. Thus with government support, plus domestic and international demands growing, the software industry in Pakistan is targeting sustainable competitive advantage growth strategies. For example, in 2022 advances in broad mobile

wallet usage, and cheap smartphones, are together helping Pakistan's e-commerce sector generate over \$1.5B in revenue (Pakistan - Country Commercial Guide, Computer Software. (2022).

Software firms are by nature entrepreneurial in their orientation. They pursue and develop new coding solutions. They use their knowledge in creative ways to generate working solutions to new, emerging, or potential problems. This approach to problem solving initiates the firm's engagement of its relevant capabilities into a collective absorptive system specifically targeted to meet the new coding solution requirements. This may involve guesswork, trial and error, design science, experimentation, exploitation, extension, and eventually collation into a useable product suite, offering ongoing sustainable competitive advantage solutions.

Hence this study pursues understanding around '*how the entrepreneurial orientation and the knowledge creation of Pakistan software firms can help them action their absorptive capabilities and use these components to deliver ongoing sustainable competitive advantage.*' The Pakistan software firm study explores dimensions of Entrepreneurial Orientation and Knowledge Creation across the industry, and how these engage firm Absorptive Capabilities to influence and help build Sustainable Competitive Advantage. It presents these as a framework model and as an introduction to the authors' ongoing research. It also identifies key limitations of enhancing firm performance in software firms in Pakistan.

LITERATURE REVIEW

This section reviews previous literature on entrepreneurial orientation (EO), knowledge creation (KC), absorptive capability (AC) dimensions, and sustainable competitive advantage (SCA). It then delivers a theoretical framework for delivering SCA within the software industry in Pakistan.

Knowledge Creation

KC has a theoretical basis regarding the business domain. It directs towards maintaining firm sustainable competitive advantage. Within the business domain, KC has 'organizational' or 'individual' connotations. KC empirical and/or theoretical firm studies around Nonaka et al.'s (1995) theory suggest knowledge and its generation is a resource leading towards firm sustainable competitive advantage. More recently theory, process and knowledge have expanded into diverse topics, such as absorbent capabilities, organizational learning, leadership styles, cultural aspects, and entrepreneurial contribution (Agarwal et al., 2022). KC is also a multi-component new knowledge acquisition construct, and Oyemomi et al., 2019 and Tootell et al. (2020) suggest it enhances firm performance and sustainable competitive advantage.

Knowledge

Knowledge is a skills and cognitions set that may apply to solve a firm practical or theoretical problem (Kim et al., 2022). External knowledge is globally acquired information and/or other sourced data (Roper et al., 2017). Internal knowledge is created by workforce individuals, systems networks, and/or beliefs (Meyer & Sugiyama, 2007). However new knowledge often blends internal knowledge components with present firm information and external knowledge acquisitions (Gourlay, 2006). Some suggest knowledge can classify as either tacit knowledge involving individual actions, experiences, procedures, values, and/or emotions (Nonaka et al., 2014). Tacit knowledge is most challenging and sometimes non-verbal (Agarwal et al., 2022). In contrast explicit knowledge is stored in hard assets -like documents, graphs, booklets, and manuals (Park et al., 2015) or extracted information from memory (Nonaka & Konno, 1998). Explicit knowledge is often technical or academic or codified knowledge (Lichtenthaler, 2016).

Software Industry Knowledge Creation

Software firms encounter opportunities and pressures within modern dynamic, technological and economic environments (Huang & Chen, 2022). In today's digital economy, knowledge is critical to delivering sustainable competitive advantage, but it is extensively spread across the global and digital marketplace. Hence, firms strive to create new strategic knowledge (Flor et al., 2018). Global, internet-connected, technological progression has reduced the digital differences between geographically-located knowledge sources. Hence, software developers pursue new knowledge horizons seeking further firm sustainable competitive advantage (Yi et al., 2021). Such pursuits can interconnect and promote firm innovativeness (Ferraris et al., 2017). Consumer relationship connectivities can also interlink firm R&D processes (Papa et al., 2018). Here, software firms pursue valuable new knowledge, conduct market-related activities, retain marketplace position, increase sales, deliver customer service, improve performance, and co-create products (Roper et al., 2017; Santoro et al., 2018) within changes in the knowledge-based economy (Tura et al., 2019; Ulas, 2019), whilst generating positive firm performance-related changes and a SCA (Abbas, 2020; Bag et al., 2021; Gangi et al., 2019; Papa et al., 2020). Thus, KC remains a strategic competency for the firm (Abbas & Sağsan, 2019), and is a likely precursor supporting firm capabilities and the firm's strategic business framework (Mardani et al., 2018).

Measurement of Knowledge Creation in Software Firms

Processes, techniques, and tools to deliver new knowledge into usable formats and participate in (SCEI Model) processes are called KC (Nonaka et al., 2000). Four different links exist between explicit and tacit knowledge. Several research studies have indicated KC is beneficial to hi-tech firms - as KC can support individual firm quests for sustainable, competitive advantage (Tootell et al., 2020).

KC captures both 'know-how' and synthesis. It supports integrating developing new ideas into firm-enriching and actionable solutions (Gourlay, 2006). KC can be a five-step KC process (share experience to explicit knowledge to justifying concepts to prototyping to cross leveling knowledge) (Song, 2008; Song et al., 2011), or it can be a three-step process (generating, then codifying, then transferring) knowledge (Barley et al., 2018).

KC involves the introduction of new knowledge into the firm (Gamble, 2020). KC codification captures/represents knowledge used repeatedly by a firm or its workforce. KC shares and utilizes components according to available firm absorptive capacities (Barley et al., 2018). KC, in part, arises from general knowledge management. Previously, KC was often tacit knowledge focused, but currently it is more a continuous firm workforce/individual procedure that is often applied and amplified whilst integrating existing firm knowledge systems (Von Krogh et al., 2012).

KC processes and interactions between tacit and explicit knowledge transform knowledge type mixes into firm-wide knowledge. For example, the SECI KC model constantly interchanges and converts firm knowledge, and then dynamically sequences relevant delivery processes (Nonaka et al., 2006) towards firm SCA solutions. New opportunities emerge when exploiting knowledge interactions and dynamic-workforce groupings into latest knowledge sharing (Chatterjee et al., 2018). The SECI KC model of knowledge conversion and transformations between explicit and tacit knowledge follows natural, rational, purposeful procedures (Andreeva & Ikhilchik, 2011) – captured as four tacit and explicit knowledge steps (socialization (tacit collation), externalization (converting tacit to explicit), combination (grouping explicit forms), internationalization (reassigning and recombining present knowledge into new knowledge). This study borrows KC measures from Papa et al.,'s (2018) four SECI segment measurement approach - as these capture KC and encompass related dimensions of knowledge management (knowledge transfer, documentation, and acquisition capacities) as tacit and explicit knowledge (Mehralian et al., 2018). It measures KC externally as a (1) new value-adding process, (2) new idea complementing current research, (3) significant unique data capture, (4) unique organizational opportunity, and internally as a (1) beneficial technologies transfer, (2) new problem solution, (3) hard-to-imitate competency, and (4) firm enriching prototype.

KC and Sustainable Competitive Advantage

Knowledge is critical to actioning firm performance capabilities (Chung et al., 2019). High-tech software firms need adequate knowledge resourcings to remain competitive (Cavaleri & Shabana, 2018). Currently knowledge remains a critical resource in delivering a sustainable competitive advantage (Bolisani & Bratianu, 2017, Tura et al., 2019). KC is a procedural process that continually incorporates and transfers tacit and explicit knowledge (Park et al., 2015). It builds new knowledge and delivers (1), new methods (2) new solutions to solve problems, (3) enhanced performance, (4) innovative work approaches, (5) novel concepts, (6) new products, and (7) new ways of reasoning (Crescenzi et al., 2016). As KC develops, novel and valuable ideas and solutions in firms. Thus, firms holding a constant competitive edge likely create additional wealth, value, and sustainable growth (Omar et al., 2016). The conversion of new knowledge into auctioning capabilities permits a firm to be more productive and efficient whilst also reducing costs and increasing speed of developing/introducing new products (Ichijo & Nonaka, 2007).

Studies indicate firms exploiting advances in KC to build additional or better capabilities, can successfully develop SCA (Cuevas-Rodríguez et al., 2014; Nonaka et al., 2000, Arnett & Wittmann, 2014; Ichijo & Nonaka, 2007; Mahdi et al., 2019) to surpass competitors (Spraggon & Bodolica, 2017). Thus, this study hypothesizes (H1a-d) 'KC is an initiating competency construct in the build of actioning ACs through its constructs blocks (acquisition, assimilation, transformation, exploitation). It further hypothesizes (H11) that KC contributes towards enhancing SCA.

H1a: KC positively influences acquisition

H1b: KC positively influences assimilation

H1c: KC positively influences transformation

H1d: KC positively influences exploitation

H11: KC positively influences SCA

Entrepreneurial Orientation

EO is well-studied (Covin & Wales, 2019). A firm's EO engages when pursuing entrepreneurial activities and endeavors (Jeong et al., 2019). EO encompasses practices, procedures, decision-making and problem-solving activities. These can encompass a novel product, technical innovation, new procedure, or different business model precursor, with each possibly influencing SCA (Altinay et al., 2016). Entrepreneurship literature suggests EO (1) helps knowing why, and how, various firms enlist new ways to develop/reinvigorate/improve over-time, (2) occurs via sets of variable items, or a continuous construct- thus offering more than one dimension to frame the firm, and (3) is unique from other entrepreneurial constructs - like entrepreneurial philosophy, climate, and others. Thus, EO is likely a fundamental entrepreneurial process component (Rodrigo-Alarcón et al., 2018).

Although greater EO generally provides better performance (Alegre & Chiva, 2013; Brettel et al., 2015; Campbell & Park, 2017; Jeong et al., 2019) an EO firm pursues efficient decision-making (Lumpkin & Dess, 1996). This study views EO as causal influence on firm performance and growth, and linking into relative performance diversity among various firms (Gaur & Delios, 2015), but recognizes EO should capture a range of variables across relevance, position, and impact in emerging SMEs markets (Jeong et al., 2019). EO also effects other constructs, and other stages of firm development (Covin & Wales,

2019). Hence for SMEs – like software firms, the literature supports EO as a suite of capacities measures (proactiveness, risk taking, innovativeness, competitive aggressiveness, autonomy) (Mullens, 2018, Gauthier et al., 2021, Mostafiz et al., 2021, Omisakin & Adegoke, 2022).

Proactiveness

EO proactiveness is a will to detect and seize innovative market opportunities (Covin & Wales, 2019), and be (1) early in the marketplace, (2) fast/active to develop products, (3) adopting new processes/services, (4) effective in searching for new industry opportunities (Kohtamäki et al., 2019).

Proactiveness is ‘acting’ instead of ‘reacting’ (Kraus, 2013) by capturing opportunities, observing new industry trends, and foreseeing the future requirements of clients (Lomberg et al., 2017). A proactive firm can be a marketplace pioneer (Filser & Eggert, 2014). In SMEs higher proactiveness pushes increasing growth and prosperity (Corrêa et al., 2022) by directing resources towards creating new products/services, capturing both opportunities, and winning new marketplaces (Song et al., 2017). Proactiveness inspires firm R&D activities (Lee & Roh, 2020), and reconfiguring resources into innovation and towards firm SCA (DeTienne et al., 2015). Thus, literature suggests EO proactive approaches push towards adopting new innovative techniques/technologies, delivering efficient performances/activities (Kreiser et al., 2010), and providing solutions desired by the marketplace. This relationship forms hypothesis (H4a-d). It further hypothesizes proactiveness as contributing to the required sustainability of the firm (H14).

- H4a: Proactiveness positively influences acquisition
- H4b: Proactiveness positively influences assimilation
- H4c: Proactiveness positively influences transformation
- H4d: Proactiveness positively influences exploitation
- H14: Proactiveness positively influences SCA

Acquiring and retaining new knowledge is important in software industries provided it’s utilized and resourced into pathways developing new processes/products/services. Proactiveness adds scope to firm innovation developments and operational performance advances (Lee & Roh, 2020). To study proactiveness in software firms we borrowed measures from Alshanty and Emeagwali, (2019).

Innovativeness

(Malerba and McKelvey (2020) note innovativeness is recognized within EO. Innovation has many forms – like product, market, service, process, and/or technological innovation. As a ‘creative destruction: process’ launching new processes/products/services and disturbing marketplaces (Lee & Roh, 2020), innovativeness initiates/promotes/acquires/produces/fosters new knowledge that adds to creation of new products/services, and to optimally and profitably utilizes resources/knowledge reservoirs (DeTienne et al., 2015). Innovativeness is a key EO dimension (Tresna & Raharja, 2019). Literature is still clarifying if EO innovation is an input or output component (Baregheh et al., 2009). Innovation considerations, like marketplace and product deliverables are considered outcome measures, whilst process and behavioral innovation capture underlying factors facilitating product and marketplace innovation. This study considers innovation a part of EO, and not as an innovation outcome. Hence this study hypothesizes (H2a-d) innovation as an important initiating construct in building AC through its constructs blocks (performance, services, intelligences, and applied risk taking). It further hypothesizes innovation as contributing to the required sustainability of the firm (H12).

- H2a: Innovativeness positively influences acquisition
- H2b: Innovativeness positively influences assimilation
- H2c: Innovativeness positively influences transformation
- H2d: Innovativeness positively influences exploitation
- H12: Innovativeness positively influences SCA

Within the software industry, innovation is typically an iterative procedure of technology and process invention that initiates new services and marketplaces. It initiates processes including development, creation, product, and marketing considerations – these may offer firm performance successes and SCA. However, technological knowledge within the firm, and in-house R&D, remain important aspects of innovativeness. (Canzano & Grimaldi, 2012). To gauge innovation in software firms we adapted measures from (Alshanty & Emeagwali, 2019).

Competitive Aggressiveness

Competitive aggressiveness describes firm tendency to intensely and immediately challenge rivals/competitors, and either attain entry, or develop differentiated performance competencies within the industry (Yaro et al., 2020). It represents the firm motive to block rival/competitor actions (Obi et al., 2021) by ‘thinking-outside-the-box’ (Cho et al., 2021). This specific planned proactive/reactive preparedness (Habib et al., 2020) helps aggressively drive towards a performance level, and successfully compete within marketplaces (Sutejo & Silalahi, 2021). It often follows a cost and price format (Porter, 2008), sometimes involving previously unachievable consumer options at lower prices, and occasionally accepting reduced profits (Stambaugh et al., 2020). Alternatively, competitive aggressiveness can increase where pace/frequency of rival attacks is higher (Crick, 2020) – such as in alliances and mergers situations (Panjaitan et al., 2021). Hence, competitive aggressiveness is measurable via firm attitudinal awareness, combined with available proactive/reactive capacities (or skills) to quickly generate

desired change. Thus, competitive aggressiveness also links into the firm's ACs to implement change. Overall competitive aggressiveness relates to other EO constructs and forms the hypothesis block of H5a-d. Further, it also links to the delivery of a sustainable marketplace (SM) and a SCA for the firm. This is hypothesized as H15.

- H5a: Competitive aggressiveness positively influences acquisition
- H5b: Competitive aggressiveness positively influences assimilation
- H5c: Competitive aggressiveness positively influences transformation
- H5d: Competitive aggressiveness positively influences exploitation
- H15: Competitive aggressiveness positively influences SCA

Awareness, motivation and capabilities determines level of competitive aggressiveness in software industry. Software firms gain competitive aggressiveness by executing latest technologies before rivals and it adopts multiple approaches to outcompete other (Ameer & Khan, 2020). To calculate competitive aggressiveness in software firms we borrow measures from (Alshanty & Emeagwali, 2019).

Autonomy

EO autonomy is the firm working independently, making decisions, taking actions, assigning individual delegation, and supporting empowerment (Krauss et al., 2005; Rauch et al., 2009). Autonomy offers firm workforces individual liberties (and often liberty within teams) to enhance personal creativity and vision, and to promote favorable environments for entrepreneurship to occur (Omisakin & Adegoke, 2022). Autonomy supports innovation and creativity, and these link towards quality performance. Autonomy enables individual freedom, but brings enforced controls to prevent misuse (Wales et al., 2013). Autonomy encourages firm entrepreneurship, but also promotes opportunistic individualistic behavior (Lumpkin & Dess, 1996). Autonomy contributes to new ideas, but remains hard to estimate, especially as to its linked contributions towards marketplace acceptance (Tresna & Raharja, 2019). Autonomy positively links towards entrepreneurial firm performance (Gauthier et al., 2021). Management helps build innovation and creativity to emergent opportunities and problems in entrepreneurial firms (De Jong & Den Hartog, 2007, Ireland & Webb, 2007). Managers can also facilitate firm-wide autonomy and balance smart resourcefulness against rule-breaking, along with firm and individual initiatives (Peters & Kallmuenzer, 2018), especially when pursuing novel opportunities (Baier-Fuentes et al., 2019).

Innovative firm structures with smooth hierarchies of authority, may offer powers of decision-making to operate as an independent entity or autonomously. These can promote ongoing business innovation and new ventures (Arshi et al., 2020). Thus, innovation and autonomy likely covary. Further, autonomy links towards ACs and supports their active implementation of change. Thus autonomy relates to ACs across its constructs, and this forms the hypothesis block of H6a-d. Further, autonomy combined with innovation link to the ongoing enhancement of a SM and to a SCA for the firm. This is hypothesized as H16.

- H6a: Autonomy positively influences acquisition
- H6b: Autonomy positively influences assimilation
- H6c: Autonomy positively influences transformation
- H6d: Autonomy positively influences exploitation
- H16: Autonomy positively influences SCA

Autonomy is important in building firm performance in software firms. By providing ability to work independently to other employees, creating small departments according to tasks, giving employee freedom to individually solve queries and develop a product part, novel ideas emerge that can further empower SCA in the marketplace (Hakala, 2013). To study autonomy in software firm we adapted measures from (Alshanty & Emeagwali, 2019).

Risk-Taking

Risk-taking is firm tendency to take uncertain initiatives and execute risky activities whose results are not sure (Peters & Kallmuenzer, 2018). EO, early researchers described risk taking as firm risk due to new entry and innovation (Miller & Friesen, 1982). Today risk taking is a firm skill dependent upon entrepreneurial desires for control/development/operation of risky ventures (Corrêa et al., 2022). SMEs - like software firms, see entrepreneurial risk-taking as linking with capabilities performance levels (Meekawekunchorn et al., 2021), with risk assessed against fiscal impact of firm capabilities performance levels (Belás et al., 2018). Risk taking can be structural and/or organizational, and set against firm goals and objectives (Brettel et al., 2015).

Risk taking can be high if firms acquire (1) large/risky investments, (2) new venturing resources, (3) new human and financial resources for untested marketplaces, (4) large bank debts (Baker & Sinkula, 2009, Filser & Eggers, 2014). Risk is not gambling. It is a summary calculation, and often includes safety hazards (Dess & Lumpkin, 2005). Risk averse firms often miss advantageous opportunities, and so create missed opportunities risk (Nishimura, 2015). Risk can be external and internal and miscalculated leaving the firm further and less competitive (Bekefi et al., 2008). Hence there remains a wide gap in EO literature concerning the risk taking construct and its measurement dimensions (Naldi et al., 2007).

Risk taking relates to ACs constructs, and this forms the hypothesis block of H3a-d. Also, risk taking is a competency measure, and it likely covaries with innovative strategies, levels of autonomy, degrees of proactiveness, competitive aggressiveness, and

to some degree KC. Further risk taking likely impinges on ongoing enhancements to a SM and to a SCA. This is hypothesized as H13.

- H3a: Risk taking positively influence acquisition
- H3b: Risk taking positively influence assimilation
- H3c: Risk taking positively influence transformation
- H3d: Risk taking positively influence exploitation
- H13: Risk taking positively influence SCA

Risk taking in software firms is a common occurrence as they develop new projects to consumer requirements. By analyzing their past projects, designing prototypes, and apply beta testing, firms take calculated risks against new technologies and platforms. To study risk taking in software firm we borrow measures from (Alshanty & Emeagwali, 2019).

Entrepreneurial Orientation and Sustainable Competitive Advantage Relationship

The resource-based view believes a firm's higher performance and SCA arise from firm-specific capabilities and resources that are not as affordable to competitors, and/or are rare, and/or are values laden, and and/or non-substitutable (Mullens, 2018). Resources contain, but are not restricted to, capabilities, assets, organizational processes, information, firm attributes, and knowledge (Barney, 1991). EO refers to existing procedures or competencies, and these may then lead towards creating a new capabilities opening, and this intangible resource can be used by the firm to help create SCA (Ibarra-Cisneros & Hernandez-Perlines, 2020). Intangible assets, rather than physical ones, often drive different firms' performance levels - because intangible firm assets are normally not as vulnerable to imitation by competitors as are physical firm assets (Mostafiz et al., 2021).

Considering software firms, EO is processes, practices, philosophy, and decision-making activities helping then innovate (Emami et al., 2022). Firms with solid EO management continuously seek new opportunities towards strengthening their sustainable competitive positions (Hidayat et al., 2021). Opportunities are not necessarily associated with something new, and they can be related to optimizing current firm structures (Covin & Wales, 2019). Firms committed to pursuing SCA, likely review the dynamics of their marketplace and their entrepreneurial advantage (Jansson et al., 2017). Thus software firms continue to work on new capabilities pathways to overcome obstacles and to retain their SCA. EO can help the firm frame capabilities opportunities and also adapt to technological and other changes (Arshi et al., 2020). Hence this study hypothesizes that for software firms, there is a likely positive transition from EO to ACs and to SCA,

Absorptive Capability

AC is the firm's ability to recognize, assimilate, transform and utilize resources from the environment. These auctioning dimensions suggest that is not only the ability to reproduce already present technological solutions and products, but it also enables the firm to develop new products/services by combining new and existing knowledge (Zahra & George, 2002). AC facilitates firms to be responsive to valuable external knowledge to recognize opportunities according to current vibrant needs and a dynamic business environment (Lee et al., 2018). AC allows firms to constantly reconfigure their existing capabilities and resources stocks, and to action and create new helpful capabilities and knowledge components to meet environmental and business needs (Wang et al., 2020). According to dynamic customer requirements, firms – like software firms, can then adaptively and flexibly utilize their new and developing resources to feedback, modify, and re-create superior competencies, and/or product/service capabilities into more efficient and technological beneficial developments (Migdadi, 2022). Thus, AC is not about updating firms, but it is about innovating, and generating new knowledge and resources (Lichtenthaler, 2016). Hence, it is likely important for firms to invest in AC, since this can, enhance, complement and refocus its knowledge base (Flor et al., 2018).

AC divides into two groups: potential AC and realized AC (Zahra & George, 2002) - with four further primary capabilities constructs or dimensions (1) acquisition of new beneficial knowledge, (2) assimilation of acquired knowledge, (3) transformation of refined, integrated knowledge, (4) exploitation by altering knowledge into firm operations (Usman et al., 2022).

Acquisition and assimilation are potential ACs and transformation, and exploitation are realized ACs (Ahmed et al., 2020). Each dimension is believed a distinct capability of a firm, and collectively they deliver AC (Sun & Anderson, 2010), and further explain dynamic influences of knowledge mechanisms against marketplace change conditions (Zahra & Hayton, 2008).

Acquisition

Acquisition is a firm (or a software firm) ability to identify/gather/apply external resources and increase performance. This is knowledge focused (Zahra et al., 2009) towards firm resources and R&D actions. Intangible acquisition influences include determination to acquire knowledge, speed, intensity, motivation and the selected direction (Rodríguez-Serrano & Martín-Armario, 2019), plus inter-functional exchange interfaces and staff participation (Lichtenthaler, 2016). Resultant technology updates focus towards out-competing market rivals (Lee et al., 2018). We adapted measures from (Jansen et al., 2005), (Engelman et al., 2017), (Flatten et al., 2011) and (Lee et al., 2018)

Assimilation

Assimilation is routines and processes that let firms examine/process/explain/appreciate information gained from external sources (Zahra & George, 2002). These helps mobilize capabilities actions such as thrive to learn new things or training about new market trends (Hernández-Perlines et al., 2017). Knowledge assimilation measures according to firm managerial task, compensatory, centralization functions (Flor et al., 2018). Assimilation also develops across exchange or inter-firm interfaces, and good connectivities pathways (Knoppen et al., 2011).

Assimilation from the software firm perspective enlists processes to identify/capture requirements fitting the construct's capabilities. External information and technologies coalesce into relevant innovative strategic actions (Lee et al., 2018). We adapted measures from (Jansen et al., 2005), (Engelman et al., 2017), (Flatten et al., 2011) and (Lee et al., 2018).

Transformation

Transformation refers to a firm capability to refine/develop/action routines which assist in the combination of prior/newly acquired resources (Zahra & George, 2002). Transformation offers two elements - internalization and conversion. These measure as impact of research projects against new product and/or innovative ideas (Volberda et al., 2010). This area lacks detailed empirical and theoretical dimension support. Recent conceptual literature suggests transformation is affected by entrepreneurial factors (1) coordination skills, (2) systems facilities, (3) socialization workforce abilities.

Software firms apply new software versions/policies to frame compatibilities against developed products and external marketplace environments They also create new algorithms with gained knowledge and store these for future use in different products/services. We adapted measures from Jansen et al., (2005), Engelman et al., (2017), Flatten et al., (2011) and Lee et al., (2018).

Exploitation

Exploitation is firm ability to use new external resourcing and increase innovation to increase firm performances (Lichtenthaler, 2016). Exploitable capability either enhances/expands/influences existing capabilities or creates/actions new knowledge capabilities (Usman et al., 2022). The capability to exploit knowledge is affected by accessibility of connectivities mechanisms, formalization mechanisms, and socialization tactics (Zahra & Hayton, 2008). The qualitative research of five biotechnology firms explored ACAP process, concluding several vital characteristics exist across ACs process. It also confirms cumulative/multidimensional/interactive features of procedures highlight the iterative, uncertain, and nonlinear nature of ACs process.

Exploitation in software firms set multi-probe rules against delivering monetary and strategic benefits, which include significant development of prototypes, assigning tasks to different departments, confirming use of programming software and implementation of other specified technologies by means of active knowledge transfer. We adapted measures from Jansen et al., (2005), Engelman et al., (2017), Flatten et al., (2011) and Lee et al., (2018).

Absorptive capability: Mediation between Knowledge Creation and Sustainable Competitive Advantage

Past era knowledge sources often deployed KC including (1) importing capital goods, (2) education and (3) technology licensing (Sahasranamam et al., 2019). Today, firm knowledge-based resources direct towards technological knowledge, and software (Ismail et al., 2018), and economic firm-related competencies and capabilities link with SCA (Wang et al., 2020). Some studies links KC and ACs relationship pathways (Knoppen et al., 2011; Scuotto et al., 2017; Volberda et al., 2010; Zahra & George, 2002), and a skilled workforce also helps build firm ACs (Ahmed et al., 2020). Firm EO competencies also help create marketplace opportunities. These articulate into initiated absorptive capacities that raise performance channels towards generating SCA (Scuotto et al., 2017). Researchers (1) explore AC as improving EO (Zahra et al. 2009), or (2) adopt AC as moderating EO-to-firm performance-related outcomes (Zahra & Hayton 2008). Engelen et al., (2014) use AC as moderator in estimating EO on performance-related outcomes such as SCA.

In this study, AC is proposed as mediating between EO and SCA, with links between new information/ knowledge pathways pursuing ongoing/potential marketplace opportunities (Hernández-Perlines et al., 2017). Additionally, a strong EO and high AC improves innovation activities and speed, helps develop new products and services in respond to marketplace opportunities and likely positions the firm with a stronger SCA (Zhai et al., 2018). Hence based on the above sections of research, this study recognizes the EO and SCA relationship can be expanded by including the likely mediating effect of AC. This relationship also supports the embedded hypotheses H7 H8 H9 and H10.

- H7: ACs have positive influences on firm SCA
- H8: ACs have positive influences on firm SCA
- H9: ACs have positive influences on firm SCA
- H10: ACs have positive influences on firm SCA

Sustainable Competitive Advantage

Sustainable Competitive is measured by an organizational success that uses internal resources to satisfy consumers in the marketplace and by meeting consumer demands more than their competitors (Maury, 2018). In competitive and slow-growth markets, firm leaders focus on achieving SCA (Hossain et al., 2021). A firm can have competitive edge after implementing a

strategy capable of producing profit or unique benefit. A firm has SCA when other companies cannot replicate the same strategic value (Barney et al., 2001).

Competitive advantage is described through exogenous or market factors and internal resourcing (Liu & Mantecon, 2017). A firm’s high performance outcomes emanate via (1) traditional industrial organization economics considering competition and industry influences and ongoing above-normal returns (Porter, 1985, Li et al., 2021; Nguyen Dang Hoang et al., 2021). Economic performance captures social allocative efficiency, customer satisfaction, and strong profitability (Hossain et al., 2021). Alternatively a firm’s high performance outcomes emanate via (2) unique blends of resources and capabilities that coalesce and enhance performance (Barney, 1991). In addition to resource-based theory, firms seek costly-to-copy inputs, and where possible, also seeks improvements/opportunities for further capabilities actioning that can shift firms towards pursuing a SCA, and likely expanding their marketplace (Anning-Dorson, 2018). Thus, value of firm-actioned capabilities to continuously pursue further marketplace returns against rivals can help drive a SCA (O'Malley & O'Gorman, 2001, Torres et al., 2018).

Firms identify (1) product/presentation tactics, (2) develop core capabilities, (3) employ skilled workers, and (4) collect intellectual assets (Hult et al. 2001, Dimitrieska, 2016). They improve these constructs, generate greater economic worth (Ferreira et al., 2021) and coalesce them into a SCA (Sigalas & Papadakis, 2018). SCA relies on four constructs (1) profitability, (2) sustainability, (3) firm reputation to perform and deliver, and (4) good governance (Aras & Crowther, 2010). Software firms evaluate aspects that holistically constitute a SCA (Knudsen et al., 2021; Orr, 2019). They consider the firm as a whole, and view how each construct is addressed (O'Malley & O'Gorman, 2001). However, every construct is likely essential to business success, and when combined, can likely lead towards enhanced outcomes in terms of SCA (Aras & Crowther, 2010). Hence this study considers SCA, as a likely culmination of conjoint coalesced, and maybe networked construct approaches.

Within firms - like software firms, SCA is captured as competencies and capabilities, consumer perception, quality of servicing, firm governance, financial profitability, Innovation, Marketplace indicators, firm strategies, product features, sustainability, and resourcing attributes (Aldar, 2018, Torres et al., 2018, Uraon & Gupta, 2019, Severo et al., 2020, Sharma & Sharma, 2020, Hossain et al., 2021, Bhandari et al., 2022, Shah, 2022). These constructs help elevate investment profits (Liu & Mantecon, 2017), hinder rivals from nullifying firm performance outcomes (Arsawan et al., 2020), present new opportunities and new knowledge that offers sustained firm elevation within marketplaces (Karia & Asaari, 2016) and keeps it ahead of competitors in the industry (Rua et al., 2018). To measure firm performance as SCA, this study borrows four constructs and items from Aras and Crowther, (2010), Lee et al., (2018) and Mahdi et al., (2019).

RESEARCH PURPOSE

As EO supports ACs and ACs mediates EO and SCA, this study establishes its software firm research framework for sustainable competitive advantage in Pakistan, and presents as Figure 1. The research framework model also accounts for the hypotheses developed and included across the above materials.

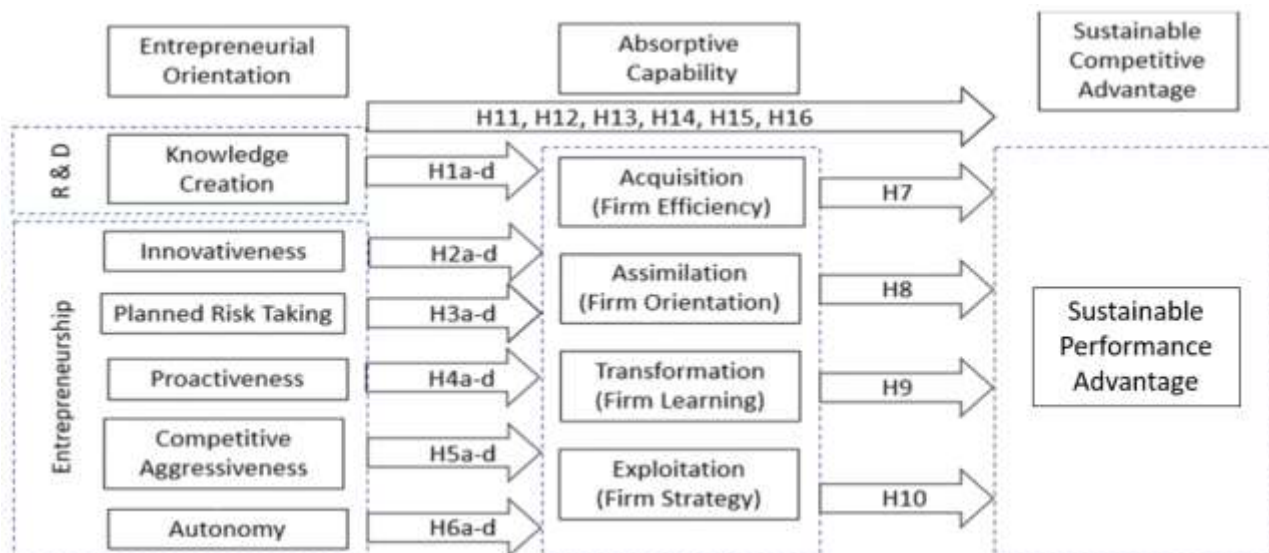


Figure 1. Research Framework for Software Firms pursuing SCA.

METHODOLOGY, PROPOSED ANALYSIS PLAN AND ACKNOWLEDGMENT

Both James Cook University’s College of Business, Law and Governance (through this doctoral study) and The Ministry of Information Technology & Telecommunication Pakistan Software Export Board (from 07/12/2021) (through its surveying assistance and member support) are supporting this study’s data capture across Pakistan’s six key digital software development cities. Software firm registered-members in Pakistan are emailed the survey link, six times (at regular intervals) across 6 weeks (to maximize response rates). They are also email advised of the industry value regarding completing this study’s digital

survey. Video-clip emails are included in both the fifth and sixth email (to further encourage laggard responders). A Likert 5 point (1= strongly disagree to 5 = strongly agree) survey is supported by qualitative open ended questions and demographics. Data analysis across 250 plus respondents from 3775 members offers suitable for AMOS28 SEM or Mplus quantitative path analysis modelling and construct total effects assessment, provided discrimination, model significance ($p > 0.05$), calibration and validation requirements are achievable. This mixed methods study approach also involves qualitative analysis. First open ended question text responses are coded into relevant themes. NVivo is engaged for theme analysis of these unstructured responses. Theme analysis approaches followed include word cloud/tree, directional project mapping and 3D cluster analysis.

RESULTS AND DISCUSSION

A mixed methods study is beneficial in this study. SEM or Mplus 'standardized total effects' provide a relative importance measure of constructs and their items. This is useful when prioritizing maximum effect adjustments to constructs. NVivo word cloud/tree analysis provided linkages to terms and the relative degree of their importance. The directional project mapping provides support for SEM modelling pathways. 3D cluster analysis provides special relations between constructs and items. These approaches are likely useful when modelling for item improvements across EO constructs, and ACs constructs, and when deployed collectively to drive SCA shifts. NVivo theme/mapping findings further triangulate study precision against literature and SEM. These findings likely offer feedback pathways to prioritize, and then improve, specific constructs and/or items offering most benefit to software firms in Pakistan as they pursue enhanced sustainable competitive advantage positioning.

EXPECTED CONTRIBUTION AND CONCLUSION

SCA in entrepreneurial software firms in Pakistan can likely be assisted using the research framework displayed in Figure 1. This involves acquiring better understanding regarding the relationships and total effects of six inputs constructs through to four intermediary constructs, and then into four output constructs, and using this understanding to refine and optimize the system in order to deliver SCA for a software firm. The approaches suggested above are likely applicable to software firm and software industries operating in highly competitive environments beyond Pakistan. This area of research is now available to researchers.

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