Technology, Innovation and SMEs' Export Intensity: Evidence from Morocco

Mohamed Yacine Haddoud
Mohamed.haddoud@buid.ac.ae,

The British University in Dubai, United Arab Emirates
Liverpool Business School, Liverpool John Moores University, UK

Ned Kock,
Texas A&M International University, Laredo, TX, USA

Adah-Kole Emmanuel Onjewu
adah-kole.onjewu@northumbria.ac.uk
Newcastle Business School, Northumbria University, UK

Vahid Jafari-Sadeghi
v.jafari-sadeghi@aston.ac.uk
Aston Business School, Aston University, UK

Paul Jones
w.p.jones@swansea.ac.uk

School of Management, Swansea University, Swansea, Wales, UK

Abstract

This study seeks to understand the scarcely examined relationships between SMEs' foreign technology licensing, R&D expenditure, innovation and export intensity. Espousing an integrated open innovation and self-selection paradigm, observations of 446 Moroccan SMEs are analysed through structural equation modelling. The definitive path analysis showed that foreign technology licensing and R&D expenditure distinctively affect innovation and, in turn, innovation increases export intensity. In further insights, to illustrate how the distribution of these inputs enhances internationalisation, a probabilistic analysis shows that foreign technology licensing, R&D expenditure and innovation will incrementally stimulate export intensity by ≥71%. The permutations of these variables in the fresh setting of Morocco summon scholars' empirical attention at the same time as policymakers' consideration.

Keywords*: Foreign Technology Licensing; R&D; Innovation; Export Intensity; SMEs; Morocco.*

1. Introduction

More than ever, firms operate in an environment of relentless change for which adaptation is required to maintain competitiveness. In developing countries, this is particularly challenging for small and medium enterprises (or SMEs hereafter) as they need to mitigate uncertainty while leveraging limited resources (Mallinguh *et al*., 2020). Compared to their developed country counterparts, SMEs in

developing markets operate within hostile institutional environments that necessitate even greater innovation (Abubakar *et al*., 2019; Park *et al*., 2020). Likewise, with the increasing globalisation of markets, the ability to export is largely considered to be an indicator of SMEs' competitiveness (Bıçakcıoğlu-Peynirci *et al*., 2019). Intrinsically, international expansion allows firms to harness new resources and develop new capabilities (Fu *et al*., 2016). As a matter of firm orientation, there is a belief that entities availing themselves to knowledge flows beyond their immediate boundaries, otherwise known as open innovation, are more likely to develop new capabilities (Chesborough *et al*., 2018). Successively, the pursuit of external inputs leads to superior performance as firms are inherently more productive when they tap into their knowledge-rich surroundings (Sisodiya *et al*., 2013). Moreover, when firms are engaged in export activity, there is a corresponding self-selection view that internationalisation is enabled by their intrinsic productivity (Haddoud *et al*., 2021). In effect, an obvious synergy between open innovation and self-selection is perceived, and this provokes a fresh reflection.

To this end, accessing and adopting novel technology is fundamental to effectively identifying and exploiting opportunities for delivering new products and services (Shane and Venkataraman, 2000). Hence, scholars have long expressed the importance of SMEs for championing change and adopting new technologies (O'Regan *et al*., 2006a; Amara *et al*., 2008). Doing so fosters innovation (O'Regan *et al*., 2006b) and, in turn, advances internationalisation (Sharma, 2018; Mallinguh *et al*., 2020). Also, adopting new technology helps SMEs utilise otherwise slack resources (Edeh *et al*., 2020). Nonetheless, country-level access and availability of technology has proven to be a perennial challenge in the developing world (Abor and Quartey, 2010; Chandra *et al*., 2020), adversely affecting the rate of SMEs' innovation and export performance in such countries. For successful technology adoption, Prasanna *et al*. (2020) stressed the need to possess resources, skilled personnel, supportive work and policy culture as key conditions. These prerequisites are typically lacking in developing countries.

Alternatively, one way in which SMEs in developing countries can overcome the above barriers is by accessing foreign technology through licensing (Barasa *et al*., 2019). Fundamentally, technology licensing agreements give the licensee the right to use the licensor's proprietary knowledge and methods (Gregorič *et al*., 2020). The opportunity to access technology in this manner can be a viable option for resource-constrained SMEs (Barasa *et al*., 2019). Lee *et al*. (2020) explain that firms in developing countries source technology through external collaboration to transfer innovation from developed countries. From a macro perspective, the upsurge in foreign technology licensing, particularly by developing economies has been notable. In Brazil, for example, the sluggish rate of technological change provoked a flurry of legislative changes that stoked the inflow of foreign technology (Amann, 1999). Simultaneously, India and South Korea followed this path (Sridharan and

Brower, 1996), as did Argentina (Vishwasrao, 1994), China (Tsang, 1994) and Poland (Jasinski, 1997). Mowery and Oxley (1995) suggest that the inward transfer of technology was a keystone in the transformation of Japan and other East Asian economies in the aftermath of 1945.

Another option for SMEs in developing countries to foster innovation is through collaborative R&D activities. Investment in R&D activities is known to trigger innovation (Crespi *et al*., 2016; Rodríguez and Nieto, 2016; Santoro *et al*., 2018). However, due to their lack of financial and human resources (Park *et al*., 2020), a considerable proportion of SMEs are impaired from creating effective R&D systems that are adequate to spark innovation. Hence, they [SMEs] seek external R&D because outside collaboration is seen as critical for innovation activities (Koo and Lee, 2018; D'Angelo and Baroncelli, 2020; Paiva *et al*., 2020). External cooperation can reduce uncertainty in the R&D process, and this drives SMEs' active innovation. Subsequently, the evidence demonstrates that effective R&D allows SMEs to grow internationally (Del Giudice *et al*., 2019). This is arguably the case in Morocco, a developing country that is nonetheless Europe's largest trading partner in the Mediterranean (Abouzzohour, 2019). According to the European Commission (2021), 56% of Moroccan merchandise and 64% of its exports were sold to the European Union in 2019. Having said that, firms' capacity to convert technical information into products, processes and services is still considered low in Morocco (Casadella and Bouacida, 2020; Rachidi and El Mohajir, 2021). Precisely, these mixed dynamics make Morocco a representative developing context to examine the correlations of foreign technology licensing, R&D and innovation as predictors of export intensity.

Against this backdrop, the aim of this study is to investigate the influence of foreign licensed technology and R&D activities on Moroccan SMEs' innovation and export intensity. Exploring the interactions of foreign-sourced technology, innovation and international activity addresses the recent call for new inquiries examining the intersections of technology, innovation and entrepreneurship (Liguori *et al*., 2021). Also, this paper attenuates the scantness of research on the strategic considerations of SMEs which Bouncken and Schmitt (2022) allude to. Theoretically, the impending conceptualisation is supported by an assimilation of the open innovation paradigm and self-selection view of internationalisation. Firms often need to complement their internal assets with external resources, notably through collaborative R&D. This path aids the development of innovation capability in line with the open innovation paradigm (Vanhaverbeke, 2006). Subsequently, with more intense innovation, these firms become more competitive in overseas markets. This echoes the self-selection hypothesis that identifies innovation as a precursor to internationalisation (Monreal-Pérez *et al*., 2012). In short, this is in a bid to demonstrate that, in developing countries, the open innovation paradigm and the self-selection view should be considered in tandem as the former may enhance the actualisation of the latter.

For specificity, our contributions to the extant literature are threefold. First, we provide evidence on the role of foreign licensed technology in improving SMEs' performance. Although scholars have previously examined licensing agreements (Cabaleiro-Cerviño and Burcharth, 2020), prior works have overlooked their impact on innovation and internationalisation. Therefore, the current study fills this gap by examining the influence of foreign licensed technology on product and process innovation, and how these relationships predict export intensity. Uncovering the role of foreign licensed technology will shed more light on the existing discourse surrounding the supposed reverse effect of foreign technology, caused by a contextual misfit. Second, we provide evidence on the influence of both internal and external R&D on SMEs' innovation and internationalisation. It has been argued that the lack of a strong conceptual framework depicting the relationship between R&D and SMEs' performance in international markets undermines current knowledge (Davcik *et al*., 2020). Urbano *et al*. (2019) assert that scholars, policymakers and managers are none the wiser in the extent to which resource investment in R&D activities translate into profitable and successful innovation for firm growth. Similarly, Park *et al*. (2020) and Aiello *et al*. (2020) maintain that little attention has been paid to R&D undertaken outside the boundaries of the firm. This is problematic for knowledge development following suggestions that external support for R&D might potentially reduce firms' investment in their own R&D and therefore hold a negative influence (Kou *et al*., 2020). Hence, investigating the effect of external R&D will help to address the lack of clarity on the role of this attribute in promoting or hindering innovation. Third, we bring evidence from the increasingly important yet largely under-researched context of North Africa. The indications in Abubakar *et al*. (2019) are that foreign technology licensing in Africa is still in a nascent stage. This is explained by a lack of or poor enforcement of intellectual property protection which can forestall inward and outward technology exchange. Thus, it is not surprising that scholars have mainly provided evidence of foreign technology licensing between firms in northern hemisphere countries (Fosfuri, 2006; Arora and Gambardella, 2010; Mendi *et al*., 2020), except for a few studies (e.g., Altuntas *et al*., 2018; Sharma, 2018). Nevertheless, research into foreign technology licencing in Africa is deemed necessary as governments in the continent are increasingly pursuing foreign technological transfer to equip local firms (Adu-Danso and Abbey, 2020). Similarly, regarding external R&D, Medase and Abdul-Basit (2020) posit that due to prevailing difficulties in accessing external knowledge, interest in the role of external R&D in fostering innovation within African firms has been low. Reporting such evidence is timely for informing policy and guiding practitioners in their selection of relevant foreign knowledge for domestic application.

Overall, this study binds the technology, innovation and internationalisation literature by reconciling the distinctive influences of foreign technology licensing, R&D and innovation on export performance. It does this by addressing the following research question: 'How does foreign technology licensing and internal and external R&D activities affect innovation and

internationalisation?'. The rest of the paper is organised as follows: Section 2 appraises foreign technology licensing, R&D, innovation, and export intensity by way of literature review, prior to a description of the research context in Section 3. Subsequently, section 4 clarifies the data collection procedure leading to the analysis and presentation of findings in section 5. Section 6 initiates a discussion before conclusions are drawn alongside the implications and future research avenues in section 7.

2. Theoretical Background and Hypotheses Development

2.1. Open innovation and Self-selection: Integrating the two Paradigms.

The model in development contends that both internal and external sources of R&D and technology boost product and process innovation, which in turn enhances export intensity. By definition, process innovation concerns a continuous improvement in the efficiency of workflow to lower average production costs (Freixanet *et al*., 2020), while product innovation pertains to the successful introduction of new offerings to meet market demand (Querbach *et al*., 2020).

In theory, the model is explained by the twin mechanism of the open innovation paradigm and the self-selection perspective. On the one hand, the open innovation paradigm advocates the need for firms to combine internal and external sources to advance their innovation. In suitable institutional conditions, the paradigm considers R&D as an open system wherein firms leverage external sources of knowledge, along with in-house know-how, to develop innovation (Vanhaverbeke, 2006). From an ecosystem perspective, it is anticipated that, to increase performance, SMEs require access to diverse resources and assets primed for innovation activity. Moreover, these resources and assets are typically acquired by interfacing with external stakeholders (Mei *et al*., 2019).

This paradigm is particularly relevant to developing contexts as SMEs in these parts have fewer resources which undermines their innovative capabilities. Sag *et al*. (2016) also posit that developing country SMEs face greater innovation costs, risks and increased threats in local markets due to globalisation. In such scenarios, collaborating with external partners through R&D [open innovation] is deemed beneficial for overcoming resource scarcity (Vrgovic *et al*., 2012). Correspondingly, harnessing external knowledge (Paul and Rosado-Serrano, 2019) and foreign licenced technology are deemed to be effective strategies for bypassing local deficiencies and fostering innovation (Fu *et al*., 2016). As such, Lee *et al.* (2020) noted that firms in developing countries rely on their developed world partners for technological upgrades.

On the other hand, when firms become more innovative, they are more likely to venture into international markets. This corresponds with the self-selection hypothesis which argues that innovative firms are more likely to internationalise (Monreal-Pérez *et al*., 2012). In this regard, Brem

and Nylund (2021) explain that, in theory, open innovation in the form of close collaboration boosts countries' international impact. Therefore, linking this to the open innovation paradigm, we argue that open innovation would theoretically self-select SMEs in developing countries to become exporters. However, this does not make the learning-by-doing view, which relates to process innovation, obsolete by any means. In fact, learning-by-doing follows from self-selection into export markets as firms later seek innovation through learning effects (Van Beveren and Vandenbussche, 2010). For context, the integration of two theoretical lenses [open innovation and self-selection] is particularly relevant to developing contexts. We argue that, due to environmental weaknesses and institutional voids in these contexts, there is a greater need [compared to developed contexts] for open innovation practices to self-select into export markets. In fact, Moreno-Menéndez (2018) theorised that firms seeking new knowledge to operate in foreign markets view cooperation in innovation as a precursor to exporting. In other words, the author suggests that innovation collaboration facilitates the development of internal capabilities that are suited to export markets. To this extent, firms' learning capacity is enhanced by innovation cooperation which, in turn, results in the development of new products that are viable in export markets (Kottaridi and Lioukas, 2017). Moreover, earnings from international markets can offset costs incurred in open innovation through greater economies of scale (Preece *et al*., 1999). In this regard, Moreno-Menéndez (2018: 360) contends that 'high-technology firms, for example, may decide to internationalise proactively in order to recover significant R&D costs'. Based on this theoretical underpinning, hypothesis development is now commenced.

2.2 Foreign Technology Licensing, Product and Process Innovation

Innovation is a costly and risky endeavour that firms in developing countries may be unable to undertake due to the shortage of capital and infrastructure. To circumvent this position, these firms often rely on the acquisition of foreign technology as a primary driver for innovation (Fu *et al*., 2016). It is viewed as a means for accessing strategic assets for new product development in an effective and relatively inexpensive manner (Wang and Li-Ying, 2015). Hence, Foss *et al*. (2013) and Wang and Zhou (2013) note that it is common for firms to procure technologies from foreign partners because appropriate solutions are unavailable in many domestic markets. Precisely, making use of external technology is thought to enrich the innovation process through technological convergence, lower transaction costs and shortened development cycles (Fu *et al*., 2011). When technology licensing ensues, there is also the provision of related technical assistance, training and support, which would elicit learning through knowledge transfer (Wang and Li-Ying, 2015). Therefore, there is a dominant perception in developing countries that foreign technologies confer a higher return on investment for productivity and production than otherwise (Sharma, 2019). It is deemed valuable for accessing state-of-the-art technology which, correspondingly, drives innovation (Leone and Reichstein, 2012; Wang and Li-Ying, 2014; Lin *et al*. 2020). Gregorič *et al*. (2020) argue that when entering into an agreement

with foreign licensors, firms in emerging markets can benefit from access to technologies that are not available locally, allowing them to build and upgrade innovation capability.

Furthermore, particularly in Africa, this evidence seems to hold true. Adu-Danso and Abbey (2020) acknowledge that African firms lag behind their western counterparts in terms of technology and innovation. Tadele (2017: 6) asserts that 'improved technologies or inputs that enhance productivity are poorly implemented in Africa'. Correspondingly, Ahmed and Nwankwo (2013) cite the widespread scarcity of efficient technologies in Africa, such as low broadband penetration and a suboptimal adoption of artificial intelligence and e-government solutions (Aikins, 2015; Arakpogun *et al*., 2020; Arakpogun *et al*., 2021). Relatedly, Suberu *et al*. (2013) mention that there is a general deficiency in technological knowledge on the continent. Consequently, even though there is, so far, limited empirical evidence, it is prudent to conceive that African firms are more likely to access and license technology from overseas providers to initiate either product or process innovation. Adu-Danso and Abbey (2020) explain that firms with access to foreign technology are likely to develop new products and processes. Abubakar *et al*. (2019) showed that foreign technology licensing in sub-Saharan Africa is positively associated with both product and process innovation. Therefore, consistent with Wang and Li-Ying's (2015: 1001) proposition that 'technology licensing from foreign origins is positively associated with the licensee firm's subsequent technological innovation performance', and in line with the open innovation paradigm, we suggest the following hypotheses:

> ***H1***. *The use of technology licensed from a foreign-owned company is positively related to product innovation.*
>
> ***H2***. *The use of technology licensed from a foreign-owned company is positively related to process innovation.*

2.3 R&D Expenditure, Product Innovation and Process Innovation

Although considered one of the riskiest activities for businesses (Tsuji *et al*., 2018), the role of R&D in enhancing innovation has been acknowledged (Pegkas *et al*., 2019). Conte and Vivarelli (2014) noted that R&D is a driver for product innovation in both small and large companies. Likewise, Medda *et al*. (2020) showed that R&D intensity is a significant driver for both product and process innovation. Caleb *et al*. (2021) found that in China, the effect of foreign firms' local R&D investment on their local subsidiaries' innovation performance is moderated by local government support. R&D is defined as the set of activities centred on new product ideation, product optimisation and the understanding of consumers' emerging needs within the departments of a single firm [internal R&D] or across a network of different firms [external R&D] (Davcik *et al*., 2020). In their pioneering study, Audretsch *et al*. (1996) outlined that internal and external R&D complement each other in high-tech sectors. More recently, Radicic and Balavac (2019) posited that in accordance with the knowledge-based view of the firm, engagement with both in-house and external R&D boosts firms' capacity to innovate.

2.3.1. External R&D

Williamson (1989) drew on transaction costs theory to rationalise the outsourcing of R&D activities to other entities. They argued that external R&D spending is sensible when doing so reduces the time and other resources exhausted by the firm; vis-à-vis the financial and non-financial gains that accrue. In such scenarios, there are indications that contractors possess superior levels of rare knowledge to be transferred to the contracting company (Afcha and López, 2014). Audretsch *et al*. (1996: 521) support this argument by stating that 'once information is no longer considered to be perfect, the locus of the decision may shift away from internal R&D towards external R&D'. Several studies have since demonstrated a positive link between external R&D and innovation. For one, Love and Mansury (2007) identified the importance of external networks for stimulating creativity, reducing costs and improving product quality. Likewise, while focusing on family firms, Aiello *et al.* (2020) demonstrated that external R&D significantly improves innovation performance. In the developing context, the link between external R&D and innovation has also been examined. In Tunisia, Boujelben and Fedhila (2010) concluded that occasional internal and external R&D efforts encourage product and process innovation. Likewise, Rahmouni *et al*. (2010) found that external technical knowledge sources enhance the product and process innovation of Tunisian companies, while internal R&D only affects product innovation. In China, Jiang *et al*. (2021) reported that external R&D increases the innovation performance of manufacturing firms.

Despite these merits, external R&D can be disadvantageous. It reduces the control of information and firms adopting this approach seldom command the legal mechanisms needed to manage the property rights that arise, and this may lead to losses or at least reduced profitability (Afcha and López, 2014). Specifically, some believe that external R&D might not be suitable for developing contexts. For instance, Torres de Oliveira *et al*. (2020) concluded that the expected positive relationship between openness and innovation depends on the market in which firms operate. They found that R&D cooperation can have a negative moderating impact on the link between openness and innovation. In this regard, they explain that openness is sought when external knowledge is superior to internal knowledge. However, given the overwhelming extant evidence suggesting a positive influence, and heeding the open innovation paradigm, we propose the following hypotheses:

> ***H3****. R&D expenditure with companies outside the establishment is positively related to product innovation.*

> ***H4****. R&D expenditure with companies outside the establishment is positively related to process innovation.*

2.3.2. Internal R&D

Due to the shortcomings of external R&D, firms also need to develop in-house capacity for new product and service delivery (Dahlander and Gann, 2010; Krzeminska and Eckert, 2016; Muñoz-Bullón *et al*., 2020). Leonard-Barton (1992) and Tidd (2000) believe that the internal attributes of the firm are the basic competencies needed to successfully realise innovation. Internal R&D then becomes a springboard that increases the odds of successful innovation (Conti *et al*., 2013), to the extent that proponents of external R&D admit that investment in the former improves absorptive capacity and exploitation of external innovation opportunities (West and Bogers, 2014). Still, comparing the two, Mairesse and Mohnen (2010) state that internal R&D competencies are most often reported to generate greater innovative output than external R&D. In like manner, Anzola-Román *et al*. (2018: 235) hypothesised that 'engagement in internal R&D activities positively affects the probability of obtaining successful technological innovation'. On these grounds, scholars have stated that organisations' ability to assimilate external knowledge is foreshadowed by internal R&D (Arora and Gambardella, 1994; Watkins and Paff, 2009). Equally, in developing nations, several works have confirmed the influence of internal R&D on innovation (e.g., Boujelben and Fedhila 2010; Rahmouni *et al*., 2010). For instance, in ASEAN countries, Tsuji *et al*. (2018) concluded that R&D active firms show a higher likelihood of generating product innovation compared to their non-R&D active counterparts. Similarly, investigating a sample of 115 developing countries, Goel and Nelson (2018) concluded that R&D performing firms were more likely to innovate. In India, Seenaiah *et al*. (2018) found that R&D expenditures positively affect the innovation of manufacturing firms. With this in mind, the succeeding hypotheses are considered in relation to innovation:

H5*. R&D expenditure within the establishment is positively related to product innovation.*

H6*. R&D expenditure within the establishment is positively related to process innovation.*

2.4 Foreign Licenced Technology, Process Innovation, Product Innovation and Export Intensity

Neither process nor product innovation is self-fulfilling. They are pathways for firm performance which is measured through a variety of financial and non-financial outcomes. As noted, the performance outcome of current interest is export intensity described as the ratio of foreign sales relative to total sales. There is evidence that export activity is enhanced through knowledge derived from product and process innovation (Wagner, 2007; Golovko and Valentini, 2014). In theory, it is probable that firms will enter and succeed in international markets by overcoming the pitfalls of sunk costs [self-selection] which, equally, fast-tracks internationalisation (Sharma and Mishra, 2011; Monreal-Pérez *et al*., 2012; Freixanet *et al*., 2020). Also, innovation, as an internal capability and intangible asset, confers value to the firm to generate and retain competitive advantage across borders (Azar and Ciabuschi, 2017). Alvarez (2004) affirmed that higher productivity and the introduction of new products as a consequence of innovation increase export intensity. The underlying mechanism is that cost advantages arise from new and more dexterous workflows [process innovation] and/or from

introducing new offerings to old or new markets [product innovation] (Rodriguez and Rodriguez, 2005). Falahat *et al*. (2020) confirmed that product innovation is a significant predictor of SMEs' international performance, while Bodlaj *et al*. (2020) concluded that SMEs' export growth depends on product innovation among other factors. Therefore, in line with the self-selection view, we hypothesise the following relationships:

H7*. Product innovation is positively related to export intensity.*

H8*. Process innovation is positively related to export intensity.*

However, notwithstanding their seeming interdependence, several studies demonstrate that product innovation has a more significant relationship with export behaviour than process innovation (Cassiman *et al*., 2010; Becker and Egger, 2013; Lewandowska *et al*., 2016, Tavassoli, 2018). D'Angelo (2012) reached the same conclusion specifically on export intensity, but this does not by any means negate the important role of process innovation in enabling exports. There are opposing findings such as Özçelik and Taymaz (2004) suggesting that process innovation has a significant influence on export intensity. Also, Edeh *et al*. (2020) unequivocally claim that it is process innovation, and not product innovation, that expedites export performance. That being said, some evidence seems to suggest that process innovation indirectly affects export intensity via product innovation rather than directly. In this regard, prior studies imply that there is a strong interrelationship between process and product innovation (Reichstein and Salter, 2006; Tang, 2006; Lopez et al., 2022). In their study of 209 manufacturing firms in China, Xie *et al*. (2019) revealed that firms' performance is enhanced by the positive impact of process innovation on product innovation. Also, Simms *et al*. (2021) stress that in order to achieve radical product innovation, firms must first and foremost undertake radical innovation of existing processes, and this often requires major changes in equipment (Kurkkio *et al*., 2011). Generally, firms' success depends on new products that need to be processed by new equipment (Simms *et al*., 2021). In effect, the more mature the industry then the greater the urgency for process innovation as firms become rigid and path-dependent on established knowledge, technical trajectories and routines (Cesinger *et al.* 2007). Likewise, the empirical findings of Khazanchi *et al.* (2007) highlight that advanced manufacturing technology, as an example of process innovation, contributes to higher product development and subsequent firm performance. Hence, to reconcile extant conflicting evidence concerning the superiority of product or process innovation, we propose the following hypothesis:

H9*. Process innovation holds an indirect positive effect on export intensity through product innovation.*

Lastly, turning to the interaction of such links with foreign licensed technology, there are reasons to believe that the latter is likely to strengthen the role of innovation in fostering export intensity. Drawing on evidence suggesting that SMEs in developing contexts benefit from accessing state-of-the-art solutions coupled with technical assistance and knowledge transfer when licensing foreign

technology (Wang and Li-Ying, 2015; Sharma, 2019; Gregorič *et al*., 2020), it is arguable that firms benefitting from such advantages will more effectively harness innovation outputs to access international markets. Therefore, the concluding hypothesis revert to a comparison of how both types of innovation impact the international sales of SME manufacturers in Morocco, as well as the interaction of foreign licensed technology in these associations:

> ***H10***. *Foreign Licensed Technology moderates the relationships between product and/or process innovation and export intensity.*

3. The Moroccan Context

Located in the Middle East and North Africa [MENA] region, the Kingdom of Morocco is the most westerly country in the Maghreb [Arab West]. Only 12 kilometres from Europe (Ahmed *et al*., 2015), Morocco is flanked by the Mediterranean Sea to the north and the Atlantic Ocean to the west. In 2018, they were 35 million inhabitants spread across 12 administrative regions covering a total land area of 710,850km^2 (Dahchour and El Hajjaji, 2020). Morocco is presently considered one of the most stable economies in the region, especially since the aftermath of the Arab Spring (Vidican, 2015). In gross domestic product [GDP] terms, it has emerged as the 5th largest economy in Africa with a market size of $119.7 billion in 2019 (World Bank, 2021). This stemmed from gradual market liberalisation and sector privatisation beginning in 1993 (Kauffman and Wegner, 2007). In addition, the National Pact for Industrial Emergence rolled out in 2005 aimed to provide technical assistance to firms and upgrade national infrastructure for the purpose of stimulating countrywide entrepreneurship and SME activity (El-Haddad, 2020).

Our focus here is on SMEs in the manufacturing sector. In Morocco, they constitute 93% of all enterprises, of which 29% are small and medium-sized and 64% are micro firms (Zizi *et al*., 2020). Thus, as in the case of most developing countries, the country's development is contingent on the contribution of SMEs through employment generation, the lowering of rural-urban migration, optimum utilisation of resources and poverty alleviation (El Makrini, 2015). However, such impact is hindered by myriad challenges faced by these SMEs limiting their contribution to GDP to a modest 20% in both the formal and informal sectors (Zizi *et al*., 2020). Also, SMEs in Morocco suffer from market stagnation and a high mortality rate (Rachidi and El Mohajir, 2021). These issues do not only hamper their economic contribution but also their international performance as Moroccan SMEs' overall contribution to exports is a mere 30% (Tarek *et al*., 2016), and a fraction of the country's imports (El Makrini, 2015). Some of the factors undermining SMEs' internationalisation are limited training, low productivity and weak innovation. It is noticeable that Morocco has underperformed in the conversion of new knowledge into market offerings (Badaj and Radi, 2017; Rachidi and El Mohajir, 2021). In part, this is because the existing environment has not promoted research activity, knowledge creation and the use of technical information (Casadella and Bouacida, 2020).

Against this backdrop, Morocco is elected as a fertile ground for uncovering factors that may enhance SMEs' international performance. The current study acquiesces Zizi *et al*. (2020) and Rachidi and El Mohajir's (2021) solicitation for more research on the drivers of SME performance in Morocco. Equally, following Casadella and Bouacida's (2020) invitation, it focuses specifically on foreign licensed technology and R&D as predictors of innovation and international performance. Currently, there is a shortage of studies assessing the drivers of export intensity as a firm-level outcome in Morocco. To be sure, Clerides *et al*.'s (1998) inquiry was conducted over two decades ago. Thus, investigating the Moroccan context to offer fresh evidence is important on several fronts. In theory, SMEs depend on resources such as technology available in their home market to be able to export (Hessels and Terjesen, 2010). When such assets are non-existent, they will either forfeit exporting or seek foreign technology. This appears to be the case in Morocco where firms are heavily dependent on foreign technology as local solutions are considered inadequate (OECD, 2008). This has led the government to offer credit to small firms to purchase foreign technology services (Oxford Business Group, 2020). As for external R&D, although this provides a constant inflow of outside knowledge that enhances innovation outputs (Fey and Birkinshwa, 2005), the involvement of Moroccan companies in collaborative R&D is still lagging, which undermines sustainability of innovation (Hamidi and Benabdeljalil, 2013). This highlights a gap in the extant literature on developing contexts vis-à-vis the interactions between foreign licensed technology, external R&D and innovation. Hence, new intelligence on the interplay of foreign technology licensing, R&D and innovation will provide further contextual insights into the roles of external R&D and foreign technology.

4. Method

4.1 Data and Measures.

To test the hypotheses, firm-level data from the World Bank Enterprise Survey (The World Bank Group, 2020) have been assessed. The objective of the Enterprise Survey is to shed light on firms' experience in the private sector. The data were collected in Morocco between May 2019 and January 2020 using stratified random sampling of business owners and senior managers. To gather respondents, a screener questionnaire was first relied on to determine eligibility and make appointments via telephone, and this was followed by a face-to-face interview with the manager/owner/director of each establishment.

For the purpose of this study, only SMEs defined as establishments with a maximum of 250 employees were extrapolated. After removing all missing data and 'don't know' responses, a total of 446 firms met this criterion. In terms of statistical power, this sample size is significantly higher than the 302 to 316 range suggested, respectively, by the gamma-exponential and inverse square root methods (Kock and Hadaya, 2018). As for the measures, our model includes six main variables

namely, R&D spending within and outside the establishment (R&DIN and R&DOUT), the use of technology licensed from a foreign-owned company, excluding office software (FORETECH), Product Innovation (PDTINNO), Process Innovation (PRCINNO) and Export Intensity (EXP). All the constructs were measured using single binary items, except for export intensity which was a single-item continuous variable.

In addition, three control variables were included namely firm size, sector and region. Firm size indicates the human resources available in the firm (Dhanaraj and Beamish, 2003) which can affect export intensity (Wang and Ma, 2018). There is an argument that larger firms possess greater resources and capabilities to compete in international markets (St-Pierre *et al*., 2018). Regarding the location of the firm, this factor may play a role in boosting export performance. For instance, comparing metropolitan and regional areas, Freeman *et al*. (2012) concluded that a firm location could provide network and infrastructure/services advantages that would boost export performance. Likewise, Zhang and Mia (2020) argued that a geographical location could confer cost advantages, especially in areas close to borders of importing countries and/or maritime ports and airports. Lastly, regarding the sector, Reis and Forte (2016) reported that industry characteristics in terms of labour productivity and concentration affect firms' export intensity, as higher productivity and lower concentration were associated with greater exports. The premise here is that low levels of concentration imply high domestic competition, which pushes firms to seek international markets. Similar findings were reported by Zhao and Zou (2002) suggesting that industry concentration is negatively related to export intensity. Table 1 further outlines the measures of the main variables.

Table 1: Measurement Details

Variable	**Items**	**Scales**
R&DIN	Over the last three years, did this establishment spend on research and development activities within the establishment?	Yes/No
R&DOUT	Over the last three years, did this establishment spend on research and development activities contracted with other companies?	Yes/No
FORETECH	Does this establishment at present use technology licensed from a foreign-owned company, excluding office software?	Yes/No
PDTINNO	During the last three years, has this establishment introduced new or improved products or services?	Yes/No
PRCINNO	During the last three years, has this establishment introduced any new or improved processes?[1]	Yes/No
EXP	% of Sales: Direct Exports	Continuous (0-100%)

4.2 Sample Characteristics

In the current sample (see table 2), 41.5% of firms had 5-19, 39.9% had 20-99, and 18.6% had 100-250 employees. As for location, most firms were in Rabat-Salé-Kénitra, Casablanca-Settat,

[1] These include methods of manufacturing products or offering services, logistics, delivery or distribution methods for inputs, products or services, or supporting activities for processes.

Marrakech-Safi and Fès-Meknès. In terms of industry, the majority were from retail (21.3%), garments (13.5%), wholesale (12.6%) and food (11%). The remaining firms operated in sectors including IT, chemicals, construction, non-metallic mineral products, machinery and equipment.

Table 2: Sample Characteristics

Screener Size		
	Frequency	**Percent**
5-19 employees	185	41.5
20-99 employees	178	39.9
100-250 employees	83	18.6
Total	**446**	**100**
Region of The Establishment		
	Frequency	**Percent**
Tanger-Tétouan-Al Hoceima	26	5.8
Oriental	40	9.0
Fès-Meknès	56	12.6
Béni Mellal-Khénifra and Drâa-Tafilalet	45	10.1
Rabat-Salé-Kénitra	110	24.7
Casablanca-Settat	98	22.0
Marrakech-Safi	58	13.0
Souss-Massa	13	2.9
Total	**446**	**100**

5. Analysis

To analyse the data, the robust path analysis algorithm in WarpPLS version 7.0 (Kock, 2020) was applied. This approach was considered relevant for this study as it allows the simultaneous testing of all variables in the model, including the mediators (Kock and Gaskins, 2014). Moreover, WarpPLS is well suited for analysing models with dichotomous variables (Demek *et al*., 2018; Kock, 2014). Specifically, models with dichotomous variables (including endogenous dichotomous) can be assessed with WarpPLS since *p*-values are calculated via nonparametric techniques that do not assume that the factors meet normality expectations (Kock, 2014; 2018).

5.1. Model Checks

By convention, prior to analysing the paths, the reliability and validity of latent variables are assessed. However, in this study, all variables are single-item indicators. Hence, these criteria do not apply. The possibility of collinearity issues in the structural model was checked by estimating both the block and full collinearity variance inflation factors [VIFs]. The block VIFs refer to collinearity only among predictors of endogenous variables in the model, which is how multicollinearity has classically been assessed (Kock and Lynn, 2012). The full collinearity VIFs refer to collinearity among all variables in the model as a more conservative assessment of multicollinearity and common method bias (Kock, 2015; 2021; Kock and Lynn, 2012). As presented in tables 3a and 3b, all values were below the threshold of 5, suggesting no multicollinearity or common method bias (Hair *et al*., 2011; Kock and Lynn, 2012).

Table 3a: Block VIFs

	R&DIN	***R&DOUT***	***FORETECH***	***PDTINNO***	***PRCINNO***	***EXP***	***SECT***	***REG***	***SIZE***
PDTINNO	*1.53*	*1.48*	*1.19*		*1.83*				
PRCINNO	*1.30*	*1.29*	*1.11*						
EXP				*1.49*	*1.40*		*1.24*	*1.09*	*1.27*

Table 3b: Full Collinearity VIFs

	R&DIN	***R&DOUT***	***FORETECH***	***PDTINNO***	***PRCINNO***	***EXP***	***SECT***	***REG***	***SIZE***
	1.41	*1.44*	*1.48*	*1.69*	*1.61*	*1.50*	*1.26*	*1.28*	*1.37*

Furthermore, seven model fit and quality indices that are applicable in robust path analyses suggest a good fit between the model and the data [see table 4]. The average path coefficient [APC]; average R-squared [ARS], and average adjusted R-squared [AARS] were all statistically significant, suggesting good explanatory power. Also, the average block VIF [AVIF] and the average full collinearity VIF [AFVIF] met the required thresholds suggesting no collinearity issues. The Tenenhaus GoF [GoF] suggests a large degree of model-data fit. Finally, the Sympson's paradox ratio [SPR] suggests that the model is sound in terms of its network of cause-and-effect relationships (Kock, 2022; Kock and Gaskins, 2016; Chitsaz *et al*., 2017; Bag *et al*., 2021).

Table 4: Model Fit and Quality Indices

Indices	**Values**
APC	0.184, P<0.001
ARS	0.250, P<0.001
AARS	0.242, P<0.001
AVIF	1.369, acceptable if <= 5, ideally <= 3.3
AFVIF	1.472, acceptable if <= 5, ideally <= 3.3
GoF	0.500, small >= 0.1, medium >= 0.25, large >= 0.36
SPR	0.857, acceptable if >= 0.7, ideally = 1

5.2 Structural Model and Hypothesis Testing

Figure 1 depicts the structural model with the path coefficients (β) and the *p*-values of the relationships hypothesised.

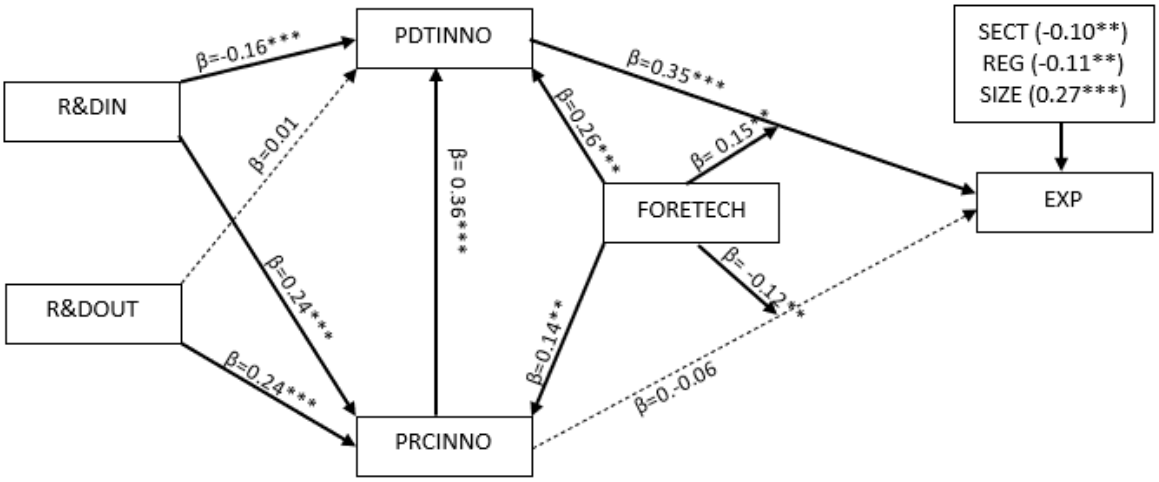

Figure 1. Structural Model

It can be concluded that the use of technology licensed from a foreign-owned company is significantly and positively related to both product innovation (β = 0.26***) and process innovation (β = 0.14**). Hence, H1 and H2 are accepted. As for R&D, spending outside the establishment was found to be significantly and positively related to process innovation (β = 0.24***), while the influence on product innovation was non-significant (β = 0.01). Therefore, H3 is rejected and H4 is accepted. Contrastingly, spending within the establishment was found to hold a negative significant influence on product innovation (β = -0.16***) and a positive significant effect on process innovation (β = 0.24***). Hence, H5 is rejected while H6 is accepted. Furthermore, product innovation was found to be significantly and positively related to export intensity (β = 0.35***), while process innovation held no significant influence (β = -0.06). Therefore, H7 is confirmed while H8 is rejected. Overall, it can be argued that for exporting, product innovation will likely hold a direct influence as opposed to process innovation, which tends to influence international sales indirectly. In fact, process innovation was found to hold a significant indirect effect (β = 0.13***) on export intensity via product innovation, which supports H9.

As for indirect effects of foreign technology licensing on export intensity, it was found to hold a significant and positive effect (β = 0.08*). Hence, it can be concluded that product innovation mediates the relationship between foreign licensed technology and export intensity. Furthermore, internal and external R&D spending had an indirect positive effect on product innovation (β = 0.09**; β = 0.09**), suggesting that process innovation mediates the influence of R&D on product innovation. In terms of moderation, the link between product innovation and export intensity was found to be positively moderated by foreign licensed technology, whereas the opposite effect was found in the link between process innovation and export intensity. Hence, H10 is partially accepted. Lastly, the control variables of firm size, region and sector were all significant. Overall, the model

explains 31% of SMEs' export intensity. The Q-squared coefficient for this variable was 0.31, and 0.22 for the two other endogenous variables [product and process innovation], suggesting good predictive validity (Kock, 2014; Kock and Gaskins, 2014).

5.3. Conditional Probabilistic Analysis

From the results, the path coefficients suggest that SMEs' export intensity is positively and directly influenced by product innovation, as well as indirectly by process innovation, internal R&D spending, external R&D spending, and foreign technology licensing. This means that, in probabilistic terms, increases in the direct and indirect predictors lead to increases in the conditional probability that SMEs' export intensity will be above a certain value. Yet, conditional probabilities cannot be directly estimated based on path coefficients; and these probabilities may be of interest to both researchers and practitioners.

By using the 'explore conditional probabilistic queries' feature within WarpPLS, conditional probabilities [see Kock, 2020] of this type can be estimated: 'What is the probability that: export intensity will be high (i.e., above average); if product innovation is high, and process innovation is high'. Since latent variables are standardised, with a mean of zero and standard deviation of 1, the statement 'export intensity will be high (i.e., above average)' refers to instances in the dataset where the standardised latent variable corresponding with export intensity is greater than 0. The same interpretation applies to other latent variables.

Because of the positive skewness of the latent variable referring to SMEs' export intensity, instances in the dataset where the latent variable is greater than 0 (i.e., where its value is high) make up the top 21.1% of the dataset in terms of export intensity. Below we show a sequence of probabilistic queries with progressively more detailed conditions. These queries allow the estimation of conditional probabilities that could be of interest to Moroccan manufacturing stakeholders and policymakers.

What is the probability that:
Export intensity will be high (i.e., above average)
If:
Product innovation is high, and
process innovation is high.
(Answer: 44.2%)
If:
Product innovation is high, and
process innovation is high, and
internal R&D spending is high.
(Answer: 45.5%)
If:
Product innovation is high, and
process innovation is high, and
internal R&D spending is high, and

external R&D spending is high.
(Answer: 68.8%)
If:
Product innovation is high, and
process innovation is high, and
internal R&D spending is high, and
external R&D spending is high, and
foreign technology licencing is high.
(Answer: 71.4%)

The conditional probabilities above could be seen as a stepwise sequence aimed at illustrating the incremental contribution of direct and indirect predictors of the probability that SMEs' export intensity will be high. As we can see, the conditions that 'product innovation is high, and process innovation is high, and internal R&D spending is high' are not enough to ensure that SME's export intensity will be high frequently enough, since the conditional probability in this scenario is only 45.5%. This means that, under these conditions, SME's export intensity will be high in fewer than 5 out of 10 cases. However, when we add the condition that 'external R&D spending is high' to the above-mentioned conditions, then the conditional probability that SME's export intensity will be high increases to 68.8%. Adding a further condition that 'foreign technology licensing is high' boosts the conditional probability that SME's export intensity will also be high up to 71.4%. This implies that, under this more comprehensive set of conditions, SME's export intensity will be high in over 7 out of 10 cases.

Arguably, the scenario in which SMEs' export intensity will be high in over 7 out of 10 cases is more desirable for stakeholders than one in which there are fewer than 5 out of 10. Moreover, having an idea of the odds can be useful for decision-makers who are in a position to commit and disburse resources aimed at optimising firm performance. The knowledge that success will likely be achieved in only 7 out of 10 cases pre-empts managers' surprise if/when 3 out of 10 cases are unsuccessful.

6. Discussion

This study has investigated the interplay between foreign licensed technology, R&D and innovation in driving SMEs' export intensity. The probabilistic analysis revealed that the combinations of the foreign licensed technology, internal and external R&D, and product and process innovation increased Moroccan SMEs' probability of high export intensity by 71.4%. In other words, under this comprehensive set of conditions, SME's export intensity will be high in over 7 out of 10 cases. The ensuing discussion sheds light on the relationships across these factors.

The findings confirm the applicability of the novel dual approach adopted in this study linking the open innovation paradigm with the self-selection hypothesis. Specifically, the open innovation paradigm was illustrated through the influence of technology licensing from foreign firms on SMEs'

product and process innovation, which are then able to self-select and increase their export intensity (particularly through product innovation). Moreover, foreign licensed technology was found to strengthen the influence of product innovation on export intensity, confirming once more the complementarity of the two theoretical lenses (i.e., open innovation and self-selection). These findings echo extant evidence suggesting that companies in developing countries rely on the technologies of partners in developed settings (Lee *et al*., 2020), and that foreign technology licensing in sub-Saharan Africa is positively associated with innovation (Abubakar *et al*., 2019). Hence, licensing technology from an external party helps SMEs to equip themselves with solutions that are not readily available in the market (Leone and Reichstein, 2012). This is evidently the case in Morocco where domestic players have shown an appetite for foreign technology (OECD, 2008), compelling the government to offer credit to small firms to purchase foreign technology services (Oxford Business Group, 2020). Through foreign licensing, SMEs are able to bypass the internal investment of time and resources for the development of technological capabilities in the pursuit of new products (Tsai and Wang, 2007). In effect, royalty or license fees then become an arbitrage for new product development and constitute a considerable cost reduction and risk mitigation method (Gans and Stern, 2003). Additionally, the reliance on externally developed technology allows SMEs to focus more intensely on meeting customers' needs (Marsh and Stock, 2003; Teece and Pisano 2003); especially in competitive international markets. In this study, these findings are extended by the illustration that foreign technology fosters product and process innovation while strengthening the influence of product innovation on export intensity.

As for the distinct positive and direct influence of R&D spending on process but not product innovation, this finding supports the view that although in a developing context R&D activity may not have an immediate impact on creating innovative products, they bring about more efficient processes and lower production costs that culminate in product innovation (Un *et al*., 2010; Freixanet *et al*., 2020). This result particularly clarifies conflicting views on the role of external R&D. It has been previously argued that an increase in external R&D could potentially lead to a decrease in firms' ability to exploit knowledge spillovers (Bönte, 2003; Kou *et al*., 2020), which could hamper innovation. In this study, by distinguishing process and product innovation, we now show that for Moroccan SMEs, R&D is likely to hold a direct impact on processes rather than new product development. In fact, the mediation analysis suggests that SMEs' investment in both internal and external R&D indirectly contributes to higher product innovation, through the intervening role of process innovation. R&D expenditure within and outside SMEs will assist the development of innovative processes to accentuate the delivery of new products. This is consistent with past evidence from developing contexts (Boujelben and Fedhila, 2010; Rahmouni *et al*., 2010; Jiang *et al*., 2021). SMEs operating in developing countries resort to open innovation practices such as collaborative

R&D to overcome resource scarcity, greater innovation costs, and risks associated with trading in such contexts (Vrgovic *et al*., 2012; Sag *et al*., 2016).

Finally, product innovation exhibited a direct positive influence on Moroccan SMEs' export intensity. This supports Di Cintio *et al*. (2017) and Muñoz-Bullón *et al*.'s (2020) view that innovation is an explanatory factor for firms' productivity, which can explain firms' export behaviour. Moreover, product innovation also acted as a mediator in the relationship between process innovation and export intensity. Hence, while no evidence is found that process innovation directly impacts on export intensity, it indirectly affects internationalisation performance when changes in SMEs' processes lead to the development of new products that can be sold in international markets. This finding reconciles the debate over the superiority of product over process innovation showing that when it comes to export intensity, process innovation is more likely to indirectly enhance internationalisation via product innovation. This is also consistent with Khazanchi *et al*. (2007) and Simms *et al*.'s (2021) understanding of the link between process and product innovation. Hence, the dual open innovation and self-selection theoretical lens is further validated. R&D active SMEs are more flexible to adjust their processes and adapt their offerings to compete in global markets.

7. Conclusions

7.1. Theoretical Contributions

The findings of this research pose important implications. Theoretically, it provides a new holistic approach to explaining SMEs' export behaviour in a developing context, based on an integration of the open innovation paradigm and the self-selection view. It has now been shown that open innovation practices allow SMEs in a developing setting to overcome institutional voids and successfully develop innovation, which in turn increases their self-selection into export markets. It is believed that open innovation facilitates learning which, in turn, stimulates the development of internal capabilities that engender export performance. Also, to bear the costs arising from open innovation, firms are incentivised to increase their economies of scale through active internationalisation (Moreno-Menéndez, 2018). On this basis, the presence of foreign technology, external and internal R&D and innovation boosts the probability of achieving high export intensity by over 71%. Hence, it is proven that, in developing countries, the open innovation paradigm and the self-selection view should be considered in concert when contemplating export activity. Predicated on the conceptualisation and ensuing findings, we outline contributions with respect to the extant calls cited at the beginning of this paper. These stipulations will improve our understanding of the open innovation approach in SMEs, which has been said to warrant further investigation (Albats *et al*., 2021).

First, our findings increase understanding of the role of foreign technology licensing on firms' innovation in a developing SME context. In this setting, we show that foreign technology licensing improves both process and product innovation and strengthens the influence of product innovation on export intensity. Thus, we contribute to reconciling the existing debate about the supposed reverse effect of foreign technology, which is caused by a lack of technical fit in less advanced contexts. Hence, alongside Abubakar *et al*.'s (2019) work, we believe that this research is one of the very first studies providing contextual evidence on the impact of foreign licensed technology on SMEs' innovation.

Second, our findings on the role of R&D reveal that both its internal and external forms improve processes rather than new product development. This settles conflicting evidence inferring that external R&D undermines firms' innovation. Arising from the current findings, it is noted that although external R&D may not hold a short-term effect through new product development, it will instead improve processes which in the long run lead to new products. In making this determination, we address calls by Urbano *et al*. (2019), Park *et al*. (2020) and Aiello *et al*. (2020) for scholars to fathom the ambiguous role of external R&D activities in shaping innovation.

Third, our findings conclude that it is product rather than process innovation that will directly impact Moroccan SMEs' export intensity. Nevertheless, process innovation will indirectly improve exports through product innovation. Therefore, this addresses concerns about the irrelevance of process innovation when it comes to exporting. We argue that while it may not directly increase international sales, it will contribute to product innovation which, in this study, eventually boosts export intensity. Hence, this finding signals the longer-term influence of process innovation on SMEs' internationalisation.

Fourth, it is suggested that national differences can shape firm innovation. By examining Moroccan SMEs as the study's context, we address the shortage of research on African firms highlighted by Adu-Danso and Abbey (2020) regarding the use of foreign technology licensing, and by Medase and Abdul-Basit (2020) on the influence of external R&D. We also respond to concerns by Haddoud *et al*. (2020) that there is limited evidence from North Africa pertaining to the internationalisation of SMEs.

7.2. Practical Implications

There are also practical implications arising from the current study. Our study revealed that SMEs investing in internal and external R&D, licencing foreign technology and developing product and process innovation will be over seven times more likely to achieve high export intensity. Accordingly, the following actions are outlined for stakeholders in Moroccan manufacturing SMEs and for policymakers:

SMEs' decision-makers (e.g., founders, managers) seeking to enter foreign markets or expand current international operations ought to carefully develop their innovation capabilities. As such, insights from this research contribute to expanding empirical perspectives on product and process innovation within internationally oriented small and medium firms in Morocco. In this context, managers seeking a prompt solution in their international foray can equip their firms with foreign licensed technologies primed for improving extant processes and manufacturing new products. In fact, accessing foreign technology enables Moroccan SMEs to access state-of-the-art solutions and advanced technical assistance that is otherwise unavailable in local markets. At the same time, licensing foreign technologies will assist SMEs to conserve resources for other activities that generate relatively fast results. Having these advantages will allow these firms to develop higher-quality innovation outputs, which eventually enhance their international competitiveness and export sales.

Moreover, R&D contributes to the establishment of systems and processes that can provide long-lasting advantages for international firms. Such activities may be performed internally as part of SMEs' operations or be outsourced to external collaborators. For the latter, SMEs may partner with universities, for example, to revamp current processes and explore new operational possibilities. Creating such ties with universities will be a masterstroke since they possess the knowledge base to inform the modification and optimisation of processes. Alternatively, SMEs' decision-makers could choose to undertake R&D with collaborators (such as suppliers and competitors) to facilitate process innovation and eventually develop new competitive products. In this regard, evidence suggests that external collaboration reduces time and resource requirements and provides access to superior knowledge. Ultimately, this allows Moroccan SMEs to gain the capabilities required for successful internationalisation.

For policymakers, grasping the significant contribution of foreign technology to product and process innovation, government bodies should encourage the rate of licensing [of foreign technology] by promoting and enforcing intellectual property protection. This recommendation is made because Kim and Vonortas (2006: 273) maintain that, among other factors, the likelihood that two companies will enter into a licensing agreement depends 'on the strength of intellectual property protection in the primary industry of the licensor'. Besides, Hessels and Terjesen (2010) argue that SMEs in markets with limited IP protection will be unable to access relevant network resources. Therefore, our findings appeal to the Moroccan Office of Industrial and Commercial Property (OMPIC) and the Copyright Office of Morocco (BMDA). Foreign technology vendors will be more likely to trade licenses with Moroccan firms when the perceived risk of intellectual infringement is low. Therefore, the said agencies have a critical role to play in showcasing Morocco as intellectual property protection compliant. On top of this, OMPIC and BMDA can go one further by facilitating foreign technology

license training for SMEs as a provision for boosting product and process innovation and export performance in the manufacturing sector. Not forgetting the positive effect of internal and external R&D on SMEs' process innovation, the possibility of external collaboration between SMEs and universities should be stressed. We echo prior suggestions to support SMEs' access to R&D. In this regard, in Morocco, a shared agenda by the Ministry of Industry, Trade, Investment and the Digital Economy as well as the Ministry of National Education, Vocational Training, Higher Education and Scientific Research may set the tone. Although there are already three techno-parks in Casablanca, Rabat and Tangiers for university-industry collaboration, they have only catered for the IT, green technology and cultural industries (Daily and Sussan, 2018; Amraoui *et al*., 2019). Bespoke hubs for universities and manufacturing SMEs will further expand the sector's share of national GDP and exports.

7.3. Limitations

Finally, this study acknowledges the following limitations which may pave way for future research. First, due to the cross-sectional nature of the data examined, associations rather than causal links have been captured. Hence, any reference to causality should be taken with caution as the associations deduced were based on theoretical underpinning. Other studies are invited to complement the present cross-sectional work with longitudinal studies so that causal relationships can be assessed with greater confidence. Second, although it is believed that the findings may reflect what obtains in neighbouring countries such as Algeria, Tunisia and other MENA countries further afield, scholars can validate the results in these contexts to improve generalisability. Third, regarding the external R&D variable, the measurement item only captured whether there was an outside source but did not specify the type of entity such as a university, research institute or other firms. This is worth disclosing because alternate sources of external R&D could have a distinctive impact on both types of innovation. As evidenced by Medda *et al*. (2020), external R&D with universities versus other companies held a different influence on product and process innovation. Therefore, future research may investigate the discrete influence of different sources of external R&D.

DISCLAIMER

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- All the analysis, interpretations, and conclusions drawn from the data are entirely and solely those of the users.

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