Technopreneur versus Entrepreneur Orientation in Fashion Design Education

Rahayu Purnama[1*], Rosita Mohd Tajuddin[2], Shaliza Mohd. Shariff[3]

[1]Fashion Design Education Program, State University of Jakarta, 13220 East Jakarta, Jakarta, Indonesia
rpurnama@unj.ac.id
[2 3]College of Creative Arts, Universiti Teknologi MARA, 40450 Shah Alam, Selangor, Malaysia
rositatajuddin@uitm.edu.my
shaliza478@uitm.edu.my
[*]Corresponding Author

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Abstract: The fashion industry requires technopreneurs, people who engage in technology-oriented entrepreneurship, to develop fashion designs that align with Industrial Revolution (IR) 5.0 and resolve technological and digitalisation-based complexities arising from this era. Entrepreneurship dimensions involve autonomy, innovativeness, risk-taking, proactiveness, and technology proficiency prove inadequate for technopreneurship following their constraint resources and access to and insufficient knowledge of foreign technopreneurship within fashion design. Thus, the research aimed was to identify and review technopreneur orientation literature from empirical domains: (i) entrepreneurial dimensions and (ii) entrepreneur-oriented technology or "technopreneurship" catalysts in fashion design. A systematic method entailing 25 pertinent articles from published Scopus-indexed journals between 2009 and 2021 was adopted. The paucity of research on the technopreneur dimension led to 10 dominant and representative articles extracted from Scopus-indexed journals and other relevant journals indexed by Google Scholar between 2002 and 2021. Notably, the current study recommended a conceptual technopreneur orientation framework in fashion design education. The content analysis of the past research revealed that technopreneur concept is crucial and must be engaged in designing a competitive fashion design education. The integration between entrepreneurial orientation and technopreneur concept will lead towards a competent graduate who will have an enhanced technology know-how with entrepreneur capabilities that will complement the needs of IR 5.0.

Keywords: Content Analysis, Entrepreneur, Fashion Education, Industry 5.0, Technopreneur

1. Introduction

Apparel industrial activities have denoted the acceleration of Sustainable Development Goals (SDGs) to implement green supply chains for current technological and innovative business operations following Industrial Revolution (IR) 5.0 (Buzzo & Abreu, 2019; Longo et al., 2020; Neil Sharp, 2021), including the globalised 'fast fashion' concept despite specific complexities (Bick et al., 2018; Garcia-Torres et al., 2017; Joy et al., 2012; Liu et al., 2020). Conventional business education entails ambiguous settings, such as creativity, proactiveness, and risk-taking programmes (Jones & English, 2004) while the entrepreneurial dimension constitutes autonomy, innovation, proactiveness, competitive aggressiveness, and risk-taking (Bolton & Lane, 2012; Byun et al., 2018; DiVito & Bohnsack, 2017; Gaweł, 2012; George Thomas Lumpkin & Dess, 2015; Rauch et al., 2009). Based on this preliminary research, fashion education alumni requires credible technological competence to fulfil the present apparel industry requirements (Purnama et al., 2021). Notwithstanding, past studies failed to explicitly

discuss and comprehend technopreneurs in fashion design. This research strived to establish a sound theoretical understanding of how entrepreneur dimensions would be incorporated into technopreneur orientations and associated with technological proficiency. A systematic literature review framework recommended by (Booth et al., 2016) was adopted in this study to determine (potentially) distinct technopreneurship catalysts in fashion design education. The journals elicited from the Scopus database were selected and assessed for an overview of technopreneur dimensions to integrate entrepreneur orientations with technological roles towards conceptual model development. Lastly, recommendations for future research were highlighted based on the knowledge gaps.

2. Literature Review

2.1 Preliminary Conceptual Framework

This section elaborates on a technology-oriented fashion design business to develop the types of entrepreneur dimensions empirically regarded as technopreneur orientation. Entrepreneurial dimensions were extensively discussed from multiple disciplines. Despite the research scarcity on technopreneur dimensions, particularly in fashion design, technology proficiency denotes a key determinant of technopreneur practices in the conceptual framework. Meanwhile, entrepreneur orientation is derived from several literature reviews that associate technopreneurs with technologybased entrepreneurship. The entrepreneurial dimension encompassed technology, entrepreneurship, technology proficiency, the creation of future concepts, opportunity-seeking, and novel business development (Baumol, 2002; Florida & Kenney, 1988; Rae, 2006; Yli-Renko et al., 2002).

2.1.1 Entrepreneurship Orientation

Entrepreneurship implies business or work consistency, conceptual innovation, and promising outcomes (Drucker, 2020) with creative entrepreneurship denoting the pillar of economic progress in emerging nations. As one of the dynamic instruments inducing national economic development, entrepreneurship facilitates sustainable and balanced growth. Entrepreneurial orientation constitutes autonomy, innovativeness, proactiveness, competitive advantage, and risk-taking (Bolton & Lane, 2012; Byun et al., 2018; Covin & Lumpkin, 2011; Dess & Lumpkin, 2005; DiVito & Bohnsack, 2017; Fernandes et al., 2019; Gaweł, 2012; George Thomas Lumpkin & Dess, 2015; Rauch et al., 2009; Sung & Park, 2018). An entrepreneur creates innovative solutions to a problem, takes risks, and seeks opportunities from existing (Fernandes et al., 2019). As a dynamic instrument that induces national economic development, entrepreneurship facilitates sustainable and balanced growth. Entrepreneurial orientation constitutes autonomy, innovativeness, proactiveness, competitive advantage, and risk-taking (Bolton & Lane, 2012; Byun et al., 2018; Covin & Lumpkin, 2011).

2.1.2 Technopreneurship

Technopreneurs constantly convert good notions into profitable commercial ventures while technopreneurship implies an integral attribute between technology application abilities and business development (Alias et al., 2020). Technopreneurs employ technological innovations that are transformed into commercialised products or services (Fowosire & Idris, 2017) by integrating relevant requirements and technologies with the entrepreneurial component in the technology industry, such as potential entrepreneurial opportunities in technological development for innovative product generation (Olusegun et al., 2019). As such, the entrepreneurial dimension based on technology, entrepreneurship, technology proficiency, and the creation of future ideas is highly prioritised (Florida & Kenney, 1988; Mashingaidze, 2016; Yli-Renko et al., 2002). Many studies conclude that innovation and proactive are two essential dimensions and occupy the top. The results indicated that innovative and proactive are in second and third place after autonomy which is in the highest order. Competitive aggressiveness is fourth, and risk-taking is last (Wongmuek, 2018). Meanwhile, Sung and Park (2018) stated that innovative, proactive, and risktaking are the main dimensions with the most influence (Byun et al., 2018). According to Gawel (2012), the intensity of innovation and proactiveness is high potential level,

while risk-taking and aggressiveness of competition and autonomy are lower. He also added that entrepreneur It encourages the identification of future innovations related to sustainable economic, social, and environmental development at the innovative and proactive level (Gaweł, 2012). Technopreneurship catalyzes creativity towards successful products or services by increasing innovative product competitiveness (Alias et al., 2020; Olusegun et al., 2019). An entrepreneur could undertake necessary measures and benefit from business possibilities that create novel, innovative products (Bohnsack & Divito, 2018), process, management, and marketing (Fernandes et al., 2019). Technopreneur development entails a technology-savvy level, education quality, risk tendency, and innovation (Adeoti, 2019). Currently, technopreneurship is crucial to resolving the intricacies of globalization, economic liberalization, and human resource optimization (Alias et al., 2020; Mashingaidze, 2016). As entrepreneur orientation dimensions were derived from a technopreneur's viewpoint, the other four categories of dimensions (create a future idea, business innovation, seek opportunity, and technology proficiency) were regarded as technopreneur orientation dimensions.

3. Method

A systematic literature review ascertains a knowledge point at specific intervals(Booth et al., 2016) through empirical articles between 2009 and 2021. Given the need for competent operators to adopt novel technologies in the apparel industry, which remains lacking (Nayak & Padhye, 2015), the paucity of research on technopreneurs in fashion design (Purnama et al., 2021; Putri, 2019) and technopreneur orientation needs to be resolved. Past entrepreneurship literature (Fowosire & Idris, 2017; Scarlat, 2014; Selvarani & Venusamy, 2015) only regarded recent peer-reviewed publications. The consistent development of literature reviews in a specific study area with novel implications and evidence provides advanced knowledge and theoretical clarity through high transparency and internal validity (Booth et al., 2016).

3.1 Research Procedures

The current work determined keywords pertaining to the research questions. This systematic review was initiated by identifying scholarly articles through specific keywords: "entrepreneur dimension", "entrepreneurial orientation", "entrepreneur based-technology", "technopreneur orientation", and "technopreneur dimension". Entrepreneur orientation was first selected following its reputation as one of the most established research constructs in entrepreneurial literature represented by its entrepreneur dimensions (Mazzarol & Reboud, 2020). The entrepreneur-based technology domain was selected owing to its connection with technopreneur in line with this study while technopreneur orientation was identified to complement the research focus. The above mentioned terms were searched following a preliminary literature review given that this research strived to integrate knowledge from three distinct streams and incorporate "autonomy", "innovativeness", "proactiveness", "risk-taking", and "technology proficiency" as pivotal topics. This method paralleled past studies that employed string keys to conveniently filter the required information based on the studies and determine relevant publications (Williams & Toth-Fejel, 2017). For example, entrepreneurial orientation and technopreneur orientation were utilised as keyword strings to ascertain entrepreneurial orientation articles. Both strings served to determine empirical reports on technopreneur orientation. Figure 1 depicts the systematic review process.

Step 1. Denotes the inclusion criteria where only peer-reviewed articles in English were selected as most scholarly papers were published in this language following (Bocconcelli et al., 2018). This criteria also included publications on entrepreneurial orientation and technopreneurship in the last 12 years.

Step 2. Involves Scopus selection with high percentile by Scimago Journal & Country Rank and categories (keywords employed in search the entrepreneur dimension, entrepreneur education, and entrepreneur orientation title and abstract space), which were selected parallel to the research focus on technopreneur orientation catalysts. A total of 212 papers were gathered from Scopus-indexed journals and 200 papers from Google Scholar-indexed papers.

Step 3. This study subject was filtered based on entrepreneur dimensions: autonomy, innovativeness, proactiveness, risk-taking, competitive advantages, and creativity. The first screening

resulted in 195 potentially pertinent publications for the meta-analysis scope. The Google Scholar index was employed for the expansion of journal selection, which was excluded from the Scimago journal rank list given the paucity and novelty of research on technopreneur orientation. Similar connotations between the entrepreneur orientation-technopreneur orientation dimensions were also analysed. A total of 120 papers were gathered of 68 papers were gathered from Scopusindexed journals and 75 papers from Google Scholar-indexed papers.

Step 4. Only articles with complete texts were selected and evaluated with Mendeley for article accessibility. The first screening resulted in 195 potentially relevant publications for the metaanalysis scope. A total of 68 papers were gathered from Scopus-indexed journals and 30 papers from Google Scholar-indexed papers.

Step 5. The aforementioned 195 publications were reduced to 25 counterparts (15 on entrepreneurial dimension and 10 on technopreneur orientation) for specific reasons. A total of 10 papers were gathered from Scopus-indexed journals in Quartile 1 while four were collected from Google Scholar-indexed papers. Overall, representative articles between 2014 and 2015 with over 10 citations were utilised in this study.

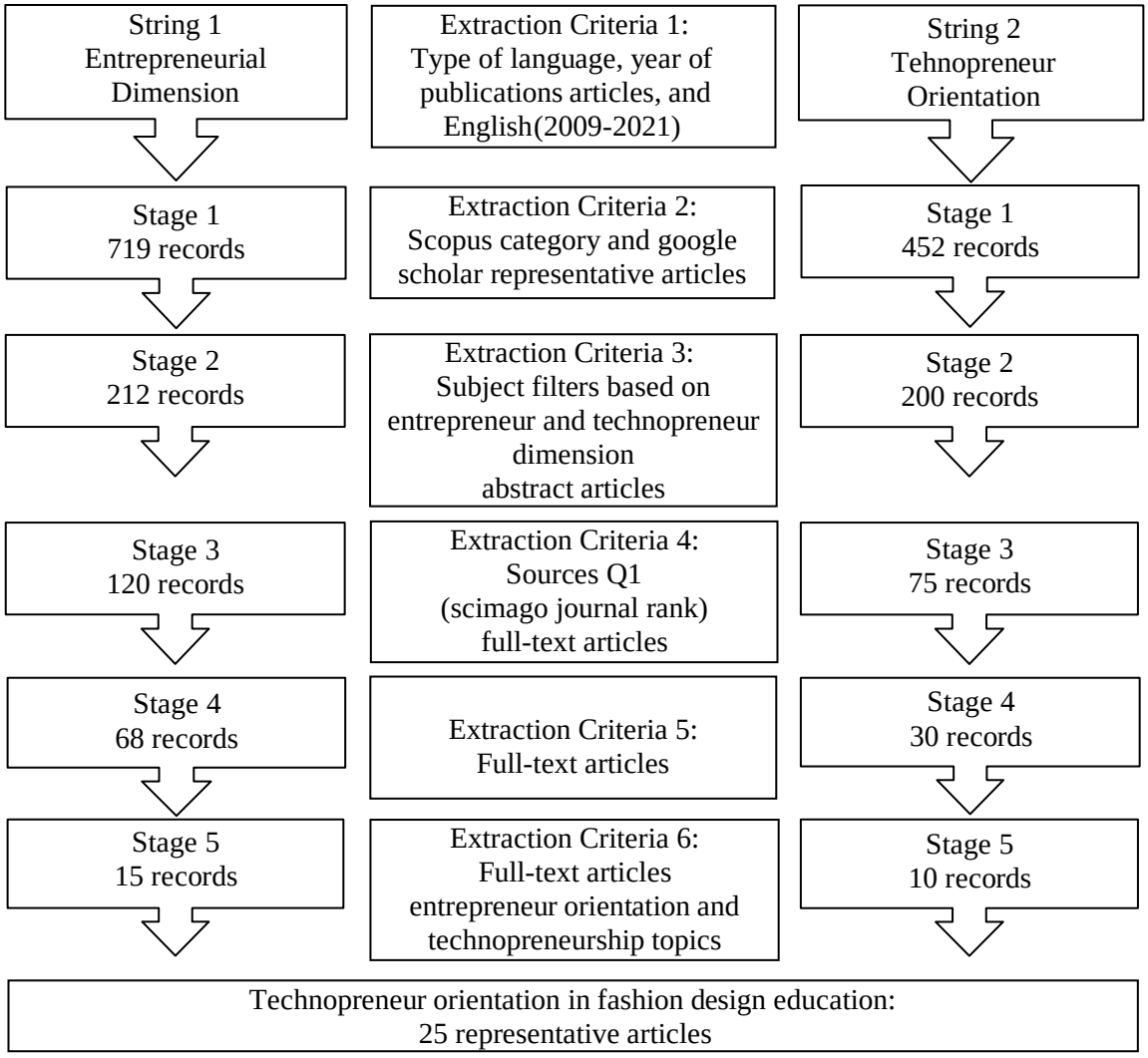

Fig.1 Systematic review process

4. Results and Discussion

The data patterns appear to fluctuate; under ten journals were published between 2009 and 2021. The quantitative data gathered and assessed from literature reviews denoted the most popular method among the 11 papers. The quantitatively-analysed data was gathered using a survey among seven articles: three case studies, two secondary data usage papers, one mixed-method research, and one literature review. Resultantly, 15 publications implied entrepreneurial orientation and entrepreneur dimension, while the conceptual method was extensively employed in 17 articles.

4.1 Descriptive Analysis

The data patterns appear to fluctuate; under ten journals were published between 2009 and 2021. The quantitative data gathered and assessed from literature reviews denoted the most popular method among the 11 papers. The quantitatively-analysed data were gathered using a survey among seven articles: three case studies, two secondary data usage papers, one mixed-method research, and one literature review. Based on further assessment, a quantitative method was selected to examine 11 articles, followed by a qualitative approach to study 11 articles, and a mixed-method to investigate two papers. Resultantly, 15 publications implied entrepreneurial orientation and entrepreneur dimension while the conceptual method was extensively employed in 17 articles. An entrepreneur could undertake necessary measures and benefit from business possibilities that create novel innovative products (Bohnsack & Divito, 2018) process, management, and marketing (Claudy et al., 2016) by increasing innovative product competitiveness (Olusegun et al., 2019). Technopreneur development aspects entail technology-savvy, level, education quality, risk tendency, and innovation (Adeoti, 2019). As entrepreneur orientation dimensions were derived from a technopreneur's personal viewpoint, the other four categories of dimension (create a future idea, business innovation, seek opportunity, and technology proficiency) were regarded as technopreneur orientation dimension.

4.2 Thematic Analysis

An entrepreneur could undertake necessary measures and benefit from business possibilities that create novel innovative products (Bohnsack & Divito, 2018), process, management, and marketing (Claudy et al., 2016; Fernandes et al., 2019). Successful entrepreneurs demonstrate 10 dimensions of character: the need for achievement, self-confidence, initiative (proactiveness), independence (autonomy) and responsibility, risk-taking propensity, and experience (Al-Damen, 2015). Technopreneurship catalyses creativity towards successful products or services by increasing innovative product competitiveness (Alias et al., 2020; Fowosire & Idris, 2017; Olusegun et al., 2019). Currently, technopreneurship proves crucial to resolving the intricacies arising from globalisation and economic liberalisation, and human resource optimisation (Mashingaidze, 2016). Technopreneur development aspects entail technology-savvy, level, education quality, risk tendency, and innovation (Adeoti, 2019). As entrepreneur orientation dimensions were derived from a technopreneur's personal viewpoint, the other four categories of dimension (create a future idea, business innovation, seek opportunity, and technology proficiency) were regarded as technopreneur orientation dimension.

4.3 Dimensions of Entrepreneur

The entrepreneur dimensions encompass five entrepreneur orientation counterparts: autonomy, innovation, proactiveness, competitive aggressiveness, and risk-taking (Baker & Sinkula, 2009; Bolton & Lane, 2012; Bratnicki & Gabrys, 2008; Byun et al., 2018; Covin & Lumpkin, 2011; Dess & Lumpkin, 2005; DiVito & Bohnsack, 2017; Frishammar & Åke Hörte, 2007; Gaweł, 2012; Rauch et al., 2009). Notably, Dess and Lumpkin's four dimensions render Entrepreneur Orientation to be a more operational concept.

4.3.1 Autonomy

Autonomy enables idea-generating liberty and the envisioning of arising opportunities to be actualised through creativity and astuteness (G Tom Lumpkin & Dess, 1996; Maddikunta et al., 2021; Wongmuek, 2018), revolutionary possibilities, advancements in scientific and technological developments, and adaptation with highly dynamic implications (Kates et al., 2005). Specifically, autonomy is associated with technopreneur orientation where the creation of future concepts could navigate future business notions or visions for relevant opportunities (Alias et al., 2020), such as technology-oriented business plans with novel approaches (Fernandes, 2018; Gehlhar, 2021; Lang & Liu, 2018; Sirelkhatim & Gangi, 2015). On another note, fast fashion could create business opportunities with the willingness and competence in discovering and assessing idea discovery within fashion design despite the advent of specific issues (Claudy et al., 2016). Conclusively, independent idea-generation in technology-oriented fashion design could be incorporated into technopreneur orientation.

Proposition 1: Autonomy is explicitly incorporated into technopreneur orientation in fashion design

4.3.2 Innovativeness

Innovative differentiation is represented by product development creativity, novel technology applications, advanced innovations, quality design, and the pursuit of novel products, processes, or business models (innovativeness) with the anticipated commercialisation of innovations in new product or market domains (Bolton & Lane, 2012; Byun et al., 2018; Covin & Lumpkin, 2011; DiVito & Bohnsack, 2017; Flavián et al., 2021; Gaweł, 2012; Kariv et al., 2019; Marniati & Witcjaksono, 2020; Rauch et al., 2009; Sirelkhatim & Gangi, 2015; Wongmuek, 2018). Involvement in supporting new ideas, novelty, experimentation, creative processes (Kariv et al., 2019; Yang et al., 2020), digital fashion show (Bertola & Teunissen, 2018), new service and distribution commercialisation, omnichannel marketing, commercialisation of novel process-based technology (personalisation), new marketing commercialisation, and market-based innovation (digital marketing or application, e-commerce, one-on-one service and web) (Barr et al., 2009; Hansen & Wyman, 2021; Oakey, 2013; Soomro & Shah, 2021; Zachary & Mishra, 2011; Zhou et al., 2010). Summarily, a technopreneur in fashion design must incorporate innovation to sustain in the apparel industry amidst Industry Revolution 5.0.

Proposition 2: Innovativeness is explicitly incorporated into technopreneur orientation in fashion design

4.3.3 Proactiveness

Proactiveness implies foresightedness based on which first-mover or market-leader benefits could be reaped, the search for market opportunities to present novel products or services ahead of one's competitors, and the anticipation of future demand (Bolton & Lane, 2012; Byun et al., 2018; Covin & Lumpkin, 2011; DiVito & Bohnsack, 2017; Flavián et al., 2021; Gaweł, 2012; Kariv et al., 2019; Marniati & Witcjaksono, 2020; Rauch et al., 2009; Sirelkhatim & Gangi, 2015; Wongmuek, 2018). Specifically, proactive technopreneur orientation denotes the seeking of opportunities in line with future technologies and digitalisation through mentoring sessions and competitions, such as preparing start-ups with business incubators (Barr et al., 2009; Byun et al., 2018; Lang & Liu, 2018; McGowan & Cooper, 2008; Min & Wilson, 2019; Soomro & Shah, 2021; Zachary & Mishra, 2011), business seminars from academicians (Leicht et al., 2018), and networking: collaborating with alumni, practitioners, and the industry (Liu et al., 2020). Product proactiveness could be characterised using technology by focusing on market or consumer requirements and services ahead of the competition and acting in anticipation of future demand (Wongmuek, 2018). As such, fashion design technopreneurs proactively seek business opportunities by enhancing professional and technological competence.

Proposition 3: Proactiveness is explicitly incorporated into technopreneur orientation in fashion design

4.3.4 Risk-taking

A risk-taker who strives to generate organisational profitability or success through enterprise or business creations seeks novel alternatives to address technological ambiguities (Bhardwaj, 2020; Soomro & Shah, 2021). Following past literature, technopreneurs who create novel businesses are willing to face potential business risk. Risk-taking demonstrates the acknowledgement of ambiguities and risks by investing resources and activities towards uncertain implications (Hughes & Morgan, 2007; G Tom Lumpkin & Dess, 1996), thus risking people who work autonomously or under employment when a company leader uncertainly decides on a specific project (Schillo, 2011; Wongmuek, 2018). Technopreneurs need to be self-prepared as agents of change for conceptual development and future advancements in the fashion industry (Sousa et al., 2019). Overall, creating a novel fashion design business implies a risk-taking capacity that integrates fashion design technopreneurs.

Proposition 4: Risk-taking is explicitly incorporated into technopreneur orientation in fashion design

4.3.5 Technology Proficiency

As entrepreneurs with knowledge of technological processes and utilisation for entrepreneurial goal attainment (Dana et al., 2021; Kleine et al., 2019), technopreneurs are capable of dominating the financial market and changing the economy (Fowosire & Idris, 2017; Kleine et al., 2019; Oakey, 2013), presenting innovative and high-technology products, or incorporating advanced and creative technologies for product delivery to consumers (Arribas & Alfaro, 2018; Scarlat, 2014; Selvarani & Venusamy, 2015; Soomro & Shah, 2021). The capacity to operate technology and digitisation positively impact fashion design (Padhi, 2018; Purnama et al., 2021; Sun & Zhao, 2018; Yang et al., 2020). As Industrial Revolution 5.0 emphasises the delivery of (i) customer experience, (ii) hyper-customisation, (iii) responsive and distributive supply chain, (iv) experienced and activated (interactive) products, and (vi) human resource returns to factories (Demir et al., 2019; Fernandes et al., 2019; Maddikunta et al., 2021). Overall, technologically-proficient fashion design technopreneurs play a substantial role in the fashion industry as future fashion design graduates encounter complexities in pursuing the technological opportunities resulting from Industrial Revolution 5.0 (Wenyuan et al., 2020).

Proposition 5: Technology proficiency is explicitly incorporated into technopreneur orientation in fashion design

5. Conclusion

The current research presented two conclusions regarding the literature reviews of entrepreneur orientation, entrepreneur-based technology, and technopreneur orientation publications for the past 11 years. First, the entrepreneurial orientation dimension entailed the foundation underlying technopreneur orientation using technological developments with specific technopreneur connotations and dimensions from current research, such as technopreneurs in technology-based entrepreneurship. Similarities in terms of creating future ideas reflected autonomy, business innovation implied innovation in the entrepreneurial dimension, opportunity- seeking denoted proactiveness, new business creation resembled risk-taking, and technology proficiency characterised technopreneur perspectives, which did not arise from the entrepreneurial orientation in past studies. Based on the research model, the technopreneur orientation dimension was impacted by entrepreneur orientation. A conceptual technopreneur orientation framework in fashion design education that integrated past study implications was proposed in this study to mould a sustainable fashion design technopreneur in the future. This research implies that in today's globalization era, in attending to the needs of Industrial Revolution 5.0, the entrepreneur orientation needs to adapt the technopreneur concept in producing a sustainable fashion

design education. With a sustainable fashion design education, students who graduated are not only competitive, but they will be competent in technology know-how that enable them to operate fashion businesses with ethical who fulfill the technopreneur capabilities.

5.1 Research Contributions

The current study incorporated knowledge of the entrepreneur orientation dimension from two research streams and ascertained which drivers potentially impacted technopreneur orientation. The entrepreneur orientation strategy enriched theoretical technopreneurship discussions in fashion education based on past scholars. A basis for comprehensive theory development, including technopreneur orientation in fashion design, to establish a sustainable curriculum in the future was also provided. It is deemed crucial to comprehend the various factors catalysing technopreneur orientation development in fashion design and forecast and induce sustainability awareness and attitude as the integration of sustainability proves pivotal for the achievement of SDG goals. The 2030 Sustainable Development Goals (SDGs), such as SDG 4 (education), SDG 8 (promote inclusive and sustainable economic growth, employment, and decent work for all), SDG 12 (responsible consumption and production), and SDG 13 (climate action) possibly accelerated the progress of sustainability.

5.2 Future Research

Future studies should explore how technopreneur orientation could be incorporated into a sustainable fashion design curriculum. Technopreneur orientation could be affected by (interconnections of) autonomy, innovativeness, proactiveness, risk-taking, and technology proficiency. Research on technology-oriented technopreneur orientation could offer a holistic understanding of how entrepreneurs' adoption of technopreneurship practices is developed. The concept of technopreneurship is not only can be applied in the fashion design curriculum, but this idea of technopreneurship can be adapted to other disciplines such as in science & technology and business. Quantitative approaches could also be employed to assess the proposed conceptual model and establish framework generalisability. For example, future studies could examine if and how the adoption of technopreneur orientation impacted autonomy, innovativeness, proactiveness, risk- taking, technology proficiency and sustainable fashion design technopreneurs. Empirical investigations on the recommended model for a sustainable fashion design curriculum could also be performed with technopreneur orientation.

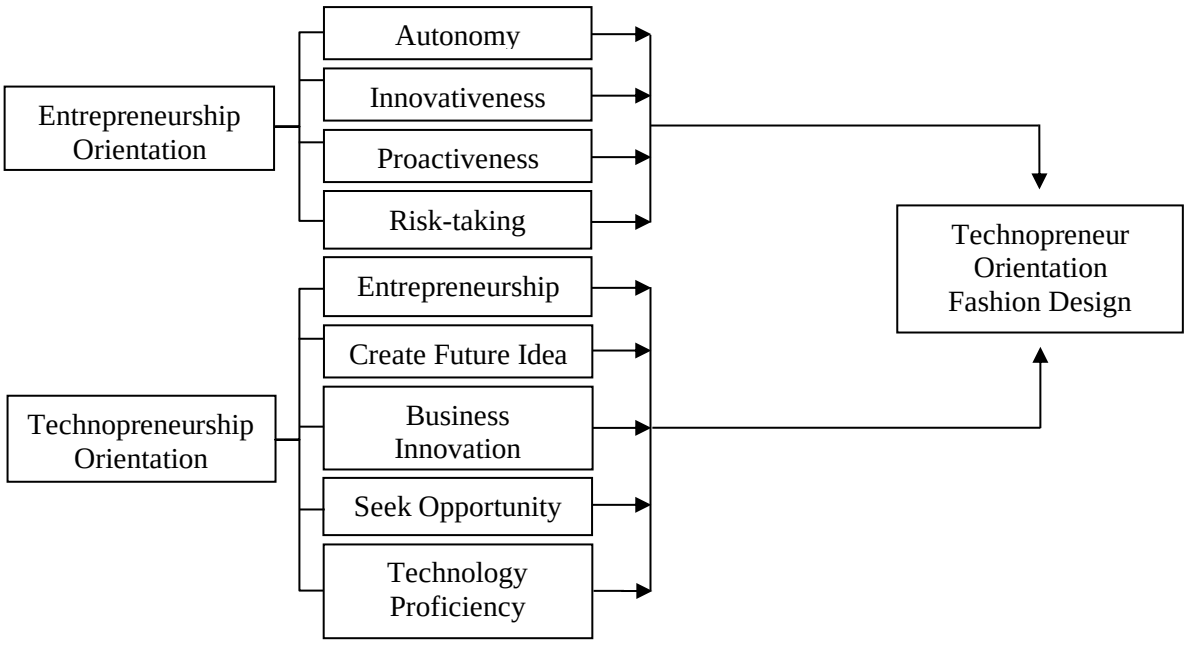

Fig. 2 Proposed conceptual framework

6. Co-Author Contribution

The authors affirmed that there is no conflict of interest in this article. Author 1 carried out the field work, prepared the literature review, the theoretical and conceptual framework of the study, revised the intellectual content critically and overlook the whole article's writeup. Author 2 wrote the research methodology and conducted the data entry providing a substantial contribution to the data collection and analysis.

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