



Digital Pattern Business Models as Sustainable Practices and Challenges faced by Student Fashion Entrepreneurs in Lagos State, Nigeria

BOISO MARIA OWODIONG-IDEMEKO, SAMSON ADESHOLA IDOWU,
TEMITOPE FELICIA OGABI, ATINUKE DORCAS OGUNDELE
Lagos State University of Education, Oto/Ijanikin and Epe Campus, Lagos, Nigeria

Abstract. The study was on digital pattern business models as sustainable practices and challenges faced by student fashion entrepreneurs in Lagos state Nigeria was conducted among 200 fashion design students from Yaba College of Technology, Yaba, Lagos. Two (2) research questions and two (2) hypotheses guided the study. It was a descriptive survey, the instrument for the data collection was a structured questionnaire containing 30 questions which was further subjected to face validity by two experts. The data collected was analyzed using mean, and Chi-square. The result revealed 192 (96) respondents answered yes, pattern cutting and marking has been digitized, 152 (76) answered yes, they have digitized their pattern production in case of pandemic. 194 (97) answered yes, there are digital business models for pattern cutters and markers. Majority answered yes, there is freemium, training and workshop, software, e-commerce, crowd funding etcetera. 197 (98.5) answered yes, there was lack of internet service. 160 (80) answered yes, soft and hardware were not available, and affordable. 156 (78) answered yes, lack of qualified technologists was a challenge. 128 (64) there was irregular power supply. 125 (62.5) answered yes, traditional model pattern cutting and marking were preferable. 196 (98) answered yes, this is the digital era. In conclusion, for digital business practice model to be a sustainable practice, the following were recommended. Production of soft and hardware for pattern cutting and marking should be made home grown, as well as good internet provider and constant electricity.

Keywords: Challenges, Digital Business Models, Entrepreneur, Pattern Cutters, Sustainable Practice

1. Introduction

Business Models are core logic of firms that creates and deliver value for its customers to give value for itself. It is a holistic perspective on the overall set up of the business and includes every process along the value chain. Involving changes in the value proposition, value delivery and value capture of the firm (Carol, 2025, Alex, 2025, Brian, 2024, Mathias, Gregersen and Jason, 2022, Lutz and Robin, 2020). However, digital business models have been understood to be models in which some or all what would be physical in a traditional organization has been digitized. (Jugindar, Kartar and Goh, 2023, Abu Saddat, Pammi, Al-Hussein and Tracy, 2021 Sascha, Carolin, Norbert, Friedrich, 2019). With the development and advancement in internet pattern makers and designers can explore various benefits offered by modern technologies such as E-Commerce strategies for Economics development and supporting social environment (Achla, 2025, Nzei 2022, Clara 2019). Pattern making is a vocational skill in garment construction that prepares students in entrepreneurship it serves, as a blueprint for clothing construction, transforming 2D sketches in 3D designs. Sustainable practices are business innovation and it is the process of incorporating element of sustainable development such as environmental, social and financial consideration into a business system through research and development. It is also a method that takes into account equity and environmental integrity (Sharifah, Mahyuddin, Nornazira, Nur, Irina, 2022, Noorzana, Chuzairy and Adibah, 2022). The traditional pattern cutter and marker production model has been increasingly unable to meet the consumer diversified and personalized needs, therefore the realization of the automated patterns production and distribution in very crucial especially in this technological age. The

problem statement is that most student pattern cutters and markers entrepreneurs are not aware of digitalization as a business model practice that can enhance performance and sustainability increasing competitiveness by providing valuable consumers, increased online visibility and generate revenue even during international crisis like COVID-19 pandemic. Moreover, pattern cutters and markers are not aware that there is various digital software available to enhance their business. However, student pattern cutters and markers entrepreneurs cannot adopt these models due to high cost of the soft and hardware. Other challenges include inadequate internet infrastructure, cybercrime, inadequate power supply, lack of qualified technologist to handle the soft and hardware. Pattern cutters and markets are unable to adapt to the changes in this era of digitalization in Lagos State, Nigeria.

There are several business model softwares as service (SAAS) for pattern cutting and marking. These include software such as Browzwear, Opitex, PAD system, Tukatech, Lectra, Gerber, Accumark, Adobe Illustrator, Corel Draw, Procreate, 3D rendering, GLO 3D. Browzwear is utilized for pattern cutting and marking and offers a superior fit with full pattern templates with accuracy. (Ahshan, 2024, Mazharul, 2023, Shuo and Xiaogu, 2022, Abu Sadat, Pammi, Al Hussein, Tracy, 2021, Adrian, Harwood, Simeon, 2020). Procreate software construct pattern, 3D rendering for actual physical production creation, Glo 3D is for visualization while Swatch book or Swatch pattern book is a library for patterns. Designers can explore patterns business models in a variety of ways such as subscription business model using this software. (Theren, 2023, Regesh, Nikita, Nikhil and Neha 2023, Pontus and Paavo, 2023). In this model pattern cutters and markers print volume proposition for a periodic recurring fee. (Ughade, 2024). The freemium model once popular for games, and many online services such as music, magazine, social networks and cloud services, is a combination of “free” and “premium”. A type of business model that offers a product or services to users at no cost and charges a premium for supplement or advanced features. (Troy, 2024, Yanying, Junfeng, Yamin, Ruochen and Peiging, 2024, Juho, Nicola and Jonna, 2020, Saso, Lidija and Martin, 2019). Market place model is a digital platform that acts as a market place where pattern cutters and markers can sell or share their digital pattern on commission from all website purchases. (Yaroslav, 2024, Jose, Abraham and Emiro, 2023, Maximillan 2020, Kawa and Walesiak, 2019). The custom design services model offers bespoke digital pattern cutting services to other designers, fashion brands or individual clients. (Jose,

Abraham and Emiro, 2023). There is the collaborative model in which collaborative platforms are used, pattern cutters and markers collaborate, share and co-create patterns. Revenue can be generated through membership fees, transaction fees or advertising (Frank, 2024, Benjamin, 2023, Marshall, 2023). In digital training and workshop model, expertise can be monetized by offering online courses, workshops and webinars on digital pattern cutting and marking using different platforms. (Manfred, 2023, Hafiz 2018). Licensing and Royalties model offers the opportunities to license their digital patterns to brands or their designs for a fee or a percentage of sales. (Will, 2024, Philip, 2024, Brian, 2020). Integration with E-Commerce platforms is another model that offers pattern cutters and markers an e-commerce strategy connecting them to marketing tools, sales, accounting or payment gateways and accurate data integration are managed accurately (Autumn, 2024, Teren, 2022, Brent, 2021). Crowd sourcing and crowd funding business model used to fund new pattern collections. Backers got early or exclusive access to digital patterns in exchange for their support. It offers the potential to transform small and medium sized enterprises with access to capital for research and development (R&D), hire skilled personnel and acquire the necessary resources to innovate. (Tahir, 2024, Wojciech, 2024). On demand manufacturing model works by some pattern cutters and markers integrating digital pattern cutting with on demand manufacturing allowing for small batch or custom pattern production (Ryan, 2024, Ronan, 2022, Brian, 2021). These business models would help enhance the social, economic and health of the pattern makers and their consumers in case of another international crisis like the COVID-19 pandemic.

However, the rapid pace of digital business model innovation has also introduced new barriers and challenges to students’ pattern cutters and markers in Lagos state, such as inadequate internet infrastructure also, adaptation of digital business models for pattern cutters and markers is still at its infancy making it to be slow. Furthermore, unstable power supply has been an issue for business owners (Ademola, 2023). There is high cost of hardware and software application and website related issues such as privacy and security. E-commerce has faced different kinds of security issues, ranging from hacking, fraud to virus attacks making customers reluctant to share personal information online. (Muhammed and Yusuf 2023, Sadiq and Hack - Polay, Fuller and Rahnan, 2022, Jugindar, Kartar and Goh, 2023, Bernard, 2023). Other barriers to users include lack of funding, outdated technologies, and business owners who cannot keep with the pace or lack interest working with obscure technology. (Christoph,

2023). Qualified talents are lacking, (Jugindar, Kartar and Goh, 2023, Bernard, 2023). Lack Of knowledge of new technology and updated new technology is making pattern cutters and markets skepticism in engaging in digital business model initiatives. There are also insufficient funds or loans and when they are available, they come with high interest. Moreover, the business owner has governance challenges which come from governance, better communication efficient coordination and cumulative vision for the business (Shettima and Sharms, 2020).

1.1 Objectives of the Study

The following objectives were formulated:

- To examine digital pattern business models as sustainable practices for student fashion entrepreneurs in Lagos State, Nigeria.
- To examine the challenges of digital pattern business model practices faced by student fashion entrepreneurs in Lagos State, Nigeria.

1.2 Research Questions

- What are the digital pattern business models as sustainable practices for student fashion entrepreneurs in Lagos State, Nigeria?
- What are the challenges of digital pattern business models practices faced by fashion entrepreneurs in Lagos State, Nigeria.

1.3 Hypotheses of the Study

Hypothesis 1: There is no significant of digital pattern business model practices for student fashion entrepreneurs.

Hypothesis 2: There is no significant challenge of digital pattern business models practices for student fashion entrepreneurs.

2. Methodology

Design of the Study: descriptive survey research design was adopted to enable the respondents go

through the questionnaire to give their personal opinions about the problem being investigated.

Area of the Study: The area of the study was Lagos state, Yaba College of technology, Yaba, Lagos,

Population of the Study: The population of the study constituted 200 respondents of fashion and design department, Yaba college of technology.

Instruments for Data Collection: A structured questionnaire was used for data collection titled: Digital pattern business models as sustainable practices and challenges faced by student fashion entrepreneurs in Lagos State, Nigeria. The first part contained demographic information of respondents while the second part with two sections containing 30 question items for responses from respondents based on specific objectives. Table I had 16 questions on digital pattern business models, table II had 14 questions on challenges of digital pattern business models practices for student fashion entrepreneurs.

Validity and Reliability of the Instrument: The instrument was given first validity by two fashion design lecturers and a lecturer from the department of statistics. Their constructive corrections were affected and test retest was used to determine the reliability and consistency of the instrument. This shows that the instrument was valid and reliable.

Method of Data Collection: The questionnaire was administered to 200 hundred respondents with the help of 2 research assistants from the department. All were retrieved.

3. Method of Data Analysis

Data were analyzed with mean and chi- square from the Friedman's test.

Hypothesis 1: There are no significant digital pattern business model as sustainable practices for student fashion entrepreneurs.

Table 1: Digital Pattern Business Models as Sustainable Practices for Fashion Entrepreneurs

S/N	Variable (N=200)	Yes (%)	No (%)	Mean Rank	χ^2 (p-value)
1	As a student fashion designer, I use patterns in my business.	199 (99.5)	1 (0.5)	7.65	195.502* (<0.001)
2	Pattern cutting and marking has been digitized	192 (96)	8 (4)	7.93	
3	I have digitized my pattern production in case of a pandemic	152 (76)	48 (24)	9.53	
4	Digitization of patterns enhances business performance for fashion entrepreneurs	190 (95)	10 (5)	8.01	
5	There are digital business models to enhance pattern cutting and marking for sustainability.	194 (97)	6 (3)	7.85	
6	One of these business models is "Freemium" model	164 (82)	36 (18)	9.05	
7	There is "marketplace" to enhance pattern business performance for student fashion entrepreneurs	170 (85)	30 (15)	8.81	
8	Custom pattern cutting and marking design model practice is for bespoke fashion	159 (79.5)	41 (20.5)	9.25	
9	There is subscription based-content pattern model practice for fashion entrepreneurs	165 (82.5)	35 (17.5)	9.01	
10	Also, collaborative digital pattern model practice to enhance business for fashion entrepreneurs	178 (89)	22 (11)	8.49	
11	Training and workshop model on digital pattern business to enhance fashion entrepreneurs	198 (99)	2 (1)	7.69	
12	There is licensing and royalties' digital model for pattern cutters and markers for entrepreneur	165 (82.5)	35 (17.5)	9.01	
13	Pattern cutters and markers can use on-demand model for digital business practices.	171 (85.5)	29 (14.5)	8.77	
14	E-Commerce strategy is another pattern business practice model for sustainability	184 (92)	16 (8)	8.25	
15	Crowd sourcing and funding is a business practice model to use by student fashion entrepreneurs	172 (86)	28 (14)	8.73	
16	There are pattern cutting and marking software to be used as business models practices	191 (95.5)	9 (4.5)	7.97	

* Significant at 1% level

The Chi-square value ($\chi^2 = 195.502$, $p < 0.001$) from the Friedman's test indicates that there are significant digital pattern business model as sustainable practices for fashion entrepreneurs ($p < 0.05$). The table shows that pattern cutting and marking has been digitized, and the digitization enhances business performance. There are digital business models to enhance pattern cutting and marking production which include "Freemium business", subscription based-content, "marketplace" model, collaborative digital model, training and workshop digital business model, licensing and royalties' digital model, on-demand model, crowd sourcing and funding, E-Commerce strategy, pattern cutting and marking software model.

Hypothesis 2: There is no significant challenge of digital pattern business models practices faced by student fashion entrepreneurs.

Table 2: Challenges of Digital Pattern Business Models Practices for Fashion Entrepreneurs.

S/N	Variable (N=200)	Yes (%)	No (%)	Mean Rank	χ^2 (p-value)
1	As a pattern cutter and marker internet service is a challenge for student fashion entrepreneur	197 (98.5)	3 (1.5)	6.45	424.451* (<0.001)
2	This is the digital era for pattern businesses	196 (98)	4 (2)	6.49	
3	Pattern cutters and markers are unable to adopt digital business models	183 (91.5)	17 (8.5)	6.94	
4	Software and hardware are not affordable for pattern entrepreneurs	160 (80)	40 (20)	7.75	
5	Qualified technologists to handle these devices are lacking for pattern cutters and markers	156 (78)	44 (22)	7.89	
6	Irregular power supply is a challenge for student fashion entrepreneurs	128 (64)	72 (36)	8.87	
7	Soft and hardware used to deliver pattern business services are not produced locally	114 (57)	86 (43)	9.36	
8	Digital pattern cutting and marking practices which would have helped in the confines of existing platforms is a challenge to fashion entrepreneurs	191 (95.5)	9 (4.5)	6.66	
9	Exchange of patterns in the digital world is a challenge to fashion entrepreneur	169 (84.5)	31 (15.5)	7.43	
10	Digital student pattern cutters and markers are unable to innovate	192 (96)	8 (4)	6.63	
11	Pattern cutters and markers are unable to integrate with the economic and social environment of the consumers	187 (93.5)	13 (6.5)	6.80	
12	Digital pattern business model can be a challenge to alleviate poverty even during international crisis for fashion entrepreneurs	151 (75.5)	49 (24.5)	8.06	
13	Pattern cutters and markers are unable to streamline design production for the real world	190 (95)	10 (5)	6.70	
14	The traditional business model practices by pattern cutters and markers are preferred by fashion entrepreneurs	125 (62.5)	75 (37.5)	8.97	

* Significant at 1% level

The Chi-square value ($\chi^2 = 424.451$, $p < 0.001$) from the Friedman’s test implies that there are significant Challenge of digital business pattern models practices for fashion entrepreneur ($p < 0.05$). Some of these challenges include, lack of access to internet facility, lack of qualified personnel to handle the devices, soft and hardware for pattern cutting and marking are not affordable, and epileptic power supply.

4. Discussion of Findings

Table I was on digital pattern business models as sustainable practices for entrepreneurs, the table revealed that 199(99.5%) answered yes, as a student fashion designer, he or she uses patterns in his or her business, 1 (0.5%) answered no (Carol, 2025, Alex, 2025). 192 (96%) answered yes, pattern cutting and marking has been digitized 8 (4%) answered no (Brian 2024, Dragana and Sasa, 2023, Christoph, 2023, Maximillian, 2020, Sascha, Carolin, Norbert and Friedrich, 2019). 152 (76%) answered yes, they have digitized their pattern production in case of a pandemic, 48 (24%) answered no (Brian, 2025, Irina, 2022). 190 (95%) answered yes, digitization of pattern

enhances business performance for fashion entrepreneurs, 10 (5%) answered no. (Achala 2025, Yaroslov, 2024, Maximilian, 2020). 194 (97%) answered yes, there are digital business models to enhance pattern cutting and marking production for sustainability 6 (3%) answered no (Theren, 2023, Mazharul, 2023, Adrian, Harwood, James and Simeon, 2020). 164 (82%) answered yes, one of this business models are “Freemium” for fashion entrepreneurs. 36(18%) answered no (Troy, 2024, Yanying, Junfeng, Yamin, Ruochen and Peiging 2024, Juho, Nicolai and Jonna, 2020). 170 (85%) answered yes, there is marketplace to enhance pattern business performance for student fashion entrepreneurs, 30(15%) (Jose, Abraham and Emiro, 2023, Maximillian, 2020, Kawa and Walesiak, 2019). 159 (79.5%) answered yes custom pattern cutting and marking model practices is for bespoke fashion, 41 (20.5%) answered no (Jose, Abraham and Emiro, 2023). 165 (82.5%) answered yes, there is a subscription based-content design model practice for fashion entrepreneurs, 35(17.5%) answered no (Ughade, 2024, Theren, 2023, Regesh, Nikita, Nikhil and Neha, 2023, Pontus and Paavo, 2021). 128 (89%)

answered yes, there is a collaborative digital model practice to enhance business for fashion entrepreneurs, 22(11%) answered no. (Frank 2024, Marshall, 2023). 198 (99%) answered yes, there is training and workshop model on digital pattern business to enhance fashion entrepreneurs, 2(1%) answered no (Manfred, 2023, Hafiz, 2018). 165 (82.5%) answered yes, there is licensing and royalties' digital model for entrepreneurs, 35 (12.5%) answered no (Will, 2024, Philip, 2024, Brian, 2020). 171 (85.5%) answered yes, pattern cutters and markets use-on demand model for digital business practices, 29 (14.5%) answered no (Ryan, 2024, Ronan, 2022, Brian, 2021). 184 (92%) answered yes, E-commerce strategy is another pattern business model for sustainability, 16(8%) answered no (Autumn, 2024, Teren 2022, Brent 2021). 172 (86%) answered yes, crowd sourcing and funding is a business practice model used for student fashion entrepreneurs, 28 (14%) answered no (Tahir, 2024, Wojciech 2024). 191 (95.5%) answered yes, there are pattern cutting and marking software to be used as business model practices for fashion entrepreneurs, 9 (4.5%) answered no. (Mazharul, 2023, Abu Sadat, Pammi, Al-Hussein, Tracy, 2022, Adrian, Harwood and Simeon, 2020).

Table II was on challenges of digital pattern business model practices for student fashion entrepreneurs, the table reveals that out of 200 respondents 197(98.5%) answered yes, having internet service is a challenge for fashion entrepreneurs, 3(1.5%) answered no (Ademola, 2023). 196 (98%) answered yes, this is the digital era for pattern businesses 4 (2%) answered no (Jugindar, Kartar, Goh, 2023, Abu Sadat, Pammi, Al Hussein and Tracy, 2022, Maximillan, 2020, Sascha, Carolin, Norbet and Friedrich, 2019). 183 (91.5%) answered yes, pattern cutters and markers are unable to adapt to digital business models. 17 (8.5%) answered no (Ademola, 2023). 160 (80%) answered yes, soft and hardware are not affordable for pattern entrepreneurs. (Muhammed and Yusuff, 2023, Jugindar, Kartar and Goh, 2023, Bernard, 2023, Sadiq, Hack-Polay, Fuller and Rahnan, 2022). 156 (78%) answered yes qualified technologists to handle these devices are lacking for pattern cutters and markers, 44 (22%) answered no (Jugindar, Kartar and Goh, 2023, Bernard, 2023). 128 (64%) answered yes, irregular power supply is a challenge for student fashion entrepreneurs, 72(36%) answered no (Ademola, 2023). 114(57%) answered yes, soft and hard ware used to deliver pattern business services are not produced locally. 86(43) answered no (Ademola, 2023). 191 (95.5%) answered yes, digital pattern cutting and marking practices which would have helped in the confines of existing platforms is a challenge to fashion entrepreneurs. 9(4.5%) answered

no. (Christoph, 2023, Ademola 2023, Shettima and Sharms, 2020). 169 (84.5%) answered yes, exchange of patterns in the digital world is a challenge to fashion entrepreneurs, 31 (15.5%) answered no (Muhammed and Yusuff, 2023, Ademola, 2023, Bernard, 2023). 192 (96%) answered yes, digital student pattern cutters and markers are unable to innovate, 8 (4%) answered no, (Ademola, 2023). 187 (95.5%) answered yes, pattern cutters and markers are unable to integrate with the economic and social environment of the consumers, 13 (6.5%) answered no (Christoph, 2023). 151 (75.5%) answered yes, using digital pattern business model can be a challenge to alleviate poverty even during international crisis to fashion entrepreneurs. 49(24.5%) answered no (Christoph 2023, Shettima and Sharms, 2020). 190 (95%) answered yes, pattern cutters and markers are unable to streamline design production for the real world, 10 (5%) answered no (Ademola, 2023, Christoph 2023, Muhammed and Yusuff, 2023, Sadiq, Hack-Polay, Fuller and Rahnan, 2022, Jugindar, Kartar and Goh, 2023, Bernard, 2023, Shettima and Sharms, 2020). 125 (62.5%) answered yes, traditional business model practices for pattern cutting and marking are preferable by fashion entrepreneurs 75 (37.5%) answered no, (Ademola 2023, Muhammed and Yusuff, 2023, Jugindar, Kartar and Goh, 2023, Bernard, 2023, Christoph 2023s).

5. Conclusion

Majority student pattern cutters and markers are aware of digitization of pattern cutting and marking which has helped as a sustainable practice to enhance business performances. However, they face a lot of challenges in making it a reality, such as high cost of soft and hardware, qualified technologists are lacking, irregular power supply, lack of good internet providers, they are unable to integrate the economic environment with social environment as such are unable to promote poverty alleviation, making majority to prefer traditional model of pattern cutting and marking to the digital business model.

6. Recommendations

In view of the findings:

- Lagos state government to provide adequate infrastructure for student pattern cutters and markers.
- Student pattern cutters and markers should make themselves acquainted with modern business practices.
- Production of soft and hardware for student pattern cutters and markers should be made

home grown by the government to make it available and accessible.

- There should be good internet providers by operators for fashion student entrepreneurs
- Provision of regular and constant power supply is not a luxury but mandatory for fashion student entrepreneurs.
- Funds in form of loans and grants should be made accessible to pattern cutters and markers with no interests.

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