

Analysis of E-commerce Characteristics of SMEs: Evidence from Scotland

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Abstract: The development of internet and digital tools has inspired the dramatically increased usage of e-commerce in the past decades. Both small and medium sized enterprises and the economy could benefit from e-commerce adoption. Based on Scottish government survey data in 2021, this study analysed the main features of e-commerce in SMEs and explored factors influencing the level of e-commerce usage. Research variables include size of businesses, business market, sector, business location, use of technologies, and investment in digital. The findings of the study show that: (1) micro sized enterprises are more favoured in using e-commerce to selling goods or services; (2) though businesses adopting less technologies rely less on e-commerce, they have shown greater inclination in digital investment; (3) business sector and location could affect the choice of SMEs in adopting e-commerce. The findings signal that further research could explore the effects of other variables and COVID-19 on e-commerce usage in SMEs.

Keywords: E-commerce, Small and Medium-sized Enterprises, Scotland.

1. Introduction

Since 1990s, the Information and Communication Technology (ICT) has shown an increasing importance in the fields of economy and has inspired the creation and evolvement of the e-commerce market. As defined by OECD, e-commerce transaction refers to “the sale or purchase of goods or services, conducted over computer networks by methods specifically designed for the purpose of receiving or placing of orders” [1]. Over the decades, e-commerce sales have experienced an enormous growth. According to ONS data, e-commerce sales by all UK businesses in 2019 has reached as high as GBP 693 billion, twice as much as of that in 2008 [2].

Small and Medium-sized Enterprises (SMEs), as defined by the Europa, are “enterprises which employ fewer than 250 persons and which have an annual turnover a turnover not exceeding EUR 50 million, and/or an annual balance sheet not exceeding EUR 43 million” [3]. SMEs have played a vital role in the economy in terms of promoting economic growth, innovation and employment [4]. At the start of 2021, 99.86% of all UK businesses (5.58 million) were SMEs, accounting for 61% of employment and around half of turnover [5].

Numerous numbers of previous researches have analysed the diffusion and adoption of e-commerce by SMEs. For example, Daniel et al. have concluded four e-commerce adoption stages. In which paper, they suggested that the first stage was the development of e-commerce service, followed by communication with customers via email; the third stage was having websites in operation, and

fourth, the establishment of online ordering system and discovering online payment options [6]. However, Drew pointed out that SMEs in different sectors tend to use different strategies for e-commerce [7]. In their study, Rahayu and Day have proposed several influencing factors for adopting e-commerce by SMEs. For instance, there were technological factors such as perceived benefits, organisational factors such as technology readiness, and individual factors such as owner's innovativeness and IT skills [8]. Additionally, Sin et al. have pointed out that competitive pressure and relative advantage are significant predictors of e-commerce acceptance in SMEs [9].

Various potential benefits are associated with e-commerce such as reduced costs in communication and marketing, increased publicity, and greater access to potential customers and business partners [10]. The success of e-commerce, however, are largely determined by customers. Gregg and Walczak argued that high website quality can earn better trust and thus result in higher shopping motivation of customers [11]. Demographic factors such as income, age and education level can also affect customers' online purchase intention [12]. Besides, it was likely that customers' satisfaction and e-commerce success are highly related [13]. This is in line with the finding of Ramanathan et al. which has concluded that performance factors such as consumer satisfaction influence the efficacy of e-commerce [14]. The same study also introduced two other factors, being as marketing factors such as advertisement, and operational factors including internal communication and improvement of product quality.

However, in spite of the increasing popularity of e-commerce among SMEs, MacGregor and Vrazalic have highlighted the relative low adoption rate [15]. In the same research, the authors have also discussed two distinct barriers of adopting e-commerce faced by SMEs, "Too Difficult" and "Unsuitable", referring to the implementing difficulty of e-commerce and unsuitable feature of e-commerce to SMEs respectively. Lawrence and Tar have found that inadequate infrastructure and a lack of communication technology strategies hinder the adopting process [16]. In addition, Zaided has stated that regulatory and political barriers such as changes in government policy and the missing of e-commerce standard are likely to be the main difficulties [17]. A more recent study conducted by Al-Tit have highlighted that connectivity cost, technology cost and internet security are main barriers to e-commerce adoption [18].

Numerous previous research has contained analyses about stages of e-commerce adoption, benefits, factors influencing adoption, and barriers to accepting e-commerce in SMEs. Despite that, so far there are few studies focusing on factors affecting the degree of adoption of or dependency on e-commerce. Identifying the factors that affecting e-commerce usage level can help SMEs to acquire the numerous resulting advantages. Therefore, through comparison among three types of SMEs, this paper aims to discover the most common features that relate to the e-commerce in Scottish SMEs, and hence gives viable proposition to SMEs on how to enlarge the share of e-commerce among their business.

2. Methodology

The data was gathered from Digital Economy Business Survey 2021 conducted by the Scottish government and its agencies between 22 February and 23 April 2021 (N=3346). Being as a sequel to the 2014 and 2017 survey, the survey evaluated the digitalised level amongst Scottish businesses over time. The survey sample reflected the population of Scottish enterprises nationwide and by area, sector and size level. Table 1 shows the respondent profile of the businesses.

Table 1: Respondent profile.

		Proportion of total (weighted %)	Number of respondents (unweighted)
Region	Highlands and Islands	12	1150
	South of Scotland	6	610
	Rest of Scotland	81	1586
Total			3346
Employees	1 - 9	87	2266
	10 - 49	10	768
	50 - 249	2	167
	250+	1	89
Total			3346
Sector	Agriculture	11	512
	Business Activities	30	912
	Construction	12	255
	Health / Social Work	4	162
	Hotels / Restaurants	8	334
	Manufacturing	5	293
	Other Services	8	218
	Transport / Communication	9	221
	Wholesale / Retail	13	439
Total			3346

In this paper, the data used was extracted from the survey data, which consists of businesses (N=1180) who made revenue via e-commerce in the past twelve months.

2.1. Research Variables

Bases on the discussion above, research variables are divided into two sections, namely organisation at different e-commerce usage levels and its six associating factors: size of businesses, business market, sector, business location, use of technologies, and investment in digital.

2.1.1. Organisations at Different E-commerce Usage Level

Among all the businesses who made revenue via e-commerce, their dependency on e-commerce sales is different. This study considers three types of organisations as shown in Table 2.

Table 2: Organisation Type.

Organisation	Sample Size	Proportion of sales made via e-commerce (%)
Type I	124	100
Type II	150	40-60
Type III	445	Less than 20

Type I organisation, as defined, is businesses with 100% sales made via e-commerce. Type II organisation has 40%-60% of the total revenue come from e-commerce transaction. Type III organisation relies on e-commerce the least, with only less than 20% sales rely on e-commerce.

$$\text{Proportion of sale made via e-commerce} = \frac{\text{Sales made via e-commerce}}{\text{Total sales}} \quad (1)$$

2.1.2. Size of Businesses

In order to analyse how business size affects businesses' dependency on e-commerce, this study compares the size of businesses in each of three organisation types. The factor is divided into three sub-categories: micro size, small size and medium size. Businesses of micro size are those with 1-9 employees. Small size businesses refer to those with 10-49 employees. Medium size businesses hire more than 10 while no more than 250 employees.

2.1.3. Business Market

This study aims to discover the relationship between where businesses sell to and their dependency on e-commerce. business market is divided into: Scotland, Rest of UK (UK other than Scotland), Rest of EU (EU other than UK), and Rest of world (world other than EU).

2.1.4. Sector

The study interests in whether business sector influences adoption level in e-commerce. The businesses selected are from the following sectors: Agriculture (SEC1), Business Activities (SEC2), Construction (SEC3), Health / Social Work (SEC4), Hotels / Restaurants (SEC5), Manufacturing (SEC6), Transport / Communications (SEC7), Wholesale / Retail (SEC8), and Other Services (SEC9).

2.1.5. Location

The relationship between business location and dependency on e-commerce are analysed in this study.

2.1.6. Use of Technologies

The analysis of each type of organisation in the use of different technologies is included in the paper. The indicators are: company website, social media, cloud computing, data analysis, and remote working software.

2.1.7. Investment in Digital

The relationship between businesses' trending in amount of investment in digital and level of e-commerce dependency is analysed in the paper. In particular, this paper looks into the correlation among three types of organisations by applying pearson correlation coefficient formula where variables are set to be types of organisations.

Pearson correlation coefficient formula:

$$r_{xy} = \frac{Cov(x, y)}{s_x s_y} \quad (2)$$

$$Cov(x, y) = \frac{\sum (x_i - \bar{x}) * (y_i - \bar{y})}{N - 1} \quad (3)$$

$$s_x = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n - 1}} \quad (4)$$

$$s_y = \sqrt{\frac{\sum (y_i - \bar{y})^2}{n - 1}} \quad (5)$$

3. Results and Discussion

Using the relative data, this paper analyses and discusses the characteristics of different types of e-commerce organisations. Main findings include: (1) Businesses of smaller size tend to have more acceptance in e-commerce adoption. (2) Greater e-commerce usage level is accompanied by wider business market. (3) Businesses in agriculture and wholesale/retail sector are less likely to rely on e-commerce. (4) Mid-Scotland and Fife are two regions which have businesses that tend to be highly dependent on e-commerce. (5) The higher the level of e-commerce usage, the more access to technologies. (6) Businesses with less e-commerce share tend to have greater intention in investing in digital.

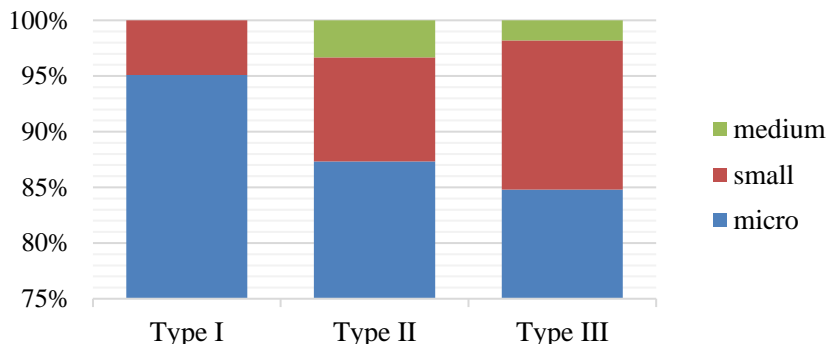


Figure 1: E-commerce adoption level in different sizes of businesses.

Figure 1 illustrates the distribution of businesses with distinct size in three types of organisations. The proportion of small size businesses, who have 10-49 employees, is lowest in Type I organisation, and is highest in Type III organisation. As moving from Type I to Type III organisation, there is a growing trend of the proportion of small businesses. In contrast, as high as 95% of Type I organisations are micro businesses, whereas this number decreases to 85% in Type III organisation. It is worth to notice that there has no medium-sized businesses in Type I organisation, and they are of the lowest percentage in all three types of organisations. In all three types of organisations, micro businesses have the highest proportion, followed by small businesses, and then medium-sized businesses.

Up to 95% businesses whose sales are all made via e-commerce are micro-sized, the rest are small-sized and none of the businesses are medium-sized. This suggests that micro-sized businesses are more dependent on e-commerce than small and medium-sized businesses. About 13% of organisations who make less than one fifth of total revenue via e-commerce are small-sized businesses, indicating that small-sized businesses less rely on making revenue via e-commerce. Medium-sized businesses, however, are barely dependent on e-commerce.

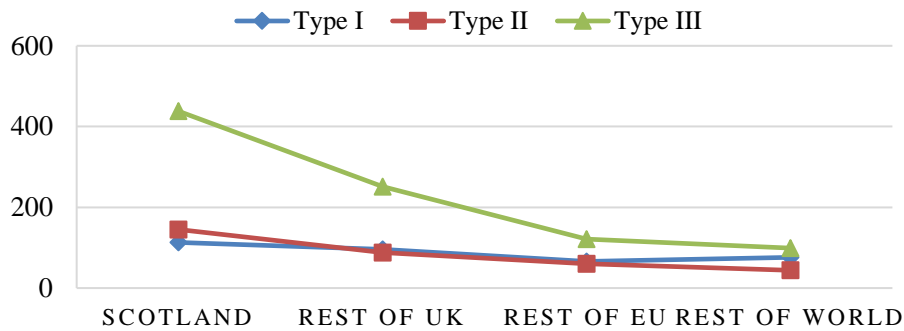


Figure 2: A The market of all three types of organisations.

Nearly all businesses sell products or service to Scotland. Almost four fifths of Type I organisations have rest of UK market, this number falls slightly in Type II organisations. Less than 60% of Type III organisations owns market in rest of UK. Just over half of the Type I organisations sell to rest of EU and rest of World. However, just 30% of all businesses in Type II organisations sell to world other than EU market. This number is even lower in Type III organisations, with about one fifth businesses make revenue from worldwide market. In all, businesses focusing on e-commerce tend to have wider market than those relying less on e-commerce. Businesses who are less dependent on e-commerce are likely to focus on only local market, whereas e-commerce-focused businesses would have less restrictions in terms of sell their products or service. This suggests that ICT barely has any regional restriction.

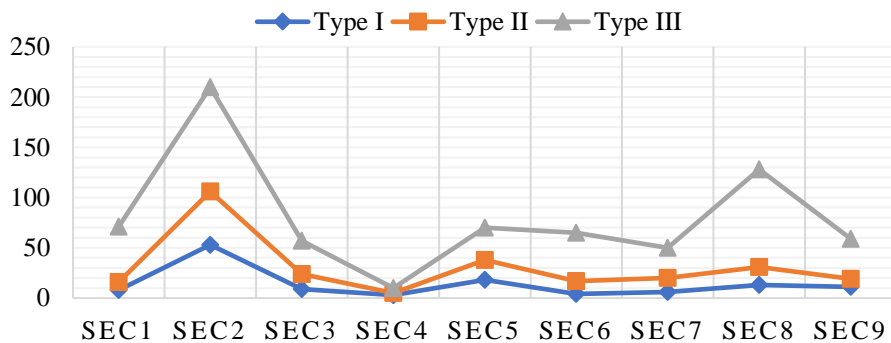


Figure 3: The distribution of businesses in sectors.

Figure 3 illustrates how different type of businesses are distributed in sectors. The proportion of agricultural businesses is much higher in Type III organisations than that in Type I and Type II organisations. The sector of Business Service dominates in all three organisation types, though its share is lower in Type III organisation. Despite the small number, Health/Social Work businesses are evenly distributed in three organisation types. Manufacturing sector has significant higher proportion in Type III organisation. The percentage of businesses in Wholesale/Retail is extremely high in Type III organisation. Businesses in other service sectors are least in Type II organisation. Overall, businesses with higher e-commerce usage level tend to be those in business service sector and health/social work sector. In comparison, businesses in agriculture, construction, manufacturing, and wholesale/retail sectors are less likely to rely on e-commerce.

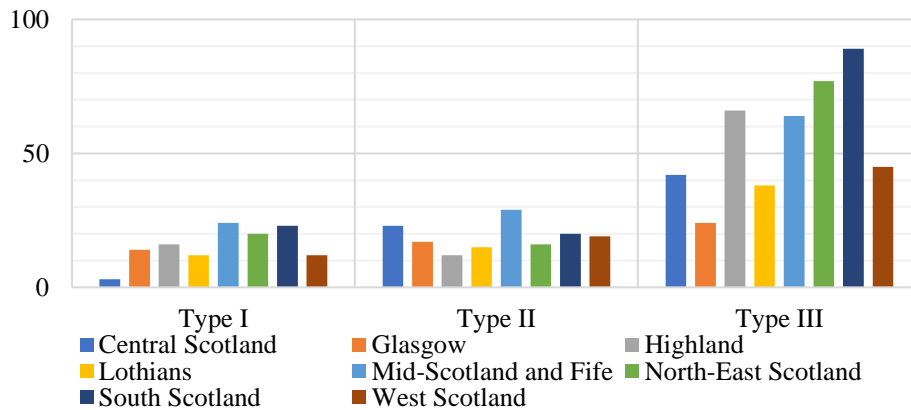


Figure 4: The spread of location of businesses.

In Type I organisations, those who are in Mid-Scotland and Fife are of the highest proportion. However, businesses located in South Scotland have the highest proportion among all Type III organisations. Though share a relative low proportion in Type II organisations, businesses in Highland have higher proportion in Type I and Type III organisations. The proportion of businesses located in Central Scotland is the highest in Type II organisations, three times higher than in Type I organisation. North-East Scotland businesses have a higher share in Type III organisation than in Type I and Type II organisations. Glasgow businesses have a low share in all three types of organisations.

Very few Central Scotland businesses are a hundred percentage rely on e-commerce for making profits. In comparison, businesses in Mid-Scotland and Fife tend to be highly dependent on e-commerce. North-East Scotland is another region whose businesses tend to rely more on e-commerce. Businesses in Glasgow, however, do not seem to adopt e-commerce to a considerable extent. A number of Highland businesses highly rely on e-commerce, but there are also many Highland businesses whose e-commerce sales only account for less than 20% of their total sales.

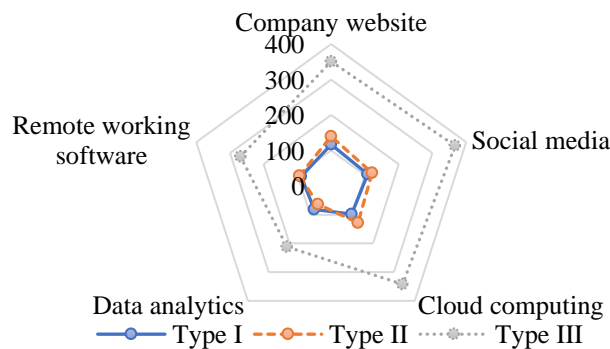


Figure 5: The distribution of use of technologies.

In terms of the use of technologies, Type I organisations have about the same number of using in all five technologies, with slightly more tendency in having company websites. In all Type II organisations, there are about the same number of businesses own both company websites and cloud computing. The rate of owning social media is slightly lower. In comparison, the rate of using remote working software and data analytics is much lower. For Type III organisation, the number of businesses using social media, cloud computing and company website are approximately the same. However, much less businesses own remote working software, and even less businesses use data analytics, almost half of that of social media.

Those businesses who 100 % rely on e-commerce sale value the importance of company website, social media and cloud computing technologies. They also have a remarkably high rate in using data analytics and remote learning software. In comparison, businesses who is less dependent on e-commerce tend to pay less attention in developing remote working software and data analytics technologies. However, all three types of organisations have a high rate in using social media, suggesting its importance in this modern world. Therefore, higher technological development would inspire SMEs to use e-commerce to a greater extent.

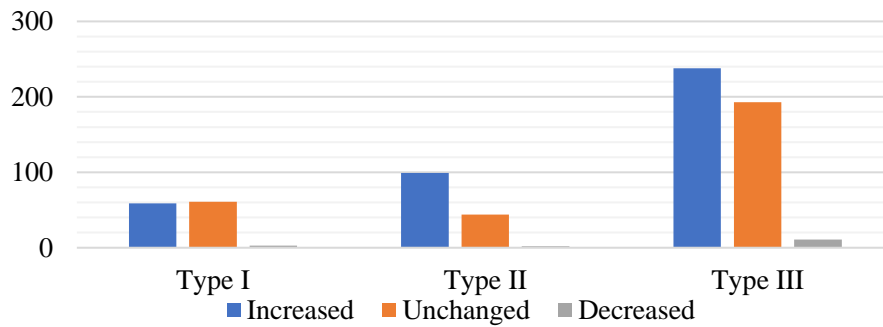


Figure 6: The comparison of investment in digital.

From figure 6, it is obvious that very few businesses in all three types of organisations choose to decrease their investment in digital though the proportion is slightly higher in Type III organisation. Within Type I organisations, there are about same number of businesses choose to increase or not change their investment in digital, with slightly higher number in unchanged investment. In comparison, around two third of total businesses in Type II organisation invest more in digital. This percentage is lower in Type III organisation, but still over a half. The correlation coefficient between Type II organisation and type III organisation is 0.916, suggesting a very strong positive correlation in terms of the investment choice.

In terms of investment in digital, it can be seen that for those businesses relying on e-commerce the most, the proportion of businesses investing more or stay the same are roughly equal. however, over half of the businesses whose 40%-60% sale come from e-commerce choose to increase their investment in digital, suggesting an increasing trend of use of digital technologies in near future. At the same time, half of the businesses who are less dependent on e-commerce choose to increase their investment in digital as well, indicating the importance of digital technologies.

4. Conclusion

Small and medium-sized businesses are vital for the economy in terms of employment creation and economic development. The adoption of e-commerce in SMEs brings benefits to both enterprises and the national economy. This study presents the main feature of Scottish SMEs and identifies what factors affect their levels of e-commerce usage. The study also gives suggestions to the survival of SMEs in the new business environment in digital modern society.

The findings show the relationship between the e-commerce dependency level in SMEs and six distinct factors including size of businesses, business market, sector, business location, use of technologies, and investment in digital. The enterprises employing 10 or less people are more active in using e-commerce to selling goods or services compared to enterprises in larger size. As seen in figures, there is a clear pattern that businesses which adopt technologies to a greater extent are more dependent on making revenue via e-commerce. At the same time, businesses which currently less rely on e-commerce sale have greater inclination in investing more in digital. Additionally, the finding agrees that enterprises focusing on e-commerce own wider market, having business across the world.

Unlike business service sector and health/social work sector, businesses in agriculture, construction, manufacturing, and wholesale/retail sectors adopt e-commerce to less significant extent. Though not applying to all cases, this study also reveals that the location of business is likely to affect the choice of e-commerce usage in SMEs.

With the understanding of the e-commerce features in SMEs, the enterprises could make advantage of e-commerce in order to increase the productivity and expand the business scale. Thus, increases in the digital investment and use more technologies could have a positive impact on e-commerce usage in SMEs. In the long term, the effects of increased e-commerce activity will lead to the development of digital economy significantly.

Considering the results presented, future research areas could make more contribution. Firstly, taking the effects of COVID-19 into consideration in order to analyse the relationship between increased internet purchase activities and the pandemic. Secondly, concerning other variables that may affect e-commerce usage level in SMEs including customers' behaviour and government policies. Thirdly, future studies could expand into nationwide view and highlight the disparities within the UK SMEs.

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