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The opportunities and challenges of digitalization for SME's

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Abstract

Small and Medium-sized Enterprises (SME's) are prevalent in the South African Industry and have been globally recognized for their contributions to economic development, job creation, poverty alleviation, and innovation. Although SME's are aware and can benefit significantly from digital systems, the time, skills, and finances required to develop SME-specific systems are prohibitive. This is because the ability to define sensor to enterprise systems demands for SME's is dependent on specific needs. The current solutions that are offered to SME's are stand-alone and not integrated. This research provides insights into the engagement and development of a demand-driven SME ecosystem. The research provides insights into the digital system priorities of some 200 South African SME's. Based on the analysis of the survey conducted, the researchers designed and developed the initial four systems for SME's out of the 10 identified. This paper covers the data gathering, design, and delivery phase of the 4 functions.

Keywords: Digitalization, SME's, Innovation, System development, Challenges, Opportunities

1. Background

The world has been increasingly moving into the digital space. The digital transformation started prior to, accelerated during, and is continuing post-COVID-19. Applying information and communications technology (ICT) infrastructure and introducing digital technologies and methods, digitalization is transforming and presenting

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unprecedented opportunities for enterprises in almost every industry [1], particularly small enterprises. Yet such opportunities also present new challenges as digital transformation changes business ecosystems (i.e., the nature and structure of companies and markets, raises concerns around jobs and skills, privacy, security, and social and economic interaction) [2]. According to [3] the lack of management resources and financial constraints that SME's encounter make it difficult for the firms to implement digital technology. Furthermore, [4] posits that even though financial limitations are addressed, SME adoption of digital technologies may still be hampered by the lack of clarity on the return on investments or by a partial ability to seize and execute the radical transformation digital prospects presented by Industry 4.0.

2. Literature

Globally, governments are beginning to recognize the importance of SME's in achieving long-term, broadly shared economic development [5]. The role of SME's in economic development, poverty reduction, innovation, and job creation is critical [5]. The latest report by [7] states that SME's account for about 90% of businesses and they contribute significantly to job creation (50%) and global economic development. However, compared to larger counterparts in the formal sector, SME's are constrained by financial and other resources [2]. Reference [8] categorised the challenges that prohibit the growth of SME's into:

- Technical Barriers: (ICT and lack of skilled employees and managers)
- Organizational Barriers: such as lack of financial resources, lack of management support, resistance to change, and lack of R&D infrastructure etc.
- Technological Barriers: Due to a lack of knowledge, SME's are hesitant to implement advanced service technologies in I4.0, which promotes innovation in manufacturing, logistics operations, and other activities. (e.g., Enterprise Resource Planning (ERP) or Computer-Aided Design (CAD), Artificial Intelligence, or Industry 4.0 Applications like BDA,).
- Legal Barriers which are associated with the lack of cooperation and integration between management and departments, as well as privacy problems.

These challenges can be mitigated with the Appropriate digital tools. The operations of an SME can be separated out into operational functions (characteristics) which can be adopted in a structured Approach to mitigate SME challenges. These inherent characteristics of SME's necessitates the establishment of a framework/mechanism that enables these firms to get support in different functions of business including technical upgradation, marketing, financial, and human resource training and development [2]. As a result, Industry 4.0 allows SME's to increase the production capabilities and global competitiveness through the Application of new technologies. In this context, For businesses, Industry 4.0 technologies may be a powerful tool for maintaining or even increasing their competitiveness in both domestic and global markets [9]. Studies show that Industry 4.0 technologies may help firms enhance cost-efficiency and product differentiation strategies [10], opening up new market prospects and increasing financial returns for SME's [3]. Industry 4.0 technologies enable SME's to better personalize goods and services based on customer preferences; develop new services that address unsatisfied consumer demands; and better regulate manufacturing processes, allowing for cost-cutting initiatives [3].

2.1. SME's digital transformation: challenges and limitations

Research indicates that there is a technological knowledge gap within the SME's. Many SME's have very little expertise on how to extract digital transformation technologies' potential. Such firms tend to have low knowledge of available solutions and their potential benefits [11]. In addition, owing to financial constraints, SME's have limited access to external consultants [12], which exacerbates the lack of more specialized IT professionals capable of extracting more value from more complex digital transformation tools [13] such as machine learning and big data. Even with the first and simpler steps of digitalization, SME's have been lagging in digital transformation and, consequently, in developing expertise on the subject [14] .

Digitalization poses several challenges to SME's such as lack of critical digital infrastructures, such as fast internet

connection, lack of required mindset and digital skills as well as financial gap [15]. Some challenges identified in the literature are related to lack of awareness and knowledge about the availability, advantages, and effective integration of digital technologies with business models and processes [15, 16]. A report conduct by [15] on "The Digital Transformation of SME's proves that SME's managers are uncertain about the benefits and risks and face mistrust in these technologies (i.e., dependency on online platforms can expose SME's to lock-in effects and unforeseen operational risks, such as sudden changes to platforms' policies and server outages). In addition, online platforms may not allow user businesses direct access to customer data, limiting the businesses' understanding of the customer pool [17]. Also different online platform fees may erode SMEs' profitability and deteriorate their competitive position compared to larger businesses with greater bargaining power that can negotiate for lower fees [15]. As SME's implement digitalization, their degree of exposure to online attacks is likely to increase dramatically, as such the costs can be disproportionate and can spread deeply into SME's' supply chains.

According to [18] digital marketing can help SME's to market and promote their products and services. There is a demand-supply gap that prevents small and medium-sized businesses (SME's) from using digital marketing platforms and e-commerce [19]. Therefore it is crucial to raise awareness of the importance of adopting technology for marketing and recognizing the opportunities it provides [20]. However, it is typically harder for SME's to attract and retain skilled employees than it is for large companies due to their limited networks and capacity to identify and access talent as well as their generally lower pay and working conditions [16]. Furthermore, tailored training is more expensive for SME's due to the smaller number of employees and the lack of opportunity to release workers for training [16]. In addition, small businesses often miss out on the opportunities that new digital tools offer, or they think the advance expenses are too high to upgrade towards more advanced digital technologies [16]

2.2. Digital technologies available for SME's/ ERP For SME's

SME's can use numerous basic and advanced digital technologies or combinations for various purposes (OECD, 2021). These includes systems for direction and strategic planning (i.e., Enterprise Resource Planning (ERP)), General administration and IT systems (i.e., Cloud computing), production, pre-production and logistics systems (i.e., Radio Frequency Identification (RFID)), and marketing, advertising and communication systems (i.e., Customer Relationship Management (CRM) and social media). Other available systems include electronic invoicing, E-commerce, Big data, Internet of Things and E-booking and orders.

SME's adoption gap is widening as technology advances or becomes more extensively used [15]. Small businesses are less likely to utilize ERP systems than larger businesses. Companies use ERP systems when they reach a key scale that enables them to handle the complexity and the substantial time, financial resources, and reskilling that ERP deployment requires [21]. As a result, the ERP adoption gap between medium and small businesses is substantially bigger than the ERP adoption gap between large and medium businesses [22]. Small and medium-sized businesses face a digital divide whether it comes to SCM software or big data analytics [15]. On the other hand, major corporations have made more of an effort to integrate many aspects of their operations (ERP, CRM, SCM), as well as tools for strategic planning and production and logistics management (RFID) [15].

2.3. Benefits of digitalization for SME's

SME digital transformation and restructuring is crucial in supporting economic development and rapidly expanding globalization [23], thus promoting innovation and long-term commercial viability of SME's. Furthermore, a various opportunities can be gained from digitalization, including lower transactional costs, reduced investment in ICT equipment, more efficient delivery and procurement of goods and services, and increased integration into global markets and interactivity, all of which contribute to the sustainable growth of SME's [15, 17, 24]. Consequently, [17] notes that digitalisation may cut costs and save time and resources, particularly for smaller businesses that have less market and bargaining strength and less internal ability to cope with complicated business settings. As such technologies such as Artificial Intelligence (AI) and Internet of Things (IoT) solutions have the potential to fundamentally modify the business models and practices of small and SME's, resulting in multiple beneficial impacts on a wide range of company operations [15]. Furthermore, digitalisation resources such as financial services, training, and employment opportunities, including those provided by the federal and state governments, may now be accessed

more easily. Firms may create data and analyse their own operations in new ways in order to enhance their performance, as well as get access to innovative assets.

2.4. SME business ECOSYSTEM/globalization

The environment of business ecosystems is always changing, in this hyper-competitive age advanced digital technologies are progressively transforming corporate operations [2]. Governments in both the developed and developing economies see economic globalization as a chance to increase their economic success by participating more actively in global trade [25]. However, the increasing competition brought on by globalization has given major challenges for SME's, and consequently, the mortality rate of SME's is relatively high after a shorter period of starting [2]. Hence, SME's facing global challenges need to adopt survival strategies and strategic choices to thrive in the competitive business environment [26]. As such Digital advancement is forcing companies to rethink their organizational models, thus some firms are already showing a superior ability to exploit digital technologies to gain a competitive advantage over the market in many industries.

3. Methodology

This study provides literature on the significance of SME to the South African economy, and various challenges on the implementation of digital systems. To address these challenges the study adopted a quantitative research methodology. The approach of the study is one of co-generation, or agile. The research team commence with training in order to raise awareness around Forth Industrial Revolution (4IR) in SME's. 200 SME's are trained in cohorts of 5 to 30 over a period of one year. Co-generation is applied in the agile solutioning, where once the companies are 4IR aware data is collected on the current status together with the desired needs of the business. The research team, post the completion of the training, deploy a literature-based instrument to determine the SME needs. Of the 200 companies 159 surveys are received and analyzed, to understand the type of systems that SME's are using, as well as the type of systems the firms would benefit from in different departments of the company (i.e., operations, finance, marketing, maintenance and human resources).

Based on the survey analysis a priority set of systems are defined. A development team commenced with development based on a single ERP architecture. From the survey analysis the study identified four thematic themes on the systems required by the SME's, which included systems for invoicing, order management, business case as well the need for website builder. The study developed application systems for the four identified themes. The development of the app ERP includes four integrated apps, the invoice generator, order management system, business case and do it yourself (DIY) website. The applications are developed using software's like MySQL and python.

- Data access/ data input - MySQL to store, retrieve and update our registered clients' templates operational(input/output) - the websites will track traffic volume of customers, manage locations, and create company profiles.
- For back-end Django was implemented, Django is a python full-stack framework for web Application development and websites.

4. Results and discussion

The results of this research study are presented in two sections: The first section is based on a conducted survey on the specific digital systems that small businesses require to sustain their businesses. The second section is built up from the previous section which aligns with the development of the digital Apps for small businesses that are identified as a need from the through the data collection instrument. The following tool is used to enhance knowledge of the present operating procedures of SME's. The questionnaire was setup to identify crucial areas for digitalization: Question 1 outlines the current state of operations, whereas Question 3 focuses on the future state of operations. The opinions of the SME participants based on the rating scale (see Table 1 below).

Table 1. Scoring system

S1	No system
S2	Paper system: no continuous assessment
S3	Paper system: continuous assessment
S4	Basic software-based system
S5	Fully integrated system

Figure 1 shows a sample of the results, while Figure 2 shows the overall results of the questionnaire, which focused on several aspects of business, such as operations, finances, marketing, maintenance, and human resources. The SME's were asked to provide or indicate the current condition of any existing systems. As the results indicate majority of the SME firms trained indicated that they do not have a system in place to conduct planning, perform scheduling, track financial transactions, document manage as well as monitoring performance. The results indicate the need for various the implementation of digital technologies, more especially in operations, finance, and marketing.

	Which type of system do you use to monitor performance in each function?					What type of system do you use to conduct planning?					What type of system do you use to track financial transactions?					What type of system do you use for document management?				
Systems	Operations	Finance	Marketing	Maintenance	HR	Operations	Finance	Marketing	Maintenance	HR	Operations	Finance	Marketing	Maintenance	HR	Operations	Finance	Marketing	Maintenance	HR
S1	71%	68%	71%	71%	80%	58%	55%	59%	61%	67%	57%	56%	61%	64%	61%	52%	55%	59%	62%	55%
S2	0%	0%	0%	1%	0%	22%	13%	13%	13%	13%	0%	1%	1%	0%	3%	9%	8%	8%	8%	11%
S3	22%	17%	19%	17%	9%	0%	9%	9%	9%	4%	15%	15%	13%	13%	14%	21%	22%	17%	17%	17%
S4	7%	9%	5%	5%	5%	20%	20%	17%	17%	16%	16%	15%	15%	13%	13%	13%	9%	9%	6%	13%
S5	0%	7%	4%	7%	7%	0%	3%	3%	0%	0%	13%	13%	10%	10%	10%	6%	6%	7%	7%	3%

Fig.1. Data sample

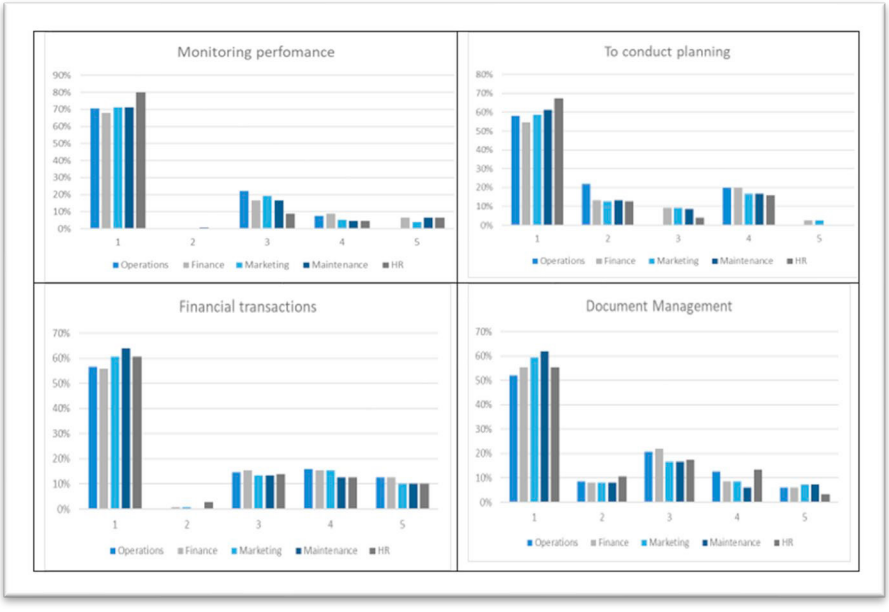

Fig.2. Graphical representation of data for current operations

The analysis reveals the following 10 systems to be the highest priority the systems are as follows:

- Business Case Systems
- Digital Invoicing and cash flow
- Digital Web Creation
- Auto Marketing
- Market and technological scanning:
- International Marketing
- Order Management
- Digital Product identification
- Digital Technologies
- Document Management System (DMS)

The research team analysed and commended with the design and development of the following four systems:

1. Invoice generator

The invoice generator is a free platform that enables SME's to generate invoices for their firm, making it easier for the firms to receive payments from their consumers. The app is structured in a manner that it enables the user to integrate information from projects and customer records with the capabilities of summarizing the personal and purchase details of each customer within a single file attached to databases. Furthermore, the app will be able to perform tax reports, and customer support in the case the system crashes in the process of generating the invoice.

2. Business case App

The business case app enables clients or users to generate digital business case templates for projects they wish to pursue. The app is structured in a very friendly manner and makes it easy for the user to navigate through it and get all the information they need and generate a business case template. Business case templates can be downloaded as a pdf, or they can have it emailed to their personal or company email.

3. DIY website

The DIY website is a free platform that enables SME's to download websites for their firm, making it easier for the firms to reach their consumers and have a digital presence. The content of the downloadable websites is easy to change to suit the needs of a SME's without the need of website development background from SME's. Furthermore, the websites allow customers to send their queries to the SME's through the website.

4. Market place/ Order management

The SME order management application emerges from research project aimed at creating a digital platform to assist small and medium sized enterprises manage their orders through the seamless tracking of orders and communication thereof with clients.

4.1. Overall architecture

The four apps are synchronized**.** Basically, the apps follow the normal standard procedure similar to that other software(s). The user needs to sign-up on the app which requires information such as: personal details of the user (i.e., full names, id/passport number and contact details), company details (i.e., company name, address, town/city, postal code and contact details) and bank details. To complete the sign-up the user needs to agree to the terms and services of the software. Then after signing up, the user can sign-in using either their username (i.e., email address or id/passport number) and the password they created.

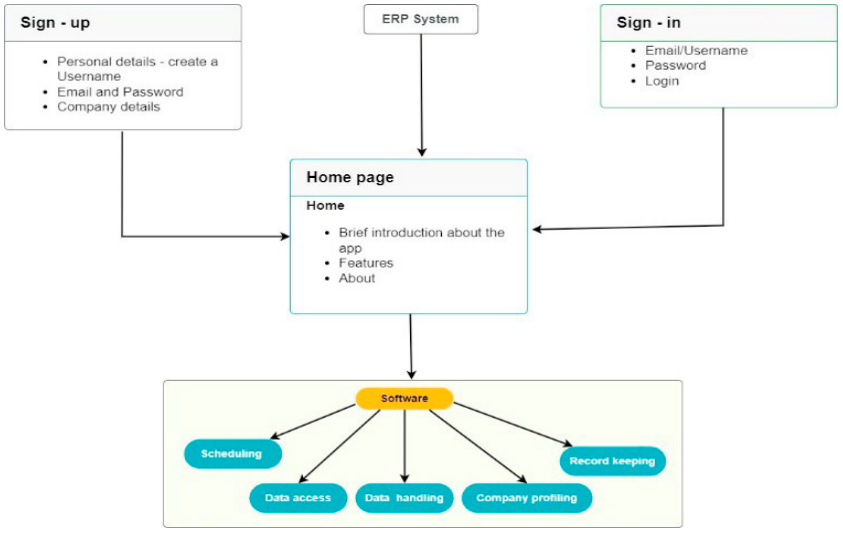

Fig. 3. Input-Output software architecture

4.2. Current status of the systems

The research team developed 4 out of the 9 systems identified and the rest of the systems have been conceptualised. Table 2 below indicates the current status of the identified systems and Figures 4 to 7 provide snapshots of the developed systems which are ready for testing.

Table 2. System/software development list

system	Concept	Project initiation	Technical architect	Application Development	Completed	Testing
Finance						
Business case systems	✓	✓	✓	✓	✓	
Invoicing and cash flow	✓	✓	✓	✓	✓	
Digital Marketing						
Digital Web, auto create	✓	✓	✓	✓	✓	
Auto Marketing	✓					
Market and technological scanning	✓					
International Marketing	✓					
Custom Relationship Management						
Order management	✓	✓	✓	✓	✓	
Digital Product identification	✓					
Digital Technologies	✓					

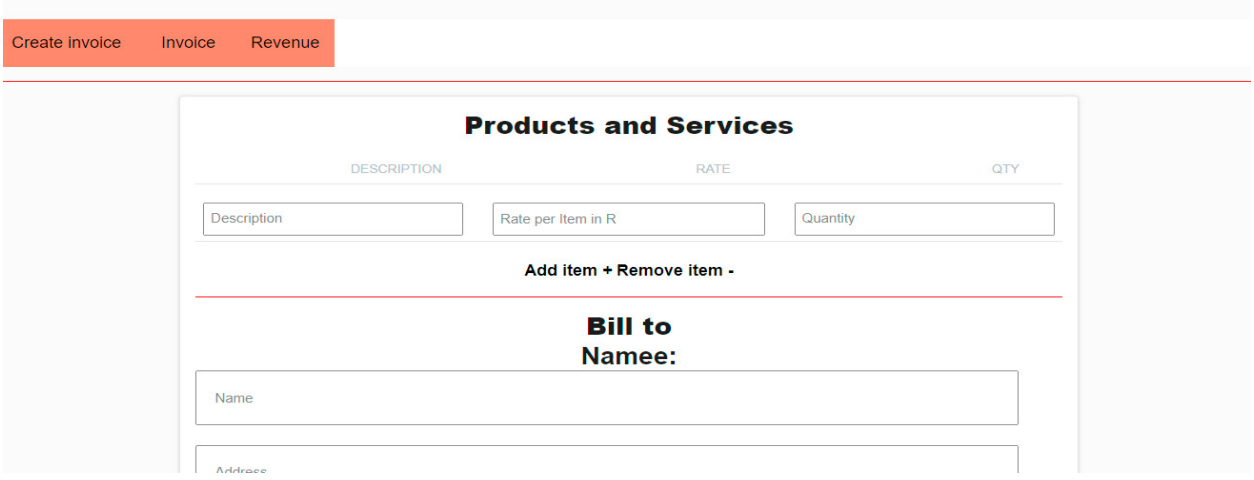

Fig. 4. Invoice app

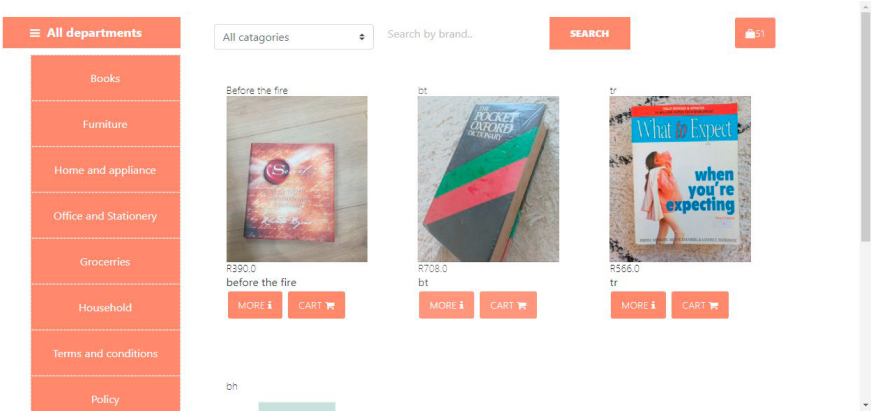

Fig. 5. Marketplace App

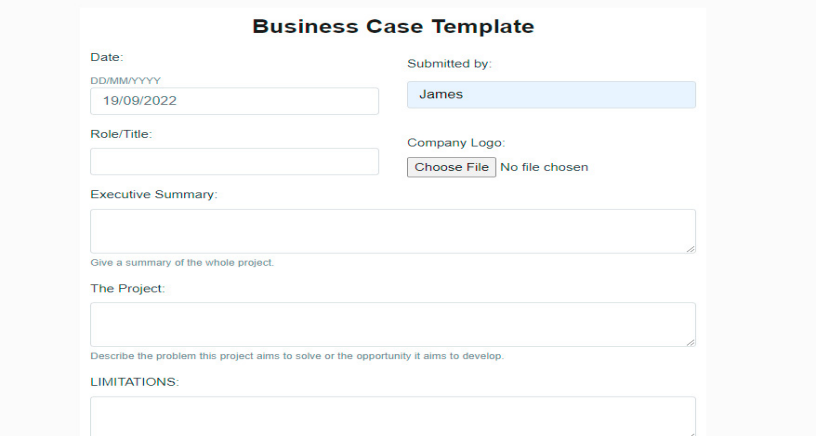

Fig. 6. Business case App

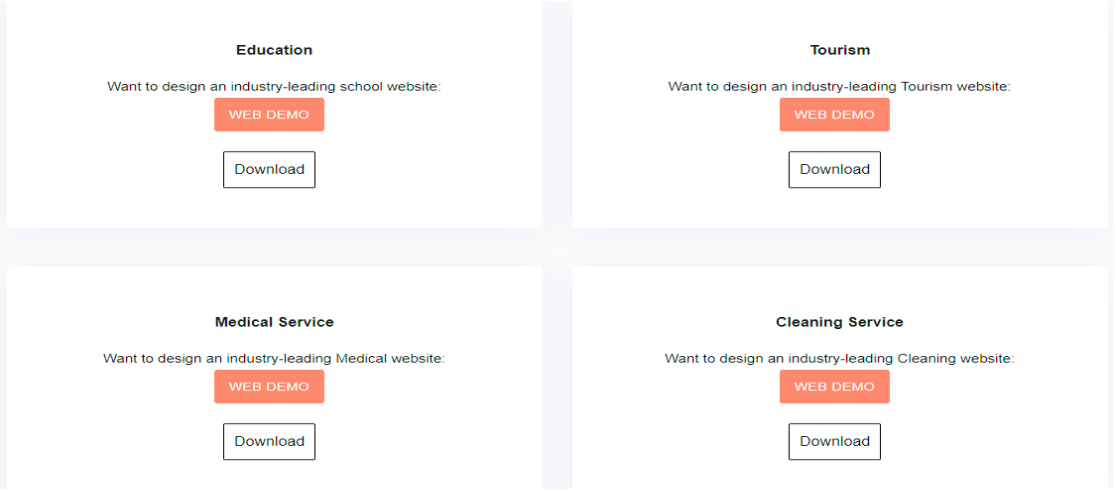

Fig. 7. DIY website App

5. Conclusion

The objective of this paper is to develop an integrated system to address the challenges of digital transformation for SME's. For SME firms, digitization presents unique challenges. The analysis of the literature highlights constraints such as time, costs and resources as great obstacles for SME's to adopt digital technologies. Through workshops the research and development team were able to identify business functions, determinants and current systems that can enhance the process of digital transformation for SME's. This paper analysed the type systems that small firms require in the field of finance, operations, maintenance, HR and marketing. The results of this study provide solutions for small business (i.e., the development of integrated system which will enable these firms ease access to digital technologies). The research team will further this study by focusing on the further development of the remaining systems which will result to a full written paper on this scope.

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