INTERNATIONAL JOURNAL OF CURRENT ADVANCED RESEARCH
IISSN: O: 2319-6475, ISSN: P: 2319-6505, Impact Factor: 6.614
Available Online at www.journalijcar.org
Volume 13; Issue 08; August 2024; Page No.3224-3233
DOI: http://dx.doi.org/10.24327/ijcar.2024.3233.1696

Research Article

INDUSTRY 4.0: IMPLEMENTATION OF DIGITALISATION AND TECHNICAL APPLICATIONS USING THE PIVOT APPROACH IN THE RETAIL SECTOR, USING THE EXAMPLE OF GERMAN PHARMACIES

Stefan Rezepa and Jürgen Lange

Comenius University Bratislava

ARTICLE INFO

Article History:

Received 17th July, 2024
Received in revised form 28th July, 2024
Accepted 16th August, 2024
Published online 28th August, 2024

Key words:

Public health; community pharmacy; Industry 4.0; digitalisation; PIVOT model

ABSTRACT

The integration of networking, artificial intelligence and robotic systems is the defining feature of the Industry 4.0 environment, as it enables systems to function with minimal human intervention. This is even more important in the healthcare sector, as there is a high level of system relevance on the one hand and fast information and data are required for successful patient treatment on the other. Pharmacies are an important factor here. However, digitalisation and the use of Industry 4.0 opportunities are weak in the retail sector. The core research question is therefore being investigated: How can operational strategies be efficiently established in the resource-poor retail sector in order to implement digital applications in the field of pharmacy without conflict, using pharmacies as an example? The aim of the research paper is to use the PIVOT approach in operational management to offer pharmacies a better way of dealing with the problems. To identify existing digitalisation and automation in community pharmacies, a questionnaire was used to determine how advanced the transformation of processes in pharmacies towards more digitalisation is and what problems still exist. As a result, it can be stated that the majority of pharmacies are far behind the possibilities that already exist, both in the active utilisation of technical possibilities and instruments as well as in digital networking and communication.

INTRODUCTION

The pharmaceutical industry is highly relevant for Germany as the largest manufacturing and demand market in Europe. Manufacturers in particular invest heavily in research and development and are regarded as digital drivers in the industry.

"Germany provides the perfect environment for development and production of research-intensive, high-grade products. In 2018, the pharmaceutical industry in Germany invested almost EUR 7.4 billion in R&D - more than any other European country." (Albrecht/Kemper, 2020, p. 3)

Technological innovations in these areas through the Industry 4.0 approach make this clear and offer enormous opportunities, but also generate problems that did not previously exist (cf. Javaid et al., 2022). An important area in the overall pharmaceutical structure is the distribution channels, which primarily include community pharmacies. In contrast to manufacturers or retail companies, pharmacies are in an ambivalent position here because, as small retail companies, they have a lack of investment opportunities, too little personnel capacity and little knowledge of digital processes and management functions for implementation (cf. Frick/Schäfer, 2020, p. 1). They are therefore reliant on government support to prepare them for the possibilities offered by healthcare networks and provide infrastructure. However, in Germany in particular, government projects are not yet standard in the healthcare sector, but are still in the planning phase or fail due to technical barriers. The Expert Commission for Research and Innovation (EFI) states 2023:

"Declarations of intent to drive forward and implement the digitalisation of the healthcare system and the healthcare industry have a long tradition in Germany. Whether in special strategy papers from the BMWi or the BMG - the introduction of digital formats, applications and tools has been regularly announced and agreed: be it the ePA (electronic patient file), the e-prescription, the telematics infrastructure or a shared data

*Corresponding author:**Stefan Rezepa**

Comenius University Bratislava

room. Little of this has been successfully implemented so far." (EFI, 2023, P. 3)

As previous digitisation plans in the healthcare sector are failing, over-the-counter pharmacies are not seeing any improvements in their economic situation and patients are clearly positive about digitisation in the healthcare sector, over-the-counter pharmacies need alternative options.

METHODOLOGY

The approach of the empirical survey is based on a questionnaire with pharmacy owners. The questions asked have two main focuses. The questions focus on which instruments, methods and technical options are used in the pharmacy. Here, the results generated show the degree of technologisation in pharmacies, which goes beyond the use of telematics for e-patient records and e-prescriptions.

The categories of the survey are focussed on the following core topics:

- General statements and assessments on the technologisation of pharmacy
- Assessment of own situation (including assessment of technologisation and digitalisation)
- Assessments of various areas of work and their technologisation/digitalisation
- Perception of impact in the implementation of technical innovations in the process

The group of respondents selected for the survey can be defined very simply as all accessible pharmacists in a quantitative range of 1% - 2% of all pharmacies. In absolute figures, this is between 190 - 350 pharmacies according to the latest inventory figures. The sample size obtained for the survey between August and November 2022 was participants.

The PIVOT model, tailored to pharmacies, will then be used to offer a strategic approach that enables a five-step transformation for this specific retail sector.

RESULTS

Frequency tables, bar charts or pie charts were created for the nominally scaled variables using the SPSS software from IBM.

Table 1 and bar chart 1 show that although around ¼ of pharmacies are not yet connected to the telematics infrastructure (24%), the majority of pharmacies (approx. 42.9%) are planning to do so or already have one (29%).[1]

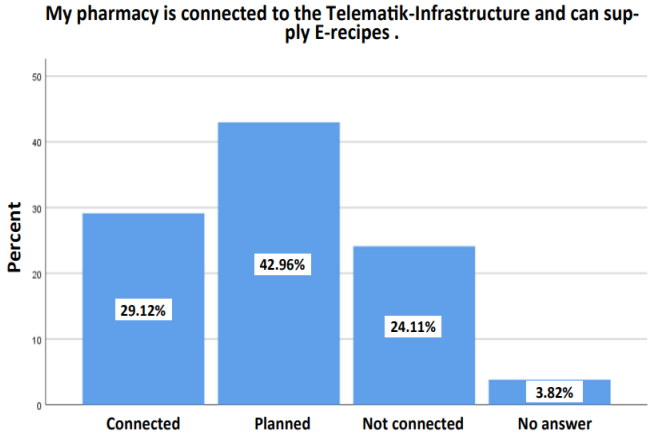
Table 1 Descriptive statistics on connection to telematics infrastructure

My pharmacy is connected to the Telematik-Infrastructure and can supply E-recipes .

		Frequency	Percent	Valid percent	Accumulated percent
Valid	Connected	122	29.0	29.1	29.1
	Planned	180	42.9	43.0	72.1
	Not connected	101	24.0	24.1	96.2
	No answer	16	3.8	3.8	100.0
	Total	419	99.8	100.0	
Missing	System	1	0.2		
Total		420	100.0		

Source: Own representation with SPSS, 2023

Illustration 1 Bar chart for telematics connection



Source: Own representation with SPSS, 2023

The processes that are currently automated in pharmacies show that purchasing from wholesalers (43.3%) and billing with health insurance companies (20%) in particular are already automated. Complex automated processes, which require a higher degree of modern technology, are used less frequently in the pharmacies surveyed. For example, the RFID storage system is only used by 6.4% of pharmacies.

Table 2 Descriptive statistics on automated processes in pharmacies

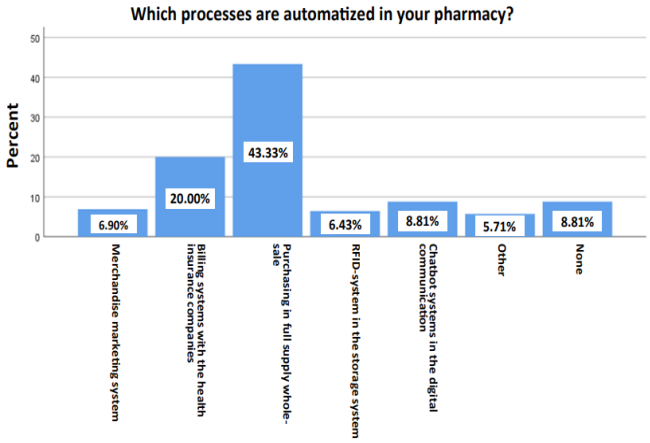
Which processes are automatized in your pharmacy?

		Frequency	Percent	Valid percent	Accumulated percent
Valid	Merchandise marketing system	29	6.9	6.9	6.9
	Billing systems with the health insurance companies	84	20.0	20.0	26.9
	Purchasing in full supply wholesale	182	43.3	43.3	70.2
	RFID-system in the storage system	27	6.4	6.4	76.7
	Chatbot systems in the digital communication	37	8.8	8.8	85.5
	Other	24	5.7	5.7	91.2
	None	37	8.8	8.8	100.0
	Total	420	100.0	100.0	

Source: Own representation with SPSS, 2023

1 The data is based on the status prior to the legal obligation to participate in telematics from 1 January 2024 (Gematik, 2024) and the possibility for patients to redeem their prescriptions electronically. The available figures correspond to the statistical data from ABDA (2023), according to which 75% of all existing dispensing pharmacies are e-prescription-capable. Nevertheless, there are still gaps in the structure that prevent 100% coverage due to technical problems and existing internet gaps. In addition, despite the opportunities for community pharmacies to participate in e-prescribing in 2023, more than 80% of pharmacists surveyed by the German Pharmacists' Association believe that e-prescribing will strengthen the mail-order business of large online providers at the expense of community pharmacies.

Illustration 2 Bar chart for automated processes



Source: Own representation with SPSS, 2023

More than 1/3 of pharmacies (34.6%) offer customers a pick-up terminal for prescriptions and OTC medicines outside opening hours in the form of a vending machine on the outside of the pharmacy.[2] This service is the most common form of automated customer service. In general, however, it can be stated that only a few pharmacies automate customer service processes. For example, only 10 per cent of the pharmacies surveyed offer the option of viewing the product range digitally.

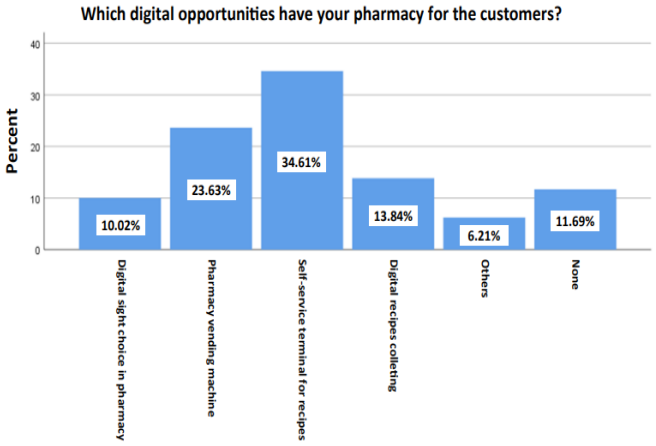
Table 3. Descriptive statistics on digital offers for pharmacy customers

Which digital opportunities have your pharmacy for the customers?

		Frequency	Percent	Valid percent	Accumulated percent
Valid	Digital sight choice in pharmacy	42	10.0	10.0	10.0
	Pharmacy vending machine	99	23.6	23.6	33.7
	Self-service terminal for recipes	145	34.5	34.6	68.3
	Digital recipes collecting	58	13.8	13.8	82.1
	Others	26	6.2	6.2	88.3
	None	49	11.7	11.7	100.0
	Total	419	99.8	100.0	
Missing	System	1	0.2		
Total		420	100.0		

Source: Own representation with SPSS, 2023

Illustration 3 Bar chart on digital offers for pharmacy customers



Source: Own representation with SPSS, 2023

The use of digital media channels for customer contact shows that the majority of pharmacies (48.2%) mainly use social media to communicate with customers. This communication channel is therefore the most frequently used main communication channel. Short message services (22.2%), emails (12.2%) and video chats (6%) are used less frequently.

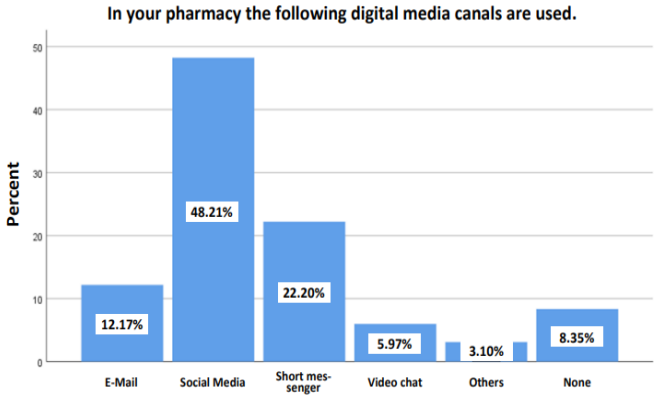
Table 4 Descriptive statistics on digital communication options for customers

Which digital opportunities have your pharmacy for the customers?

		Frequency	Percent	Valid percent	Accumulated percent
Valid	E-Mail	51	12.1	12.2	12.2
	Social media	202	48.1	48.2	60.4
	Short messenger	93	22.1	22.2	82.6
	Video chat	25	6.0	6.0	88.5
	Others	13	3.1	3.1	91.6
	None	35	8.3	8.4	100.0
	Total	419	99.8	100.0	
Missing	System	1	0.2		
Total		420	100.0		

Source: Own representation with SPSS, 2023

Illustration 4. Bar chart on digital customer contact



Source: Own representation with SPSS, 2023

2 The basic prerequisite for use is prior consultation with a pharmacist and the digital or personal presentation of the prescription (Arzneimittel-Lieferengpassbekämpfungs- und Versorgungsverbesserungsgesetz (ALBVVG), 2023, § 50 and §52 (3)). If the prescription cannot be redeemed because the medicine is not in stock or cannot be obtained directly by the customer during opening hours, it is deposited in the vending machine and can be redeemed independently by the patient at any time using a code and the prescription scan code (Christel and Gründinger, 2019). Without a consultation and prescription inspection by a pharmacist, dispensing via vending machines is otherwise prohibited (BGH Karlsruhe PharmR, 2020; Fritz et al., 2021).

Opportunities offered to pharmacies through the implementation of digital processes show that the greatest potential (43.6%) is seen in the area of digital fitness. The second most common opportunity (14.8%) was seen as online advice, while the third most common response (10.7%) was the opportunity for medical advice.

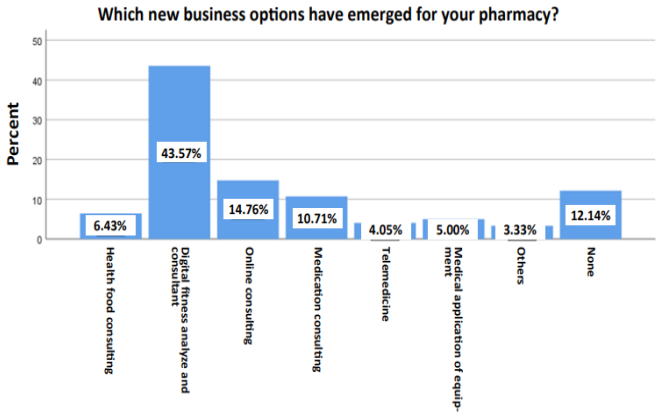
Table 5 Descriptive statistics for special digital services in addition to the core offering for customers

Which digital opportunities have your pharmacy for the customers?

		Frequency	Percent	Valid percent	Accumulated percent
Valid	Health food consulting	27	6.4	6.4	6.4
	Digital fitness	183	43.6	43.6	50.0
	Online consulting	62	14.8	14.8	64.8
	Medication consulting	45	10.7	10.7	75.5
	Telemedicine	17	4.0	4.0	79.5
	Equipment application	21	5.0	5.0	84.5
	Others	14	3.3	3.3	87.9
	None	51	12.1	12.1	100.0
	Total	420	100.0	100.0	

Source: Own representation with SPSS, 2023

Illustration 5 Bar chart for customer offers next to the core competences



Source: Own representation with SPSS, 2023

The digital sales channels currently used by pharmacies are distributed as follows. It was found that 40 per cent of pharmacies participate in cooperative webshops, in which several pharmacies join forces to present a digital range. A total of 25 per cent of pharmacies stated that they use their own webshop as a sales channel. Having their own app system was the third most common answer, although even here the proportion of respondents was only 7.6 per cent. In contrast, the proportion of pharmacies that do not use any digital sales channels was higher at 12.4 per cent.

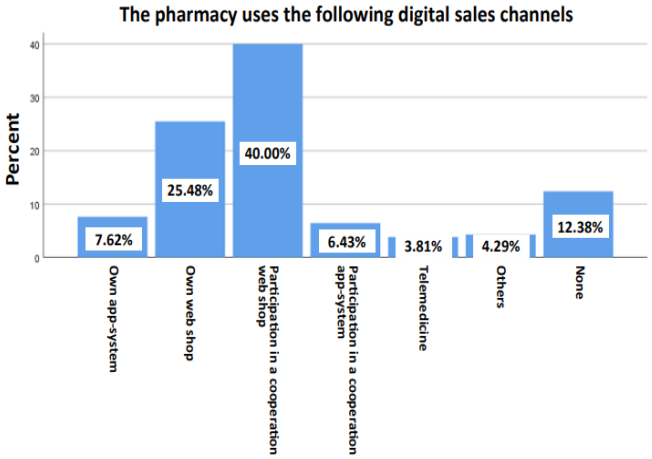
Table 6 Descriptive statistics of distribution channels in the digital sector

The pharmacy uses the following digital sales channels.

		Frequency	Percent	Valid percent	Accumulated percent
Valid	Own app-system	32	7.6	7.6	7.6
	Own web shop	107	25.5	25.5	33.1
	Participation in a cooperation web shop	168	40.0	40.0	73.1
	Participation in a cooperation app-system	27	6.4	6.4	79.5
	Telemedicine	16	3.8	3.8	83.3
	Others	18	4.3	4.3	87.6
	None	52	12.4	12.4	100.0
	Total	420	100.0	100.0	

Source: Own representation with SPSS, 2023

Illustration 6. Bar chart on digital sales channels



Source: Own representation with SPSS, 2023

In summary, the results show that participation in the prefabricated telematics infrastructure by the state is reasonably good, but that own concepts and developments are only established and utilised to a very limited extent. Digitalisation in internal processes with relevant stakeholders is similar. Here, wholesalers and health insurance companies are very strong in digital networking, although the network structures are generally provided by external partners. In-house systems, networks or utilisation or services for customers are only being developed to a limited extent.

The use of prescription vending machines, which allow customers to fill their prescriptions outside of opening hours or when they enter the pharmacy, is very popular in this research. Vending machines that provide OTC products that are in high demand are also very common. Both systems are not tied to personnel and offer ready-made solutions by the developers that amortise as a return on investment. Digital prescription collections or digital viewing of offers, on the other hand, are rarely offered, but serve as an additional benefit for customers, which is not offered due to their non-introduction.

The increased use of social media for communication is a trend that pharmacies, like other sectors, are increasingly following. What is striking is the decreasing proportion of e-mail communication, which now only makes up a small part of the means of communication. A change in communication is

recognisable here in the form that the means of communication are changing to those used more frequently by customers.

In the area of additional services alongside core competences, the area of fitness services is the most common. This also goes hand in hand with a growing awareness among customers, who are increasingly using sport and fitness as part of their work-life balance. Trackers that can be analysed by pharmacies and allow medical advice to be provided in the pharmacy area are also used for this purpose.

In the last block, it can be recognised that online offers are increasingly being offered for sale, with the technical basis being provided by cooperations, the majority of which provide the technology through wholesalers or manufacturers.

Overall, it can be seen that pharmacies are in favour of digital and technical solutions in the context of Industry 4.0, but that a high proportion of the basic requirements in the technical area are only created from externally provided architectures. In-house services and thus unique selling points as a competitive advantage are only utilised by a small proportion of pharmacies. The reasons for this and the opportunities for pharmacies to develop their own approaches to the requirements of Industry 4.0 will be addressed in the following discussion.

Discussion

Healthcare provided by pharmacies is the focus of attention and the communication and transmission of data/information is the basis for any type of cross-competence service for the end customer/patient. A healthcare system can therefore only be as good as the transmission of relevant information within the public health value chain and the opportunities for exchange between individual stakeholders and throughout the relevant supply chain. Pharmacies represent a weak point here in German public health. The success of projects planned and supported by the state to date must be considered low (cf. EFI, 2023, p. 3).

In order to provide a planning framework for pharmacies for the independent use of digital opportunities and their technology, reference is made to the PIVOT model, which considers transformations in companies in the area of digitalisation and is intended to serve as a framework for thinking about how transformation should be approached (see Gehrckes, 2019, p. 61). In this respect, the model offers the best opportunities for holistically capturing transformation opportunities and implementation requirements, as it is fundamentally based on core competences and services. This is particularly necessary in view of the gaps and behavioural assumptions identified at pharmacies, as they prefer the core business in order to

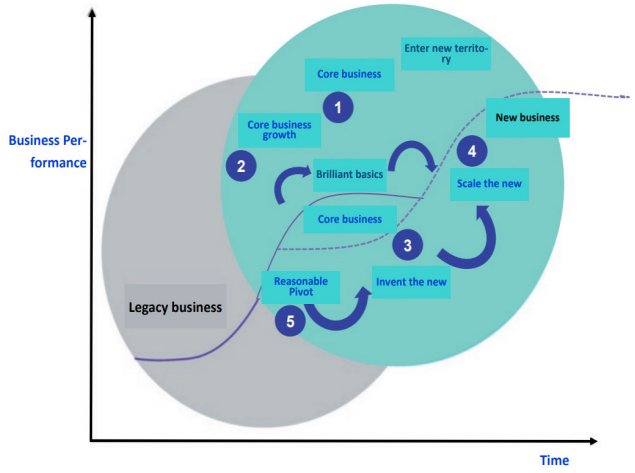
To be allowed to distribute medicines at all (legal mandate)

Main source of sales: pharmaceuticals

Customer structure focussed on the pharmacist specialist

Expansions can only be made in these special fields and closely related areas that are not too far removed from the core competences. The model can be seen in the illustration below.

Illustration 7. PIVOT model



Source: Accenture, 2017

Step 1: Analyse and adapt the core business to new technical and digital possibilities without eliminating the main tasks, but rather supplementing them. The core competences of pharmacies lie in the dispensing of medicines, medical products and knowledge-intensive advice to customers. It is important to identify which digital possibilities exist to supplement the core competences using digital tools so that they still correspond to the core task. The personnel structure and staffing levels must be taken into account, the required capital must be factored in and the sources from which it can/should be obtained, and the transformation time in which this should take place must be determined. The reason for starting here is to ensure that the core business continues to function and generate sales and that the transformation keeps any failure at this point to a tolerable level (cf. Gehrckes, 2019, p. 61). If the measures were successful, then the pharmacies would have to generate higher turnover, which can then be used as investment capital for further steps.

Step 2: Most investments are recommended in the expansion of the core business, as new ideas or offers could fail and thus threaten the existence of the pharmacy as losses. Ergo, a basic idea for the mail-order business would be to expand online offerings in the area of services or digital advice. The experience gained can then be used to initiate further planning for new business areas that promise a certain degree of security thanks to the experience gained from the core business.

Step 3: When defining new business areas, it is necessary to keep the competition in mind. It is important to find niches that are based on digital possibilities. These could be counselling services in the areas of nutrition, cosmetics, advice and product information for the chronically ill, sport and exercise and gerontological areas. Integration depends on the comprehensive range of services available in the pharmacy's catchment area. Digital approaches and communication services as well as deliveries beyond the region are promising here, but must also be weighed up against other online offerings. In addition, it would make sense to join forces with corresponding providers who are also active in this sector in new business areas. For example, collaborations with alternative practitioners or medical specialists are possible, who provide the expertise, while the pharmacy provides the infrastructure and products. Step 4/5: These two steps are summarised in the model, as on

the one hand they require that the success measurement of new approaches is also subject to strict and efficient controlling. At the same time, the fifth step requires a balance between the core business and new business ideas. The core idea remains that the core business generates the revenue, while the new business areas represent a gain until they are established on the market (see Gehrckens, 2019, p. 63).

Such strategic orientations are an option for pharmacies, but they are dependent on internal resources such as personnel, capital and time. An important factor in the core business of pharmacies is payment for the main sale of medicines, which are made on a fee-for-service basis. Margins are low and changes are tending to reduce them. This includes rising personnel costs as well as rising operating costs (see ABDA, 2022, p. 75). Additional services are an opportunity to escape price regulation if they are offered within the legal framework. This applies to all products and services that are outside the statutory framework but still meet compliance requirements.

Pharmacies can certainly develop strategic planning with the pivot process model, but they are dependent on help, which could either be initiated by the legislator or supported by the possibility of even closer cooperation with manufacturers and wholesalers.

The establishment of a digital range of pharmacy products makes sense as a first step in the OTC sector, existing own brands and supplementary products, as the product range is limited and a brand concentration can be built up in terms of image. In addition, this area is considered to be the largest growth market in the area of medicines due to the increasing health awareness of the population, which is self-medicating (see Biegert/Seiler, 2022, p. 104).

In most cases, an external specialist must be brought in for the technical set-up of a digital product viewing tool, as the set-up is quick and of a higher quality and experience at the same high level can rarely be found within the personnel structures. In principle, investments need to be made here in order to establish a basis for a digital offering. As a first step, this enables the company to address customers with an affinity for online shopping and also to achieve a higher level of awareness through the shop's regional focus. It is particularly important in the initial creation that there is a query option for stock availability and a pre-order function. As a result, these options can also be offered to customers for prescription drugs or implemented directly in extended offer structures.

As these products are not an extension of new products, they are familiar to employees and do not require any additional training from wholesalers or manufacturers. The use of the company's own digital tools is easy to implement and can be carried out by the service provider, who also carries out the design and installation. As a result, such innovations are quickly accepted and supported by employees, as they require little reorganisation of processes and are closely aligned with core competencies.

If an initial digitalisation is carried out in this context, the pharmacy can also consider how to incorporate the consultation into the digital area without having to make too many changes to the existing processes. Existing software options could be used for this or freeware could be installed to enable video consultations. Care must be taken to ensure that all employees are familiarised with its use, which is not very time-consuming and can also be done on a self-taught basis.

In order to provide such advice, it is important for pharmacy management to have a pharmacist in the core business who can flexibly take on these tasks (using a headset and their own screen as a consultation location) or who can take on this task permanently if such services become established.

Measuring success in this first phase is very straightforward and can be determined using simple key figures. This enables a simple return on investment that compares the investment costs with the income from the new opportunities and allows the amortisation point to be defined very precisely. In addition, internal staff meetings should be held to determine how consultations in digital form are perceived, what advantages and disadvantages are recognised and to what extent the new work steps influence the core business.

It is quite possible that the actual potential of Industry 4.0 is not seen or even understood by pharmacy owners. Pharmacists are not necessarily experts in IT or economics. This makes it all the more important to raise awareness and to better inform pharmacy owners about the possibilities and their implementation. For this reason, there is also a need to increasingly integrate digitalisation topics in the healthcare sector into the curriculum of young pharmacists. In this way, an important foundation can be laid for further processes.

A look at doctors' surgeries, hospitals or care facilities can also be interesting in order to better understand and perhaps even accelerate the digitalisation of the German healthcare system. The recent introduction of e-prescriptions, for example, showed that enormous hurdles need to be overcome, some of which may be due to sluggish administrations, complex regulations and sub-optimal funding. If the German healthcare system wants to meet the challenges of the times appropriately, it is essential to accelerate the digital transformation at all levels.

With the establishment of GAIA-X as a cloud-based data network, Germany has created a platform that is now used throughout the EU and is intended to protect and promote European economic interests internally (cf. BMWi, 2020, p. 5). This also includes the area of public health, which is integrated (cf. GAIA-X, 2021, p. 19). The Commission of Experts for Research and Innovation names the following target group:

These are the players in the healthcare industry with their various sub-sectors. The diversity of players is high and, in addition to patients, includes medical care such as doctors in private practice (non-inpatient facilities), private and public hospitals (inpatient facilities) and the industrial healthcare sector (production, distribution and wholesale). There are also other players, including private and statutory health insurance funds and publicly funded research. The core and extended areas of the healthcare industry and their players form a digital healthcare ecosystem, for the functioning of which the health data space is of central importance. (EFI, 2023)

It is noticeable that pharmacies are explicitly omitted here if they fall under distribution, which is not defined, which would be a misinterpretation of pharmacy services.

The GAIA-X project was developed in 2019 as a European

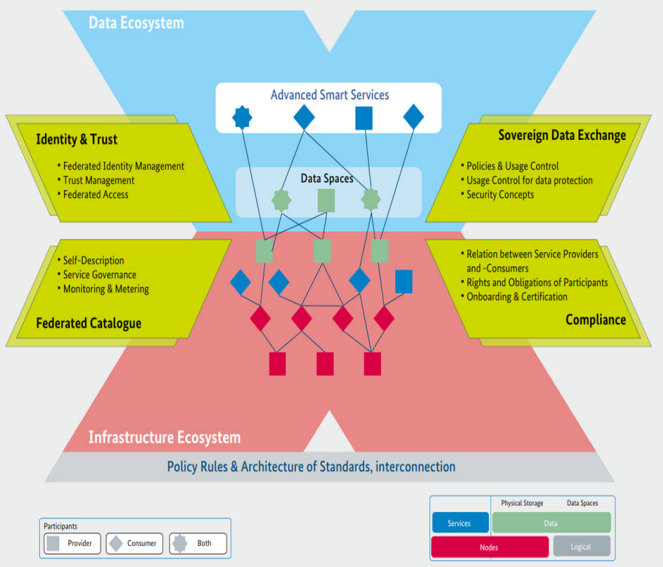
counter-model to the dominant cloud-based providers from the USA and Asia in order to develop a system that builds on the European legal and value concepts of the EU (see BMWi, 2019, p. 2).

"The existing cloud offerings are dominated by non-European providers with high market power and rapidly scaling cloud infrastructures. European alternatives do not offer comparable market capitalisation, scalability and application breadth and are at best active in specialist niches." (BMWi, 2019, p. 5)

The basic framework of this Internet structure and the possibilities for interactivity are shown in the following illustration.

Assuming that a wide variety of providers from science, industry, trade and services as well as government institutions are located on this platform, the architecture can simplify cooperation between companies and organisations by creating networks that make it easier to exchange information and generate added value. These can be collaborations that use the network structures to develop new digital sales opportunities that individual companies lack in this form due to a lack of knowledge, technical infrastructure and corresponding partnerships (see BMWI (b), 2020, p. 5).

Illustration 8 GAIA-X architecture



Source: BMWi, 2020, p. 5

In terms of pharmacies, such networks would allow knowledge management in the area of digitalisation, technical background, exploration of possibilities and training requirements to be covered and efficiently implemented. The difficulties faced by pharmacies lay primarily in their knowledge of digitalisation and implementation options, which previously had to be obtained at great expense from external consultants and specialist companies.

An architecture that provides direct connections and free information at a high level and with practical experience would be an important step for the competitiveness of public pharmacies to safeguard their own business interests as well as the supply of medicines and quality advice.

As part of the digitalisation of its own products and services, the company could offer partnerships that can provide the relevant expertise. These include companies from the IT sector or experienced online providers that do not come from the same industry and therefore do not have to fear any competitive restrictions. In return, pharmacies can offer these companies added value by being able to offer their specialised knowledge and their own product ranges.

The opportunities here are attractive for other companies, as the aspects of health and work-life balance are attracting more and more attention. This is both on the part of employers, in order to attract and retain staff through such aspects, as well as on the part of employees, with Generations Y and Z in particular paying a great deal of attention here when choosing a career and employer.

"While young people want monetary aspects to secure their existence, which reveal a materialism, they also hope for higher, overriding values such as health." (Preiß, 2017)

Pharmacies have both real and virtual opportunities to offer courses and training in the area of health in the workplace and at work. Unlike health insurance companies, which also offer such services, pharmacies are also able to offer the corresponding products that promote health. This allows them to differentiate themselves from other counselling services, as they can offer a complete package that includes knowledge, advice and products.

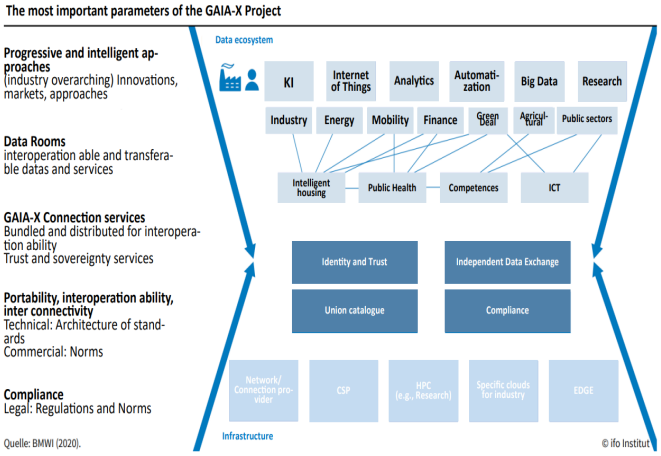
By providing knowledge and implementation strategies as well as technical solutions in the pharmacy sector in return, pharmacies will be able to offer new digital services in their core competences for their customers, while also being able to better promote partnerships through the new standards. The result is an immense win-win factor.

Exchange systems between pharmacies in the same sector are also possible. For example, there are opportunities for direct exchange between the individual providers, whereby physical distance is advantageous as there is no direct competition. This is very advantageous for individual pharmacies, as existing knowledge can be exchanged directly with each other and contribute to mutual benefit.

This can be done even more easily via pharmacy co-operations, as these already exist in an association with the same interests in purchasing. Cooperations can then act as large providers and maintain exchange relationships with corresponding partners, which promotes the digitalisation of the individual pharmacies and also offers synergy effects for the partners if services are used by the pharmacies. Should this not occur, however, cooperations have the advantage of financial strength over individual pharmacies, which makes it easier to obtain partnerships as an investment.

Even if cooperations or individual pharmacies with and without branches have already implemented digital solutions, the opportunities to obtain information and exchange ideas with specialised companies are also important here, as it has been shown that the digital transformation is constantly renewing itself. GAIA-X would therefore not only serve as an impetus, but would also keep further development up-to-date and efficient, which would increase competitiveness (see BMWI (b), 2020, p. 5). This is also made clear by the sectoral structure associated with GAIA-X.

Illustration 9 Connection of important parameters in GAIA-X



Source: BMWi, 2020; in: Bernhardt/Steininger, 2021

The connection and interoperationalisation of all sectors and their companies favours fast and resilient partnerships that can help pharmacies with digitalisation, especially by providing the missing resource of knowledge in a structured way.

In Germany, many aspects of digitalisation are lagging behind in a European comparison (see EFI, 2023, p. 96). Many initiatives are being initiated in the form of agendas or projects, but these are either not yet in a realisation phase or are repeatedly stalled or put on hold due to resistance or technical problems. This has become particularly clear in the healthcare sector since the coronavirus pandemic. Recognising the many shortcomings in the healthcare system, politicians have decided on many things to advance digitalisation in the healthcare sector. Some had already been planned before the coronavirus, others with the experience gained from the pandemic. However, there were always problems and errors that paralysed important projects. The ePatient file, telematics and Gematik, ePrescription and the expansion of healthcare infrastructures on a digital basis are particularly well known (see EFI, 2023). Germany has not yet sufficiently completed its digitalisation tasks and there are still numerous gaps in the infrastructure. This is particularly the case in rural areas, especially in the east of the country (cf. Büschel/Röhl, 2023, p. 1).

The regions that are most likely to be affected are particularly underserved when it comes to utilising digital opportunities in the area of medicine supply. These include local pharmacies, which can only utilise digital transformation to a limited extent without sufficient network coverage with high-speed networks. However, this would be important for the use of health-related services, which would be an alternative to dwindling local pharmacies via an app or as an online service. The devices are available for this, but there is not an adequate network everywhere (see Wiewiorra, 2023, p. 21)

In addition, there were various telematics problems for the ePrescription at the relevant authorities. These have supposedly now been resolved and, after years of attempts, the ePrescription will finally be widely usable in July 2023. At least according to Health Minister Karl Lauterbach. Further developments remain to be seen.

The Commission of Experts for Research and Innovation (EFI) stated in its report from spring 2023 that

"The German government has a problem with the implementation of complex social transformation projects. This problem is becoming increasingly clear with the upcoming far-reaching transformations of digitalisation and the energy transition. In order to meet the requirements of these transformations, the Federal Government urgently needs new governance structures that enable agile action and the realisation of self-imposed goals. To date, the federal government has defined goals in numerous, often unconnected strategy documents, but has not subsequently implemented them for various reasons." (EFI, 2023)

The government initiative for more digitalisation in the healthcare system therefore does not appear to be efficient and other approaches are needed to make the public health system more digital. Support for the relevant participants, especially pharmacies in this context, is therefore required, which could be provided cost-effectively by the GAIA-X network (cf. Siebenand, 2021).

However, the willingness to do so must not only come from pharmacies, as this now appears to be the case. Rather, legislators must realise what kind of development in the healthcare system they are prepared to accept in the supply of medicines sector. The following applies as a guide:

"While the physical location is becoming less important, the position in the network is becoming more important. Relationships and cooperation with the right partners will become the decisive competitive advantage of a multi-layered, connected, location-independent and networked pharmacy in 2030." (Frick/Schäfer, 2020, p. 3)

The sole aim cannot therefore be to shrink pharmacies as retailers to a minimum coverage and then hope that the mail-order business will close the gap. They cannot do this, as their product portfolios are not designed to cover all areas and they do not see any economic added value in this. Therefore, the state must consider how it can become involved in the structures of GAIA-X, for example by expanding its financial possibilities in order to at least financially support pharmacies in the digitisation process.

One solution is to make it easier for pharmacies to access state subsidies.

It is also possible that the fee structures could be adjusted and allow pharmacies better financial room for manoeuvre through an adequate increase. The investment decision would then lie with the pharmacies and would not require a hidden subsidy.

It can also offer its own training and download portals to help people acquire the necessary expertise.

The most important factor in all of this will remain the pharmacist, whose decision determines the degree of digitalisation in their company. It may be a generational change in ownership that triggers the decision to increasingly rely on digital options in order to offer their own company a future and patients security of supply (see Heide, 2019, p. 44).

CONCLUSION

The aim of this research paper was to determine how pharmacies as retailers can transform their own processes

using digitalisation and generate added value both internally and for patients. The survey results showed that digitalisation in the sector is still in the early stages of transformation and that only some pharmacies are making use of the existing opportunities. Previous approaches to reorganising processes have been initiated externally and are based on initiatives by the state or value chain participants such as manufacturers and/or wholesalers. Pharmacies rarely plan and implement their own programmes and, according to the findings, fail due to a lack of personnel and investment capital.

With the PIVOT model, which is based on a gradual change in internal processes and closely integrates core competences into the strategic orientation, even small companies such as pharmacies can undertake a process structure transformation. Existing resources can be optimally utilised, staff numbers do not need to be comprehensively expanded or renewed and investments can be kept within a framework that pharmacies can cope with.

For the further design of the transformation and the necessary support, reference was made to the GAIA-X reference programme, which offers a comprehensive network structure with all relevant economic sectors. This connects interfaces that link different sectors with each other and favours a comprehensive exchange of knowledge as well as possible collaborations. If the pharmacies or the larger cooperations join the networks here, synergy effects can be created that maintain modern and digitalised pharmacies as systemically relevant companies in the healthcare system and secure the supply of medicines (see Hariry et al., 2022).

References

1. ABDA (Federal Union of German Pharmacists' Associations) (2022). Die Apotheke - Zahlen, Daten, Fakten 2022. Berlin: Kölle Druck + Verlag.
2. ABDA (Federal Union of German Pharmacists' Associations) (2023). Die Apotheke - Zahlen, Daten, Fakten 2023. Berlin: Kölle Druck + Verlag.
3. ACCENTURE (2017). How to make a wise pivot to the "new". Available from: https://www.accenture.com/us-en/ blogs/blogs-how-make-wise-pivot-new.
4. ALBRECHT, J./KEMPER, G. (2020). The Pharmaceutical Industry in Germany. Industry overview. Published by German Trade And Invest. Bexbach: Kern. Available from: https://www.gtai.de/resource/blob/63952/.
5. BERNHARDT, J./STEININGER, M. (2021). Gaia-X - Paving the way for a digital and competitive future of the EU? ifoSchnelldienst 5/2021 74th year 12 May 2021.
6. BIEGERT, T./SEILER, R. (2022). Rethinking the healthcare market. Perspectives - potential - forecasts. Berlin: MedizinischWissenschaftlicheVerlagsgesellschaft. ISBN: 978-3-95466-639-3.
7. FEDERAL COURT OF JUSTICE (2020). Inadmissibility of the distribution of medicinal products by means of a medicinal product dispensing machine operated in Germany. Reference number (Az.): I ZR 123/19; 30th In Journal of Pharmaceutical Law (PharmR), April 2020:560-563.
8. FEDERAL MINISTRY OF JUSTICE (2022). Act on the Marketing of Medicinal Products (Medicinal Products Act - AMG). Berlin: BMJ.
9. FEDERAL MINISTRY FOR ECONOMY AND ENERGY (BMWi) (2020). GAIA-X. Technical Architecture. Munich: PRpetuum. Available from: www.data-infrastructure.eu/gaia-x-technical-architecture.
10. FEDERAL MINISTRY FOR ECONOMY AND ENERGY (BMWi) (2020 (b)). GAIA-X: The European project enters the next phase. Munich: PRpetuum. Available from: www.bmwi.de/gaia-x-das-europaeische-projekt-startet-in-die-naechste-phase.
11. FEDERAL GOVERNMENT OF GERMANY (2023). Draft Act to Combat Supply Bottlenecks for Off-Patent Medicinal Products and to Improve the Supply of Medicinal Products for Paediatric Use (Act to Combat Supply Bottlenecks and Improve the Supply of Medicinal Products for Paediatric Use - ALBVVG). Berlin: Federal Government.
12. BÜSCHEL, J./RÖHL, K.-H. (2023). Development East. The gigabit gap. IW Brief Report 15/2023. Available from: https://www.iwkoeln.de/studien/jan-bueschel-klaus-heiner-roehl-die-gigsbit-luecke.html.
13. CHRISTEL, L. and GRÜNDINGER, W. (2019). Digitisation of the local pharmacy. Understanding digital transformation. Taking countermeasures. Stay relevant. Whitepaper on success factors and measures of digitisation for the local pharmacy along the customer journey of pharmacy customers - Extended Version. Leipzig and Berlin: Apoly and BunderverbandDigitaleWirtschaft.
14. EXPERT COMMISSION FOR RESEARCH AND INNOVATION (EFI) (2023). Healthcare industry in the digital transformation. Input for the design of a roadmap. Berlin: EFI.
15. FRICK, K./SCHÄFER, C. (2020). APOTHEKE 2030: New models for a traditional business. Rüschlikon/Zurich: Gottlieb Duttweiler Institute. ISBN: 978-3-7184-7124-9.
16. FRITZ, K., ZERRES, T. and ZERRES, C. (2021). The market for online pharmacies in Germany - a legally focussed analysis. Working paper no. 58. Offenburg: Zerres. ISSN: 2510-4799.
17. GAIA-X (2021). Gaia-X Domain Health. Position Paper Version 1.0 2021. Edited by JaanaSinipuro and Bert Verdonck. Available from: https://bundesregierung.de/breg-de/service/publikationen/gaia-x-domain-health-1984754.
18. GEHRCKENS, M. H. (2019). The transformation dilemma in retail. In: Retail with added value. Digital change in markets, business models and business systems. Edited by Gerrit Heinemann et al. Wiesbaden: Springer. P. 43 - 70. https://doi.org/10.1007/978-3-658-21692-4_2.
19. HAIRY, R.E. et al. 2020. From Industry 4.0 to Pharma 4.0. Handbook of Smart Materials, Technologies, and Devices: Applications of Industry 4.0, pp.1-22.
20. HEIDE, R. (2019). Ethics in the pharmacy. Knowledge, trust and communication in the context of pharmacy. Wiesbaden: Springer. ISBN: 978-3-658-26483-3/https://doi.org/10.1007/978-3-658-26484-0.
21. JAVAID, M. et al. 2022. Understanding the adoption of Industry 4.0 technologies in improving environmental sustainability. Sustainable Operations and Computers, 3, pp.203-217.
22. SIEBENHAND, S. (2021) Recipe for success for pharmacy 4.0, PZ online https://www.pharmazeutische-zeitung.de/erfolgsrezept-fuer-apotheke-40-133278/.
23. PREIß, F. (2017). Generation Z - the new workers. ZAFH

care4care - Skilled labour requirements in the care sector in the context of ageing, diversity and satisfaction. Available from: https://www.researchgate.net/publication/321586327.

24. WIEWIORRA, L. (2018). Developing white spots in broadband coverage is the biggest challenge. In *ifo Schnelldienst*. 7/2018 71st volume 12 April 2018. p. 19-21.

How to cite this article:

Stefan Rezepa and Jürgen Lange.(2024)., Industry 4.0: Implementation of digitalisation and technical applications using the PIVOT approach in the retail sector, using the example of German pharmacies, *International Journal of Current Advanced Research*, 13(08), pp.3224-3233

****