

# Requirements for payment systems in e-commerce from the retailers' perspective

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**Abstract.** The selection and use of payment methods is an important success factor for online retailers, as many customers have already cancelled a purchase because their preferred payment method was not offered in the online shop. Online retailers now have a wide range of different payment methods available to them, which they can offer their customers for payment. In order to choose the right payment method, various requirements for e-commerce payment systems must first be determined. In addition, current EU regulations result in legal requirements that payment systems must meet, so that this also affects the requirements of the retailers. The objective of the paper is to identify, describe and evaluate the requirements for payment systems in e-commerce from the retailers' perspective. This should provide the basis for the development of a model for the evaluation of electronic payment procedures. The evaluation of the identified requirements was based on an empirical study with expert interviews. It was determined that high distribution/acceptance by customers and user-friendliness are the two most important requirements for payment systems from the retailer's point of view, which contribute to sales development. A high level of payment security and low total costs are also important requirements, but were rated as less relevant by the experts surveyed. In addition, the legal regulations of the European General Data Protection Regulation (GDPR) and Payment Service Directive 2 (PSD2) also resulted in legal requirements that payment systems must meet.

**Keywords:** payment systems, e-commerce

## 1 Introduction

In today's digital and globalised world, e-business is playing an increasingly important role. In addition to stationary sales, more and more retailers are offering their goods and services online in an e-shop or are concentrating entirely on Internet sales. While

in 2009, sales in the online and mail-order business accounted for around 7.2% of total retail sales in Germany, sales in 2017 were already reaching 13.2% [1]. For consumers, shopping on the Internet is already part of everyday life. More than half of all Germans today order their goods and services via the Internet, with around 50 million online buyers [2]. The increasing number of online users and thus potential online buyers is driving the steady growth of the German e-commerce market. A consumer study conducted by the Federal E-Commerce and Mail Order Association (BEHV) found that in 2018 a gross turnover of 65.1 billion euros was achieved with e-commerce goods throughout Germany [3]. Payment is an essential part of the ordering process. The selection and use of payment methods is an important success factor for online retailers, as 63% of consumers have not made a purchase at some point because the payment methods offered were not sufficient [4]. A challenge in online trade arises from the fact that ordering, delivery and payment are decoupled in time and space, whereas in stationary trade the goods are paid for directly [5]. Online retailers today have a large number of different payment methods at their disposal, so they are faced with the question of which payment methods they should offer their customers for payment processing [7]. In order to choose the right payment method, various requirements for payment systems in e-commerce must first be identified. This work focuses primarily on the retailer perspective, although customer requirements also influence this. A further reason is that the selection of payment methods that are not accepted by customers generally do not bring the desired success for retailers [8]. In addition, current legal EU regulations also result in legal requirements that payment systems must fulfil, thus this also affects the requirements of retailers. The objective of the paper is to identify, describe and evaluate the requirements for payment systems in e-commerce from the retailers' point of view. This provides a basis for the development of a model for the evaluation of electronic payment procedures.

## 2 Related Research

Since every payment represents a transaction, the basic technical requirements of a transaction must be reviewed for each new electronic payment procedure [7]. The requirements for a transaction include Atomicity, Consistency, Independence, and Durability (ACID). These four ACID properties together form the requirements for a transaction system known in computer science [7, 9]. By fulfilling the ACID properties, the successful execution of payment transactions can be guaranteed. Since the transactions of payment systems in e-commerce refer to large distances in the anonymous digital space, a much higher level of security must be provided than, for example, in the payment process in stationary retail trade [10]. In particular, the electronic payment procedures must ensure adequate protection against attacks, misuse or manipulation of data and financial transactions on the Internet [9]. In e-business, the (perceived) security is

also an absolute knockout criterion, because customers only accept offers from operators that can credibly exclude the misuse and manipulation of their data [10]. Protection against misuse and manipulation is an important criterion, because in addition to the direct damage, trust in electronic payment systems can be lost [11]. Data and transaction security in electronic payment transactions is perceived as given and is measured when a payment system meets the criteria of availability, confidentiality, integrity, authenticity and authorization [9, 10, 12-14]. In addition to the security requirements described above, electronic payment systems must be flexible in its use and be widely used and accepted by both customers and retailers [13, 15]. The flexibility of a payment system must be given from a technical, economic and geographical point of view [15]. The acceptance or willingness to accept a new payment procedure must be guaranteed by the players involved, so that misinvestments or loss of revenue can be prevented [9]. Acceptance is also related to the degree of penetration, which describes the density of participants in the payment system [9]. The interaction between the actors is a necessary condition for the successful dissemination of an Electronic Payment System (EPS) [16]. The critical mass of customers and retailers is crucial for the success of a payment system, because if this is not achieved, there will be too few users and the EPS will not be able to spread further in the market [16]. This means that acceptance by users increases with the number of participants [9]. In fact, after reaching a certain critical mass, the number of users grows exponentially until saturation is reached [16]. Furthermore, the current state of research shows that the acceptance of an EPS is an important and frequently researched area. Accordingly, acceptance and distribution is an important criterion for the selection of EPS. Since there must be enough users on both sides of the market for a payment method to be offered as a payment option in an online shop, the needs of both retailers and consumers must be considered. For a retailer, it is only worthwhile entering a particular EPS if there are currently enough customers using it or at least in the near future. Whereas customers choose the systems that are accepted in most online shops [7, 17].

From the customer's point of view, there are a number of requirement criteria that are decisive in determining why they choose a particular payment method for their online purchase. The results of the study conducted by the E-Commerce-Center Handel at the „Institut für Handelsforschung“ showed that consumers demand in the first place a high level of security, user-friendliness, distribution and cost of a payment procedure [18].

From the retailer's point of view, there are also some requirement criteria that are decisive for the selection of the payment methods they want to offer in their online shop. The aim of retailers is to secure and increase their sales [8]. The current situation in the e-commerce market is positive, since it continues to show double-digit growth and the e-commerce sales will continue to increase in the future [3, 19]. Retailers should be able to access and collect these revenues flexibly, easily and securely [19]. Payment systems in this context should offer a high level of security, be flexible with regard to

the amount of the sum involved, be suitable for international use and be platform or multi-channel capable. In addition, the wide distribution and acceptance to customers was also mentioned. This is influenced by the familiarity of payment systems and the payment habits of the customers, as well as by user-friendliness and simple handling. A high level of payment security also plays an important role in generating and securing sales, i.e. online retailers demand protection against non-payment and want to minimize the associated risk to a calculable level [8, 19]. The reduction of the total costs of a payment procedure and close customer relationships are also sales factors and influence a retailer's profit [8, 19, 20].

### 3 Requirements for Payment Systems from Retailers' Perspective

As already mentioned, part of the paper's objective is to identify the requirements for payment systems in e-commerce from the retailer's perspective. These requirements were determined on the basis of the literature study. In connection with the goal of a high turnover and the use of a payment method, requirements from the retailer's point of view can be divided into the following three basic property categories: revenue generation, revenue protection, costs [8, 21]. In Table 1, the essential requirements from the retailer's point of view are assigned to these property categories. The assignment of the requirements to the three categories is based on the study by van Baal & Hinrichs [8]. In addition, legal requirements are included as a fourth category.

<b>Development of Sales Revenue</b>	
Usability/Ease of Use	High Distribution/Acceptance by Customers
International Applicability	Platform Independence
Reputation & Awareness of a Payment System	
<b>Assurance of Sales Revenue</b>	
High Payment/Reliability/Low Risk of Non-Payment	
<b>Costs</b>	
Cost-effectiveness/Low Total Costs	Simple Integration Capability/Low Integration Effort
Early Date of Payment/Rapid Receipt of Payment	Reduction of Internal, Manual Processes
<b>Statutory Provisions</b>	
Data Privacy/Protection of Personal Data	Data Security/Protection against Misuse

*Table 1: List of requirements for payment systems in e-commerce from the retailers' perspective*

### **a) Development of Sales Revenue:**

These requirements are essential for the number of customers reached by a payment system and for the number and amount of possible transactions. For retailers, it is a necessary condition that a sufficient number of potential customers can pay in the online shop and are not excluded from the transaction because, for example, there is no "suitable" payment method available. In this case, the customer would then most likely abandon the checkout process and order his or her goods in another online shop that is only a mouse click away and offers his or her preferred payment method. The requirements assigned to the category of revenue generation have a strong customer reference. The user-friendliness or simple handling of a payment method also includes in particular the features of easy registration for new customers, low usage effort, fast and convenient handling as well as transparency and traceability. For online retailers, this requirement is relevant in order to enable a smooth order or checkout process for customers, so that they can complete the purchase and do not cancel it due to the cumbersome use of a payment system. Another important requirement for retailers to generate sales is a high level of distribution and acceptance among customers. Only if the retailer offers the well-known and popular payment methods of the customers in his online shop, customers will buy goods there and the retailer will achieve a high conversion rate. The reputation and familiarity of a payment system is closely linked to customer acceptance, which is also included here as a requirement of the retailers. Retailers are more willing to offer a well-known payment system, since such a system is usually widely used. In addition, a good image of the payment provider leads to higher customer acceptance. Furthermore, the flexible applicability of a payment system is also a relevant characteristic in terms of revenue generation. This includes the requirements for international applicability and platform independence, as this enables online retailers to reach more potential customers and target groups for their online shop.

### **b) Assurance of Sales Revenue:**

This includes features that directly or indirectly influence the security of the payment receipt for the retailer. The actual receipt of the customer's financial consideration can be prevented by system errors or fraudulent intentions.

In the category of sales revenue assurance, the requirement for high level of payment security is very important. For online retailers, it is crucial for their business and existence that the payment amounts requested are received by them. A high level of payment security of a payment procedure includes, among other things, the reduction of payment defaults and the non-repudiation of the payment. With regard to the reduction of payment defaults, payment systems must be examined to determine whether certain risk checks and security measures are necessary on the retailer side. This represents an additional cost factor. Non-repudiation of payment refers in particular to attempts and

cases of fraud on the customer side and cases of abuse by third parties. Here the question of liability plays an important role.

### **c) Costs:**

These include one-off and ongoing costs incurred by the trader, including opposition costs. Retailers want to ensure that the payment process runs smoothly and cost-effectively.

Various costs are incurred by the retailer when using a particular payment method. The lowest possible total costs of a payment method are decisive in determining whether a retailer will include it in its online shop. The total costs include one-time costs such as setup and integration costs, direct costs such as transaction-independent and transaction-dependent costs, costs of risk and receivables management, opportunity costs due to delayed incoming payments, costs due to service disruptions and costs due to returns [19, 22, 23]. Regarding integration costs, retailers have to consider the integration effort, i.e. whether the payment procedure can be easily integrated into the shop system and into other internal systems such as the accounting system. For example, retailers can integrate some payment methods into their shop system using plug-ins without additional programming effort. Payment methods can also be connected directly via PSP using interfaces. The reduction of internal, manual processes also plays a role in the cost criterion, especially with regard to billing and returns. For retailers, the degree of automation of the payment system is important, e.g. some invoices must be assigned manually, which will cause additional work and costs. In addition, the cost category also includes the requirement for a fast receipt of payment, which influences payment security, but is assigned to the cost category by van Baal & Hinrichs [8]. The background to this is that not negligible costs are incurred, for example, for the storage of the ordered goods until dispatch. Accordingly, the earlier or faster a payment is received by the retailer, the earlier he can ship the goods.

### **d) Legal requirements:**

Current legal regulations result in legal requirements that payment systems must fulfil. For example, EU- GDPR, which came into force in 2018, and the PSD2 have led to far-reaching changes in e-commerce and also in the payment sector within the EU.

This includes the requirements for data protection and protection of personal data and for data security and protection against misuse. Payment service providers as well as providers and online retailers must implement these two requirements in a legally binding manner in accordance with GDPR and PSD2 (implemented into German law in the ZAG). Among other things, secure encryption of data during transmission, entry of data in a protected environment and authentication play an important role. In addition, the protection of personal customer data also includes their anonymisation or pseu-

donymisation, which is also related to data economy. The requirement for data minimization for simplification is covered by the requirement for data protection. For the examination of a payment procedure, data protection also takes into account which and how much data the procedure or the provider needs and collects, and to how many and to which third parties these data are passed on. In this context, it is also relevant whether the payment provider is at least an European company, as the understanding of data protection is present and is regulated more strictly by law (GDPR). This allows retailers to collect and process data for a specific purpose. The requirement for data security describes how well a payment procedure is protected against abuse and fraud.

## 4 Methodology and Evaluation

The identified catalogue of requirements from the retailer's perspective forms the initial basis for the evaluation of different payment systems in e-commerce. To be able to compare and evaluate payment procedures, it is necessary to identify which requirements are actually relevant from the retailer's point of view and how important they are. The evaluation of the requirements was carried out on the base of a qualitative investigation with the help of expert interviews. Therefore a semi-structured guideline interview was selected as the method of collection, since requirements had already been identified in the testing phase of the interviews. This was also suitable for evaluating the requirements, since the experts were asked to select the degree of importance per requirement. In addition, the experts were able to make additional remarks and thus also specify requirements. During the course of the interview, it was possible to ask questions or additional questions based on the respective interview partner and his expertise. A total of four interviews with experts in the fields of e-banking, e-payment and e-commerce were conducted, recorded, transcribed and evaluated within a period of five weeks.

The evaluation of the interviews was based on the qualitative content analysis according to Mayring [24]. In the first step of the qualitative content analysis, the central analysis units were determined. Here, the categories of the guide were defined as analysis units. In the second step, the main text passages of these five categories were paraphrased. Decorative, repetitive, clarifying text components were deleted, e.g. "hm". The third step involved the generalisation of the experts' paraphrased statements. Since the experts have answered the questions precisely and clearly, the level of abstraction here is low. In the fourth step, generalised paraphrases with the same meaning were deleted, which is the first reduction phase. The second reduction phase took place in the fifth step, in which several paraphrases, which refer to each other and were often distributed through the transcribed material, were bundled and summarised and reproduced by a new statement. Accordingly, the already reduced contents of the categories were reduced once again by a higher level of abstraction. Step six contains the compi-

lation of the new central statements of the corresponding categories. Finally, in the seventh step, the summarised category contents were compared again with the source material in order to correct possible errors [24].

## 5 Results

In the course of the interviews, the experts were asked how important they consider the requirements listed in Table 1 to be from the dealer's point of view and which of the requirements they consider to be the most important. The experts were able to choose between four options: "very important", "important", "less important" and "unimportant". An even number of options was chosen so that the experts could not give a neutral assessment, so that they had to decide between important and unimportant and thus a tendency could be identified. All experts identified the requirements for a high level of dissemination and acceptance among customers as very important, whereby for three of the four experts this is the most important requirement for online retailers. In their opinion, the customers ultimately decide which payment methods the online retailer must offer in order to sell his goods successfully. According to expert C, the cost of the process is less important than customer acceptance, because a turnover with a poor margin is still better than no turnover at all. This statement refers to the case when the customer abandons the purchase during the checkout process because his preferred method of payment is not offered. As a result, Online retailers are forced to offer expensive payment methods if they are popular and widely used by customers. Expert B, on the other hand, considers user-friendliness and ease of use to be the most important requirements. After all, an online retailer wants to sell his goods and the threshold for this should be as low as possible for the customer, which is why a payment system should be user-friendly and easy to use. The retailer benefits if the customer can pay for the ordered goods easily and quickly in an unobstructed payment flow. Overall, all four experts rated user-friendliness and simple handling as a very important requirement.

The experts also agree on the requirement for international applicability. They rate this requirement as less important. Many online shops focus on only on regional customers. There are only a few retailers who sell cross-border, so that for most online retailers the international applicability of a payment procedures plays a secondary role. In contrast, payment habits and the payment methods offered are different in every country. There are payment methods that are widespread regionally but not relevant internationally or in other countries, such as the popular purchase on account in Germany. Thus, international applicability is not considered as a requirement criterion in the evaluation of the selected payment systems.

A simple integration capability or a low integration effort is considered by the experts to be a rather important requirement. Only for expert B, this requirement is less

important. For all online shops, it is an integration effort when a seldom used payment procedure is introduced.

In addition, some payment methods can be switched on or off relatively quickly if a plug-in is used. However, expert A believes that the trend with plug-ins is declining because many retailers want to have a customised website with their desired design to provide customers with a continuous "flow". If a retailer wants something special or unusual in his online shop, he would have to change a lot of things when using a plug-in, which may be more expensive than implementing it himself. These statements make it clear that the integration effort depends very much on the individual wishes and requirements of the online retailer. For this reason, the ease of integration or the low integration effort is not defined as a separate requirement criterion for the evaluation of the selected payment systems, but is summarised in the requirement for low total costs and taken into account in the evaluation.

An early payment date or a fast receipt of payment is considered to be a rather important requirement. According to expert B, the relevance depends primarily on the online retailers, whether they need the money in their bank account faster or not. An early and fast receipt of payment reduces the risk of non-payment on the one hand, and on the other hand it influences the total costs, since, for example, delayed receipt of payment results in storage costs for payment in advance or costs for collection measures for a purchase on account. As a consequence, the early payment date or the fast receipt of payment is not adopted as a separate request criterion for the evaluation of the selected payment alternatives, but is summarised in the requirements for high payment security and low total costs and taken into account in the evaluation.

The reduction of internal, manual processes represents a rather important requirement for the experts. Two experts agree that today's payment processes are automated and that the manual processes are manageable. After entering customer data and completing the order in the shopping cart, the payment process usually automated, including, for example, the address and creditworthiness checks of the customer when purchasing by invoice or instalment. In the meantime, a great deal can also be automated by means of image recognition procedures or similar for invoice purchases. Expert B is agrees that although the online retailer's internal processes can be implemented and implemented in a leaner manner, the time savings or degree of automation that can be achieved is insignificant from the retailer's point of view. Based on the statements of the experts, it is assumed within the scope of this study that the internal processes of online retailers are largely automated with regard to payment processing and that any process optimisations will not result in any significant changes. Accordingly, the reduction of internal, manual processes will not be included in the final catalogue as a requirement criterion.

Thus, of the ten requirements listed in the guide, only five are included as criteria for evaluating the selected payment systems, with two legal requirements being added.

These were not listed in the guide for the experts' assessment and evaluation, as they have to be fulfilled by the selected payment systems anyway.

In summary, the following seven requirement criteria are:

- usability/ease of use
- high distribution/acceptance by customers
- platform independence
- high payment reliability/low risk of non-payment
- cost-effectiveness/low total costs
- data privacy/protection of personal data and
- data security/protection against misuse.

## 6 Conclusion and Critical Discussion

In the course of this work, various requirements for payment systems were identified from the retailers' point of view. Although this work focuses on the retailer perspective, the requirements of customers were also considered, since they ultimately decide which payment method they want to use. In addition, current legal regulations have resulted in legal requirements that payment systems must meet. In particular, GDPR and PSD2 have led to far-reaching changes in payment processing in online retailing. The empirical study showed that the two most important requirements for payment systems from the retailer's point of view are the high level of dissemination and acceptance among customers and user-friendliness. According to the study, online retailers should focus on the distribution and acceptance by customers as well as on user-friendliness and ease of use when choosing payment methods. This enables them to further develop their sales and increase their conversion rate. High payment security and low overall costs are also important requirements, but were rated as less relevant by the experts surveyed. Platform independence and international applicability were also identified as requirements of retailers for sales development. However, these two requirements are less relevant and play a secondary role, especially with regard to international applicability.

The two most important requirements show that online retailers are, to a certain extent, externally controlled by the customers and that it is therefore advisable to orientate oneself according to the customers' wishes, even if this means that the retailer has to offer the more expensive payment methods. The general rule here is that the more payment methods an online retailer offers, the more sales it generates and the higher the probability that customers will find their preferred payment method. As far as the costs and effort involved are justifiable, online retailers should therefore offer as many payment methods as possible that are known and accepted by customers. Since the payment industry is in a constant state of flux due to technical developments, legal regulations and changing consumer behaviour, the topic of payment systems in e-commerce will continue to be an interesting and varied field of research in the future.

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