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Investigating building permit processes across Europe: characteristics and patterns

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ABSTRACT

Building permit processes serve as crucial gatekeepers for urban development, regulating compliance with building codes, land use policies, and safety and environmental standards. However, their complexity can lead to inefficiencies and hinder economic growth. While existing studies have made significant contributions to building permit process research, they often focus on individual countries or specific aspects, leaving a gap in comprehensive comparative analysis. Characteristics, and patterns of building permit processes vary widely across jurisdictions due to legal, cultural, technological, and institutional factors which makes a comparative analysis of these variations beneficial. To address the lack of building permit process studies, our research focusses on from an extensive comparative study of building permit processes in 17 European countries. Through semi-structured interviews and process diagrams, we investigate the differences and provide a comparative overview summarizing key characteristics. The findings have the potential to be used by policy makers and practice to better understand and compare the evolution of building permit systems in a broad international context. By bridging research gaps and providing a comprehensive view of these processes, we contribute to the awareness of the diversity of the processes and to fostering greater understanding of building permit processes.

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Building permit; process modelling; European countries; process comparison

Introduction

Building permit processes are crucial for urban development globally, setting rules and controlling the creation of our built environment. Goals and regulations for societal transitions are increasingly set by international bodies like the UN and EU (Kelemen, 2013; UN-Habitat, 2020), with digitalization driven by global technology providers. This presents a challenge for current building permit processes, necessitating their evolution to meet future demands. Moreover, despite global goals and drivers, building permit regulation remains local, conducted by local jurisdictions. Thus, the challenge lies in coherently translating global challenges to the local level.

Building permit processes stem from the historical developments of individual municipalities and jurisdictions. There is a need to evolve these local practices to better address current societal needs, particularly the global pressures for increased accountability, environmental regulation and improved service provision from a reduced skills base. This calls for a detailed understanding of existing processes to inform potential improvements. The starting point in process development efforts is understanding and describing the current situation to inform subsequent process development steps (e.g. Browning et al., 2006). The aim of this article is to assess current practices by

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examining processes in various European jurisdictions. This empirical evidence aims to describe how permit processes manifest as organizational business processes that connect different stakeholders. Our main contribution is empirical evidence of the current permit processes across Europe, providing a basis for further studies and inviting contributions from various disciplines. By highlighting the diversity of the current processes, the practical relevance of the article is to inform actors involved in the development of the building permit processes.

Building permit processes vary significantly across nations due to several factors including legal frameworks, cultural practices, technological capabilities, and institutional structures. Recognizing these divergent practices' implications necessitates a thorough comparative analysis to identify characteristics and patterns, ultimately aiding in improving these processes. The European Union has recently funded research on digitizing the building permit process as a way to potentially streamline the application and granting of building permits, combining efforts from multiple countries to facilitate mutual learning and avoid redundant efforts (ACCORD, 2024; CHEK, 2024; DigiChecks, 2024). However, countries have different needs based on their unique processes, making comparisons essential to uncover these needs. The same is true for construction companies. Comparing these processes is valuable for enabling construction contracts across different regions with varying regulations (Springer, 2018). Several researchers have explored building permit processes, emphasizing different approaches. Current knowledge encompasses planning (land-use impact and zoning) review, technical (building) approvals, and associated applications, with significant contributions from various sectors. However, these solutions remain isolated due to the complexity and numerous sub-topics involved. Recent interest in the subject has highlighted various use cases, emphasizing the need to reduce process complexity and detailed restrictions (Prusti, 2022; Sulonen & Vastamäki, 2022; Ullah et al., 2022). For instance, Sulonen and Vastamäki (2022) emphasize issues around process effectiveness, integrating regulatory changes, and promoting digitalization. These studies highlight the intricate nature of the system, but they often focus on individual countries or specific aspects, leaving a gap in a broad, comparative, and holistic understanding of each system.

The European Network of Digital Building Permits (EUnet4DBP) was established in 2020 with the aim to address this gap and develop a unified digitalized process for building permits. Process enhancement requires detailed investigation and comparison of current workflows. The literature underscores the need for detailed process investigation to support process evolution, possibly supported by comprehensive digital and automated tools. The research reveals a mismatch between efforts focused on process investigation and those targeting automation. To advance, it is essential to define which sub-processes can benefit from automation and the desirable level of automation for both individual sub-processes and the overall building permit process.

Through time, the building permit systems have therefore evolved to be increasingly complex. The top-level hierarchy of the building permit system is comprised of four concepts representing its subsystems, namely the legislative system, organizational system, technological system, and procedural system. The subsystems do not represent independent entities but are highly correlated to each other (Fauth et al., 2024).

This article focuses on the procedural system, and a qualitative approach is adopted to analyse and compare the key characteristics of the building permit process in 17 European countries. The aim is to enhance the understanding of building permit processes, guiding policy and practice towards more efficient and standardized procedures and laying a foundation for future studies on process evolution, digitalization and automation. To broaden the perspectives on the variability on how countries manage building permit processes, our research addresses two main research questions (RQ):

> RQ1: What are the sub-processes involved in current building permit processes in various European jurisdictions at a high-level, and
>
> RQ2: What patterns and characteristics can be identified through a comparative analysis of building permit processes in different European countries?

The subsequent sections detail the methodology adopted and the findings of the research. Finally, their implications for the future are discussed.

Existing building permit process comparisons in Europe and beyond

Over the past two decades, numerous investigations have been carried out to study building permit processes and their comparability. The analysis conducted by Meijer et al. (2002) examined eight European countries – namely the Netherlands, the UK, France, Germany, Sweden, Norway, Belgium, and Denmark. The analysis highlighted that while the countries shared similar legislative objectives, noteworthy variations were observed in structural arrangements and individual regulations.

However, the organizational intricacies of these processes were not extensively explored. The formulation of technical requirements in building codes, a subject of discussion over many decades, displayed substantial diversity across the countries, often encompassing qualitative stipulations subject to varying interpretations.

To develop an improved approach to building permitting, addressing identified issues (such as quality of constructions, and failure costs) and comparing situations (such as tasks and responsibilities, or technical contents of the regulations) across different countries is essential. Meijer and Visscher (2008) emphasize the need for tailored solutions to overcome specific challenges (e.g. improving both the effectiveness and the efficiency of procedures, streamlining regulatory procedures and introducing online facilities for acquiring information and applying for permits).

Considering the drive for a harmonized construction market within the EU, a study by Pedro et al. (2011) undertook a comparison of building permit procedures across the 27 EU nations. This involved surveying experts, scrutinizing legal documents, and structuring data into thematic tables. The study revealed a fundamental similarity in the basic building permit process among EU countries, punctuated by minor divergences in specific steps. They identified the following main steps: pre-consultation, possibility of phasing, submission demands, checks carried out and maximum procedure time for plan approval, possibility and timing to object to a building permit being issued, start of construction works, frequency and timing of site inspections, fees, and completion of construction work.

In a report by Rückert (2011), which compared Germany, Denmark, Poland, and Lithuania, similarities were identified among these countries, with divergences mainly manifesting in specific aspects. Notably, Germany's variations were attributed to its heterogeneous state building codes. The report advocated for standardization to augment transparency in building permit procedures.

The ByggNett study (Refvik et al., 2014), published by the Norwegian Construction Authority, examined practices in selected countries – including Norway, Denmark, Sweden, Finland, the UK, US (NYC), Singapore, Hong Kong, Korea, Japan, and Australia – with the goal of formulating a developmental strategy for an online collaboration platform within the construction industry. The study illuminated substantial disparities in the fundamental processes across the compared countries, including the degree of digitalization.

Another study analysed the permit acquisition process in Slovenia and Croatia, scrutinizing legal criteria, stage counts, and investor expenses using World Bank 'Doing Business' data (Jovanović et al., 2016). This investigation revealed both distinctions and parallels, along with associated pros and cons in the two contexts. The study unveiled a shared model stemming from typical procedural features in both countries, offering insights into potential enhancements for the existing building permit process. Findings underscored shortcomings and opportunities for improving construction permit procedures in both nations.

The 'Doing Business' (World Bank, 2019) report compiled data evaluating the easiness of business possibilities from 190 countries, including a subtopic of 'dealing with construction permits'. The data focuses on the entire process of obtaining a building permit for a simple warehouse, encompassing planning, submission, hiring external third-party supervisors, and inspections, all from the perspective of the applicant. The data also includes the duration and number of procedural steps. The results vary significantly. It is evident that the number of procedural steps does not necessarily correlate with the duration, emphasizing the importance of considering the interaction between these components. The review process within each jurisdiction is briefly summarized.

Noardo et al. (2020) conducted an initial exploration of building permit process in the United Kingdom, Netherlands, Sweden and Slovenia with the purpose of unifying them and outlining a process for building permit issuance that integrates Building Information Modelling (BIM) and GeoBIM (Geographic Information Modelling). The first phase of the research involved investigating current procedures to understand the shortcomings and needs of end-users by submitting questionnaires to project participants. Based on current workflows, a high-level common linear workflow is outlined.

Fauth and Soibelman (2022) considered the current processes in Germany and the US and developed a framework to compare them with each other and lay the foundation for process standardization in an international context. Based on the comparison, several lessons-learned were derived.

The Consortium of European Building Control (CEBC 2023 reports on 'Building Control E-delivery' (Marshall et al., 2023) including the results of a substantive (70 question) questionnaire, with input from many EU countries and including the UK and Turkey. The summary remarks 'Most European countries made significant and ambitious steps forward towards creating user-friendly electronic services, adopting building control digital tools, or even starting innovative BIM related projects.'

In literature studies, the complexity of current processes is acknowledged, necessitating the standardization of procedures to ensure a more efficient and transparent workflow (Meijer et al., 2002; Pedro et al., 2011). Other studies have developed research approaches for process comparison however, considering a small number of processes (Fauth & Soibelman, 2022; Jovanović et al., 2016; Noardo et al., 2020). These studies have revealed potentials that nevertheless need to be investigated and applied for a larger sample of processes. Other studies consider a larger sample (Marshall et al., 2023; Pedro et al., 2011) however, considering circumscribed and not deeply investigated use cases and for partial stages of the process, often basing research on data not prepared for comparative analysis in a systematic way.

The academic literature demonstrates that most international comparative studies on building permit processes often remain at a superficial, high-level overview. Although prior research has made a substantial contribution to the investigation of building permit processes, it often tends to concentrate on individual nations or specific aspects, thereby creating a gap in comprehensive comparative analysis. Furthermore, the literature fails to address the critical dimensions of delineating the responsibilities and roles of stakeholders within the process. Only through direct dialogue and active collaboration with such stakeholders can accurate and contextual data be obtained, which can guide the development of new, more effective strategies and processes in the field of building permits.

Methodology

This article focuses on the procedural subsystem of the building permit process (as shown in Figure 1), and a qualitative approach is adopted to analyse and compare the key characteristics of the building permit process in 17 European countries. The aim is to provide an as representative picture as possible of the management of the building permit process at European level. To be able to perform a comprehensive comparison, the methodology of this study is separated into three steps: (1) data collection (including semi-structured interviews), (2) data analysis (including Business Process Modelling and Notation (BPMN) maps creation, workshop, and comparison), and (3) expert validation. The steps are illustrated in Figure 2 and detailed in the following subsections. Due to the qualitative nature of this study, we followed the TACT (Trustworthiness, Auditability, Credibility, and Transferability) framework to ensure rigour in qualitative research (Daniel, 2019). The TACT framework emphasizes demonstrating these qualities during both data collection and analysis phases. Each aspect of TACT is addressed using a checklist designed to ensure that our study can adequately answer questions related to these concepts. For example, questions such as 'Is the research problem framed within the context of related literature?' and 'Is the research problem clearly described?' were included. As an example, the first question is answered by employing appropriate methods for collecting literature and identifying and assessing methods used to determine if the literature is dependable in framing our research, as discussed in our introduction.

Step 1 – data collection

The data collection phase of this study used semi-structured qualitative interviews with experts. Semi-structured interviews are characterized by their use of open-ended questions within a broad framework of topics to be explored. This format is less rigid than structured interviews, allowing the interviewee to discuss their experiences and perspectives in their own words and at their own pace, yet providing enough

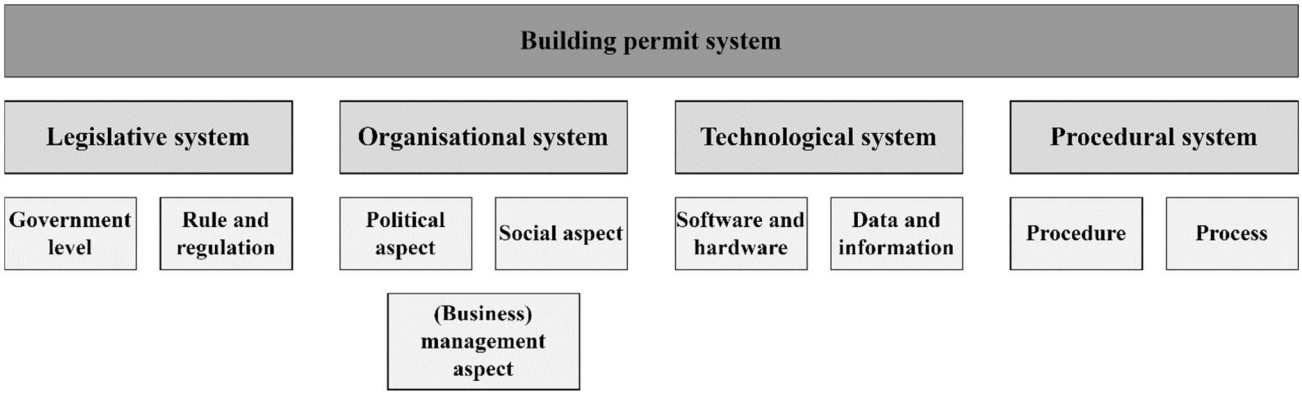

Figure 1. Overview of the building permit system, subsystems and categories.

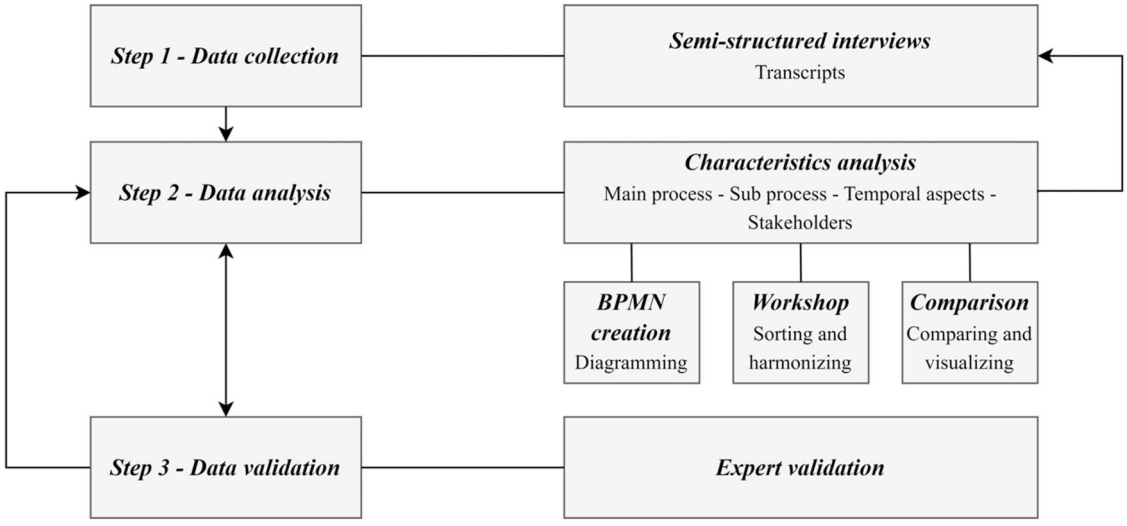

Figure 2. Research methodology.

structure to ensure critical areas of interest are covered (Kvale & Brinkmann, 2014).

These primary data sources offer first-hand insights into the intricacies of each country's building permit system. For this study, an interview guideline was developed, based on previous work by Fauth & Soibelman, 2022. The interview guideline included a range of topics related to the building permit process, such as the sequence of actions, involved parties, decision points, and potential exceptions. The focus of the interview questions laid on the review within the authority after the submission of the building application. The interview guideline was introduced to each interviewer thoroughly in a meeting to discuss the open questions, avoid misunderstandings, and find common understanding. However, room for participants to share related experiences, thoughts, and observations was also left, allowing unexpected but potentially valuable insights to emerge.

Semi-structured interviews were conducted with public officials normally involved in the building permit process in each of the 17 studied countries (Austria, Belgium, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Italy, Montenegro, North Macedonia, Portugal, Romania, Slovenia, Sweden, United Kingdom). The number of countries included in the study is the result of the research group efforts to achieve sufficient spatial distribution of the countries as well as the distribution across different underlying legal systems, especially Civil law and Common law, which have fundamental influence on many administrative systems, including building permitting. We also aimed to include the countries outside European Union (UK, Montenegro, North Macedonia). All interviewees were employed, performing building permits daily in either a municipality or county with a population size between 50,000 and 500,000 inhabitants, or, where applicable, a national building permit authority. The interviews were held in the respective native language by the authors and contributors. This means that 17 different interviewers conducted 17 interviews in 16 different languages (the German language was used twice – in Germany and Austria) in 17 countries between June 2022 and April 2023. Ethical approval was obtained from all participants in line with the guidance of the authors' universities. *n* total, about 16 h audio records were collected, transcribed, and translated into English for further analysis.

It needs to be emphasized that the focus of the interviews was on the review of the building permit authority from submission to the issuance of the notification letter. Furthermore, the answers are based on the interview data. There may be differences between municipalities, counties, or other entities. In addition, the interviewee was asked to refer to a five-storey apartment block as a fictive example when it came to multiple possibilities.

Step 2 – data analysis

The data analysis of the study is subdivided in three subparts: BPMN diagram creation, workshop, and comparison.

BPMN 2.0 diagrams creation

BPMN (ISO/IEC 19510:2013) diagrams were adopted as a modelling language to analyse how the building permit process is managed in each country and to ensure consistency in this comparative analysis. BPMN is a globally accepted standard for the graphical

representation of business processes, actors and information flows. BPMN was developed by the Business Process Management Initiative (BPMI) and is currently maintained by the Object Management Group (OMG) (Object Management Group, 2011). Many researchers have employed the standard in the construction industry domain (e.g. Awad et al., 2013; Häußler et al., 2021; Holzmüller-Laue et al., 2014) and is a widely accepted tool for expressing processes involving multiple actors.

Workshop

A workshop was conducted to comprehensively review, evaluate, and identify the common characteristics in the building permit process. The workshop, which was attended by 13 authors, focussed on scrutinizing the BPMN diagrams developed on the basis of the data collected by means of the semi-structured interviews. The workshop was structured to last for two hours and created to facilitate collaborative discussion, critical analysis, and iterative refinement of the process steps identified (Ørngreen et al., 2017). The workshop was conducted online with a real-time collaboration board where each participant was present together. The initial versions of the building permit process maps were presented to review. Each characteristic was discussed in detail.

Affinity diagramming was used as a coding process to organize and analyse the wealth of information, and insights gathered during the workshop. This technique enabled the grouping and the categorization of the data into themes and sub-themes, which facilitated a more accurate understanding and interpretation of the contributions of the experts (Liu & Eagan, 2021). Following affinity diagramming, the categorized data were thoroughly analysed to identify insights and patterns. This iterative process ensured the accuracy, comprehensiveness, and reliability of the findings.

Comparison

An essential part of the analysis was to provide a common notation that could be easily understood by all stakeholders involved in a process, from the analysts who create the initial drafts of the process maps to the technical developers responsible for implementing the technology that will run those processes and, finally, to the users who will manage and monitor them. For better readability, it was decided to visualize the results in tabular form.

Terms and terminology from the BPMN diagrams of each mapped process were extracted systematically, as well as from the interview transcriptions. Similar terms with shared meanings were identified and categorized. The next step involved the merging of these identified terms into a unified set of terms. This consolidation played a critical role in the methodology, as it allowed for the creation of systematic and consistent tables, which served as the basis for the analysis. These tables represented both the main and sub-processes of the building permit issuing process, providing a clear and comparative view across the diverse set of European countries under study. To ensure the accuracy and validity of the data within these tables, a rigourous data verification process was implemented. This process included cross-referencing the information in the tables with the original interview transcripts.

Step 3 – data validation

The validation procedure included multiple iterations of all countries and characteristics. This step ensured that the results accurately represented the characteristics of the building permit process and that any discrepancies or ambiguities were addressed, resolved, and formalized.

The expertise of the interviewers who conducted the interviews was sought due to their familiarity with the data and knowledge of the country. Their input and validation played a crucial role in assuring the accuracy and reliability of the data presented in the tables. This also means that the information presented in the tables goes beyond the data collected, which may be due to various reasons (e.g. information that was not discussed in the interview). Given the involvement of 17 interviewers, it became evident that certain details or definitions varied significantly between countries. As a result, additional data collection was required in some cases, necessitating consultations with other experts and desk research to ensure a comprehensive understanding. In some instances, re-consultation was necessary due to the unavailability of the original interviewees, which led the authors to seek information from other sources, including additional public officials. For example, in many countries, inspections are not considered part of the initial building permit review process and were often omitted during initial interviews. During data analysis, it became evident that supplementary information was needed to complete the dataset.

The distinction between the interviewers, interviewees, and other country experts lies in their respective roles and expertise. The interviewers and authors are primarily researchers or individuals affiliated with research-oriented organizations focused on building permit topics, while the interviewees and other country experts are actively engaged in the building permit process from a technical perspective on a daily basis.

The later revisions aim to ensure consistent levels of detail in the materials. We established a required

minimum level of detail to enable process comparisons, which we could not have set before conducting interviews because it would have required pre-listing processes, undermining the purpose. However, with the validation step, we could legitimately establish such criteria. For example, in the UK we had not discussed the planning/zoning process in the initial scrutiny because other processes and consultations seemed more salient. In comparison with other processes, it was an obvious omission. Checking that a process occurs or, more specifically, checking that it does not occur, is sensible for comparability.

In summary, the methodology for comparing the results from the 17 European countries analysed included the merging of terms, the creation of process maps and summary tables for each country, and a thorough and iterative process of data verification. These steps were essential to provide a comprehensive and accurate picture of building permit processes in 17 European countries, with the aim of providing high quality, reliable results in this research.

Results

By bringing together the qualitative data from the semi-structured interviews, the BPMN-compliant process maps and relevant summary tables for each country, in addition to expert knowledge for validation, we were able to identify a set of key characteristics to be examined for the building permit processes as found in each of the analysed countries. These characteristics include:

- main processes and sub-process steps;
- temporal aspects (when a process step takes place);
- actors' information (stakeholders refers to all actors and roles in the building permit process).

The results are encapsulated in Tables 1–5 and described below.

In Table 1, the identified building permit process steps are classified and defined. A side-by-side comparison of the various characteristics of each nation's building permit process is then provided based on the findings obtained from data analysis (Tables 2–5). In Tables 2, 3, 5, the cells are marked with Y (when a process is applied in the respective country), with N (when a process is not applied in the respective country), with O (when the process is an optional step in the respective country or if the step is demanded in specific circumstances), or is blank (when the interview data does not allow a statement to be made). The countries are listed alphabetically and numbered from 1 to 17.

Classification of the process steps

During data analysis, we classified the process steps extracted from the interview data and mapped into the BPMN-based process maps. For better readability, in this article it was decided to base the comparison of the mapped processes in each country on a level of analysis that did not go into the details of each individual procedure. A pre-phase, a review phase and a post-phase were identified for each country. Moreover, we differentiate main processes (level 1) based on the previously referenced taxonomy (Fauth et al., 2024) (e.g. pre consultation, submission, administrative check, assignment to a 'plan checker', participation of other agencies, participation of public, content check, issuing notification letter, inspection) and one level below (level 2). That means, according to the taxonomy, sub-processes were assigned to main processes. Table 1 shows the extracted process steps, their classification, and definition.

The aim for our study is not to present specific details of the processes, but rather present an overview of the processes derived from each of our instances. At this stage, we needed to combine different process steps mainly due to terminology (e.g. different naming, but the same process). Examples are 'register completeness' and 'registration of application' are combined; 'clerk' was combined with 'instructor', 'technical/instructor', and 'coordinator'; and 'completeness check' and 'preliminary review' were combined. Furthermore, we excluded level 3 process steps which are sub-process steps assignable to level 2 process steps. Examples for level 3 processes are: 'collection of address', 'signing procedure', or 'changing status'. Including the level 3 process steps would have exhausted our frame and the ability to visualize. We omit any irregular cases for example, when the compliance is not met at any point.

Comparing the main processes

Table 2 represents the main processes (level 1). We can clearly see that the most diversity exists in Pre consultation, Participation of the public, and Inspection. Pre consultation is an optional step for 10 countries. In 5 countries, no pre consultation takes place. Inspection from the building permit authority does not apply in 2 countries (Estonia and North Macedonia). For 4 countries, inspections are optional (Czech Republic, France, Germany, and Denmark). In Sweden, inspection is done by the building permit authority, but it is a somewhat different process handled by a building inspector. First, a building permit officer handles the building permit; when the permit is issued, the building inspector

Table 1. Classification and definition of the identified process steps.

Phases	*Processes*	*Definition*
Pre Phase	Pre consultation	*Giving advice by the building control authority before an application is submitted*
Review Phase	Submission	*The submission of a building application where different conditions and requirements needs to be considered.*
	Confirmation of receival of application	*The receipt of the building application is confirmed.*
	Administrative check	*An administrative process comprising confirmation of receipt, registration, and checking of the completeness of the submission.*
	Preliminary review	*Review of the submitted documents including completeness check of documents, and information required.*
	Registration of application	*Registering of the building application.*
	Check/request payment of taxes and fees	*Request for payment (this process can also occur in the issuance of the notification letter)*
	Assignment (to plan checker)	*Passing on an operation or content review.*
	Participation of other agencies	*Participation of other involved agencies, local authorities and any specialist authorities (for ancillary construction law), utility companies, and other experts.*
	Public agencies participation	*Involvement of public agencies outside the building permit authority and outside the municipality (e.g., agencies on national level).*
	Private agencies participation	*Involvement of public agencies (e.g., utility supplier, private consultants and experts for technical reports)*
	Internal referral department participation	*Involvement of departments in the same municipality/county/others as the building permit authority.*
	Involvement of review board	*Involvement of specific or specialized boards to give statements (e.g., design or heritage review).*
	Participation of public	*Participation of interested or concerned people that is essential for promoting transparency, inclusivity, and informed decision-making*
	Neighbour participation	*Participation of the affected neighbors (e.g., neighbors sharing a border, affected by emissions).*
	Public inquiry	*Participation of the entire public (e.g., announcement, hearing).*
	Content check	*The examination of the submission against substantive planning and building law*
	Planning/zoning review	*Examination against planning and zoning requirements*
	Building/ technical review	*Examination against building and technical requirements*
	Committee meeting	*A committee reviews the application and is responsible for the final decision*
	Internal discussion	*Consultations within the building permit authorities (on demand, on periodical basis, etc.) with colleagues or supervisors*
	Issuing notification letter	*The issuance of the decision as to whether a project is eligible for a building permit or license to occupy and any possible enforcement action.*
	Completing documentation	*Complete the case file with all necessary information and decisions (including conditions)*
	Request further documentation	*Request further information needed for the issuance of the letter*
	Issuance of construction certificate	*Issuance of a separate approval to start the construction work*
Post Phase	Inspection	*Checks on the building in construction and/or use for compliance to the legal regulations and/or the building design as submitted (can be differentiated in inspection supervision (legal aspects) and engineering supervision (engineering standards)*

Legend

	Main processes (level 1) [Fauth et al. 2023]
	Subprocesses (level 2)

takes over and handles the starting clearance (required before the construction can start) and inspections during and after the construction. In Estonia, inspection is performed during the certification of occupancy. Therefore, it is not part of the building permit process.

Comparing the sub-processes

The more detailed (second level) process steps are presented in Table 2. Here, we see even more diversity among the sub-process steps, especially within the participation of other agencies, participation of public, content check, and issuing of the notification letter. In all countries (except Austria and Romania) public agencies are involved in the process. The involvement of private agencies is optional in Denmark, the UK, Belgium, Sweden, and Finland, and does not appear in the Czech Republic, North Macedonia, and Romania and Slovenia. Private agencies are involved in the remaining 8 countries. In 10 countries, a review board is involved (see also Table 5 description). The most diversity can be seen in the participation of public, differentiating between the involvement of neighbours and/or public nearly each possibility is observed. Also, combinations, or total

Table 2. Comparison of the main process steps.

Main process steps from taxonomy (level 1)		*Austria*	*Belgium*	*Czech Republic*	*Denmark*	*Estonia*	*Finland*	*France*	*Germany*	*Hungary*	*Italy*	*Montenegro*	*North Macedonia*	*Portugal*	*Romania*	*Slovenia*	*Sweden*	*United Kingdom*
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Pre consultation	A	O	O	O	O	N	Y	O	O	O	O	N	N	O	Y	N	O	N
Submission	B	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Administrative check	C	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Assignment to plan checker	D	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Participation of other agencies	E	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Participation of public	F	Y	Y	Y	Y	Y	Y	N	O	Y	O	N	Y	N	Y	Y	Y	Y
Content check	G	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Issuing notification letter	H	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Inspection	I	Y	Y	O	O	N	Y	O	O	Y	Y	Y	N	Y	Y	Y	Y	Y

Legend

Y	*YES*
N	*NO*
O	*Optional/ depending on specific*

exclusions are possible. The case is not considered here where neighbours or the public can submit an objection after the permit is granted or the building is built. We see in the content check that a committee is involved in the decision making only in 6 countries plus 3 optional cases. Usually, the committees refer to city councils or similar entities. It appears that a differentiation between the involvement of a review board and other agencies is sometimes hard to apply as it can be a mixed version. In France for example, only for special buildings (such as high-rise buildings and buildings open to the public) are considered by a safety and accessibility committee.

Interestingly, while in all countries planning review is happening, the technical review of the building does not apply in Denmark and Slovenia and is optional in France. In France, the technical review depends on the type of building and is only done for specific building types (such as high-rise buildings and buildings open to the public) and only for fire safety and accessibility rules. The composition of sub-processes for issuing the notification letter varies in terms of the request of additional documents and information related to the notification letter. The issuance of a construction certificate allowing the start of construction as a kind of sub approval or part of the building permit is documented for Hungary, Italy, Romania, Slovenia, and UK. We observe a special case in Sweden, where a starting clearance is required before the construction can start, but this is issued as part of a technical consultation; this is performed by a building inspector, after the building permit is issued, and considered as a separate process by the building permit officer. The absence of issuance of a construction clearance for the other countries does not mean that the start of the construction needs to be announced by the contractor or the applicant. Furthermore, the payment is very diversely managed. This sub-step can happen at the beginning or at the end, even after the permit is issued. In some countries, the review does not start before a fee, or an advance payment is paid. In other countries, the issuance of the notification letter includes an invoice to be paid after the review is finished.

Comparing temporal aspects within the main processes

Tables 1–3 present the process steps without considering the temporal aspect. Hence, we present the actual order in which the steps are performed in Table 4. We can see the Slovenian case as an outlier as the participation of public and participation of other agencies takes place before the submission of the application and therefore rests with the applicant. In Montenegro, the participation of other agencies also takes place before the submission. In some countries, process steps happen in parallel, such as the content check and the participation of other agencies in Germany. It is logical that the administrative check follows closely after the submission, even it is repeated in some countries during the process (e.g. Denmark). The repetition of the content check usually refers to where the planning/zoning check and technical check is separated from each other, as in Sweden. We see that UK has a distinctive review process, due to the complete separation of the planning review and technical review which are performed in completely different and independent

Table 3. Comparison of the sub-process steps.

Main process steps from taxonomy (level 1)	Sub processes (level 2)		Austria	Belgium	Czech Republic	Denmark	Estonia	Finland	France	Germany	Hungary	Italy	Montenegro	North Macedonia	Portugal	Romania	Slovenia	Sweden	United Kingdom
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Pre consultation		A	O	O	O	O	N	Y	O	O	O	O	N	N	O	Y	N	O	N
Submission		B	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Confirmation of recieval of application	C	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Administrative check		D	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Preliminary review	E	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y
	Check/ request for payment of taxes and fees (process can also occur in the administrative check)	F	Y	N	Y	N	Y	Y	N	N	Y	Y	Y	Y	Y	Y	Y	N	N
	Registration of application	G	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Assignment to plan checker		H	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Participation of other agencies		I	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Public agencies' participation	J	N	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y
	Private agencies' participation	K	Y	O	N	O	Y	O	Y	Y	Y	Y	Y	N	Y	N	N	O	O
	Internal referral department participation	L	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y
	Involvement of review board	M	Y	O	Y	Y	Y	Y	N	N	Y	Y	N	Y	N	N	N	Y	Y
Participation of public		N	Y	Y	Y	Y	Y	Y	N	O	Y	O	N	Y	N	Y	Y	Y	Y
	Neighbor participation	O	Y	N	Y	Y	Y	Y	N	O	Y	O	N	Y	N	Y	Y	Y	Y
	Public inquiry	P	N	Y	N	O	Y	N	N	O	N	O	N	N	N	Y	O	N	Y
Content check		Q	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Planning/ zoning review	R	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Building/ technical review	S	Y	Y	Y	N	Y	Y	O	Y	Y	Y	Y	Y	Y	Y	N	Y	Y
	Committee meeting	T	Y	Y	N	O	Y	Y	N	N	O	N	N	N	N	Y	N	O	Y
	Internal discussion	U	N	Y	Y	O	O	Y	Y	Y	N	Y	N	N	N	Y	Y	Y	Y
Issuing notification letter		V	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Completing documentation	W	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Request further documentation	X	Y	O	Y	Y	N	O	Y	Y	Y	N	Y	N	Y	Y	Y	Y	N
	Issuance of construction certificate	Y	N	N	N	N	N	N	N	N	Y	Y	N	N	Y	Y	Y	N	Y
Inspection		Z	Y	Y	O	O	N	Y	O	O	Y	Y	Y	N	Y	Y	Y	Y	Y

Legend

Y	*YES*
N	*NO*
O	*Optional/ depending on specific*

Table 4. Comparison of the temporal aspect of the main process steps.

No.	Country	Pre phase	Review phase							Post phase	
1	*Austria*		S	AC	AS	CC	POA	POP	INL	INS	
2	*Belgium*	PC	S	AC	CC	POP	POA	CC	INL	INS	
3	*Czech Republic*		S	AC	AS	POA	CC	INL	CC	INL	CO
						POP					
4	*Denmark*		S	AS	AC	POP	AC	CC	POA	INL	CO
5	*Estonia*		S	AC	AS	POA	POP	CC	INL		
6	*Finland*	PC	S	AC	CC	POP	POA	INL	INS		
7	*France*		S	AS	AC	CC	INL				
						POA					
8	*Germany*		S	AC	AS	CC	INL				
						POA					
9	*Hungary*	PC	S	AS	AC	INL	CC	POA	INS	CO	INL
10	*Italy*		S	AS	AC	CC	POA	CC	INL	INS	
11	*Montenegro*	POA	S	AC	AS	CC	INL	INS			
12	*North Macedonia*		S	AS	AC	POA	CC	POP	INL	CO	
13	*Portugal*	PC	S	AC	POA	CC	AS	CC	INL	INS	CO
14	*Romania*	PC	S	AC	AS	POP	CC	INL	INS		
15	*Slovenia*	POP	S	AC	AS	CC	INL	INS			
		POA									
16	*Sweden*	PC	S	AC	CC	POA	CC	INL	INS		
				AS		POP					
17	*United Kingdom (technical)*		S	AS	AC	CC	INL	INS	INL		
17a	*United Kingdom (zoning)*		S	AS	AC	POP	CC	POA	INL		

Legend

PC	*Pre consultation*
S	*Submission*
AC	*Administrative check*
AS	*Assignment*
POA	*Participation of other agencies*
POP	*Participation of public*
CC	*Content check*
INL	*Issuing notification letter*
INS	*Inspection*
CO	*Completion/ occupancy permit*

Table 5. Comparison of involved stakeholders in the building permit process.

Stakeholders	Sub entities		Austria	Belgium	Czech Republic	Denmark	Estonia	Finland	France	Germany	Hungary	Italy	Montenegro	North Macedonia	Portugal	Romania	Slovenia	Sweden	United Kingdom
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Building Permit Authority		A	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Plan checker (technical)	B	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Urban planning checker	C	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	
	Clerk (adm. Role in charge)	D	Y	N	Y	N	Y	Y	N	Y	Y	N	Y	Y	Y	N	N	N	
	Commitee	E	Y		N		Y	Y		N	Y	Y	N	N	N	Y		O	Y
External Experts		F	Y	N	Y	Y	Y	Y		Y	Y	Y	Y	Y	Y	Y		Y	Y
	Structural	G	Y	N	Y	Y	N	Y		O	Y	Y	Y	Y	N	Y		Y	
	Landscape architect	H	N	N	Y		Y	Y	Y	O	N		N	N	N	Y		Y	
	Architecture/design	I	Y	Y	Y		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	Sewerage/ sanitary	J	Y	N	Y	Y	Y	Y		Y	Y		Y	Y	N	Y		Y	Y
	Engineer	K	Y	N	Y	Y	Y	Y		O	Y	Y	Y	Y	N	Y		Y	
Neighbors		L	Y	Y	Y	Y	Y	Y	N	O	Y	N	N	Y	N	Y	O	Y	N
Public		M	Y	Y	Y		Y	Y		O	Y		N	N	N		Y	Y	Y
Boards		N	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	O	N	N	Y	Y	Y	Y
	Rescue Board/ Health board	O	Y	N	Y	Y	Y	Y		N	Y		O	N	N	Y		Y	Y
	Board of town hall	P	N	Y	N	Y	Y	N	N	N	Y	Y	N	N	N	N		N	
	Planning appeals board	Q	N	Y	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N	
	National board of antiquities	R	N	Y	Y	N	Y	Y	Y		Y		N	N	N	N	Y	O	
Authorities & departments		S	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	City government	T	Y	Y	Y	Y	Y	Y	Y	O	Y	Y	N	Y	Y	Y	Y	O	Y
	State road office	U	N		N	N	N	N		O	Y		N	N	N	N	Y	O	Y
	Road construction authority	V	Y	Y	Y	Y	Y	Y		O	Y		N	N	N	N	Y	O	
	Nature conservation authority	W	Y	Y	Y	Y	Y	Y		O	Y		N	N	N	N	Y	O	Y
	Consumer protection authority	X	Y	N	N		Y	N		O	Y	Y	N	N	N	N		N	
	Technical Regulatory Authority	Y	Y	Y	Y	Y	Y	Y	Y	O	Y	Y	N	Y	N	Y		O	
	Agriculture department	z	Y	Y	N	Y	N	N	Y	O	N		N	N	N	Y	Y	O	
	National board of antiquities	Z	N	Y	Y	N	Y	Y	Y	O	Y		N	N	N	N	Y	O	

Legend

Y	YES
N	NO
O	Optional/ depending on specific circumstances
	Not available

departments within the local government organization. Usually, the planning and technical reviews are performed one after the other, Aspects of the technical review can be outsourced to private companies. We also observe the importance of the phase after technical assessment which includes several inspections of the construction culminating in the issuing of a certificate. Furthermore, it can be observed that in a few countries (France, Germany, Hungary, Italy, Montenegro, Portugal) public participation in this process is not foreseen or it is only optional (see also Table 3).

Comparing actors' information along the processes

Table 5 represents the identified stakeholders in the building permit review process. We compared which stakeholders that appear in which countries based on the created BPMN diagrams and classified them. Some stakeholders where grouped such as health board, rescue board, environmental board, antiquities board. The list of stakeholders is not complete. Very often, the involved stakeholders depend on the project and its circumstances, although in some countries or municipalities there is a fixed set of participants independent of the project. We also observed that in some building permit authorities the planning check is performed by another person than the technical check. In some cases, the planning check is performed by another department.

All stakeholders refer to the main processes: participation of other involved agencies and participation of public (Table 2 and 3).

Secondary findings and patterns

This section discusses secondary findings observed from the interviews and the comparisons but not illustratable within the previous presented tables.

Definition of building permits

Based on the collected data and the validation process, we can generalize several observations. One finding is that the building permit has different definitions. For some countries, the building permit is finished after the document review within the authority. But in some countries, the post phase (inspection) cannot be separated from the building permit as it represents a kind of subsidiary approval. That means that all subsidiary approvals together (planning and technical, construction clearance, occupancy) are seen as the building permit. The definition of what constitutes a 'building permit' varies significantly, impacting the overall process duration and complexity. In countries where the building permit includes multiple sub-approvals (e.g. construction clearance, occupancy permit), the process is inherently more complex but may offer more comprehensive oversight. In contrast, countries with a more streamlined approach tend to have faster processing times but may encounter issues with post-approval compliance. These structural differences underscore the impact of legal, cultural, and institutional contexts on the efficiency and effectiveness of building permit processes.

In addition, the handling of the pre and post phase processes differ in the manner of integration, responsibilities, and priorities. That means that interconnection between roles and departments works better than for others, and for that reason seen if a process step belongs to the building permit definition or not. For example, the UK separate the planning permit and the building permit completely but pay a lot of attention to the post phase such as inspections and additional approvals for higher risk buildings.

Pre consultation as a streamlining instrument

The role of pre-consultation and public participation varies significantly across the studied countries. The preliminary phase processes play an important part in the Finnish building permit process. The Finnish permit process relies heavily on pre-negotiations during the feasibility study or early design phase of a construction project. This extensive pre-consultation during the feasibility study phase potentially helps in identifying and mitigating potential issues early in the process. This proactive approach can streamline the subsequent review phases and reduce the likelihood of major revisions later. In contrast, countries where pre-consultation is optional or not practiced at all, such as in Romania and North Macedonia, might face delays during the formal review phase due to unresolved issues surfacing at a later stage. In Finland, also permit documentation can be submitted to the permitting e-service even at a draft stage to be used at the pre-negotiations. There are both planning related and technical negotiations between the applicant and the permit control administration. The rationale behind the pre-negotiations is to ensure the smooth handling of the project and to avoid critical issues later in the process. This highlights the dual role of the building control: the consultative role where providing information is a key task, and the inspecting role where compliance with requirements is checked.

Variety of responsibility of different stakeholders

In some countries the building permit process cannot be limited to the review process performed in the building permit authority (which was the focus of our interview guideline). In some cases, review processes are performed by third parties, and public officials only take note of the submission of the review certification at the building permit application stage. However, the responsibility for this review remains with the applicant or with specialized external validating bodies (e.g. structural analysis), as illustrated in Table 5.

Regarding patterns on a geographical manner, the issuance of a construction certificate is mostly observed in Eastern Europe countries and in the UK. The temporal aspects of building permit processes in Slovenia and Montenegro appear nearly identical, likely due to their shared historical background.

Discussion

The aim of this study was to understand the sub-processes involved in building permit processes across various European countries to identify patterns and characteristics through a comparative analysis of these processes. The findings address the two primary research questions: RQ1: What are the sub-processes involved within current building permit processes in various European jurisdictions at a high-level, and RQ2: What patterns and characteristics can be identified through a comparative analysis of building permit processes in different European countries? To answer the RQ's, the main contribution of this study is the successful integration of all country building permit systems into a comprehensive and detailed comparative framework. In this section, findings are discussed in the light of the research questions and referring to each of the tables presented in the results. Further, the broader sample and the methodology are discussed as well as the study's limitations and potential future work based on the results.

Comparison of the main process steps (Table 2)

The comparison of the main process steps across countries underscores the diversity in how building permits are managed, particularly in pre-consultation, public participation, and inspection. On the other hand, the comparison also underscores the similarities of the systems in a majority of the processes meaning that on a high level, the building permit systems are comparable. The optional nature of pre-consultation in most countries and the varying roles of inspections illustrate different approaches to managing risk and public engagement. These differences might reflect cultural and legal variations, which can affect the efficiency and transparency of the permitting process. The findings suggest that while some countries prioritize early engagement to streamline later stages, others focus on post-approval oversight, which could influence the overall project timeline and regulatory compliance.

Comparison of sub-process steps (Table 3)

The analysis of sub-processes shows even greater diversity, particularly in the involvement of public agencies, content checks, and the issuing of notification letters. The optional involvement of private agencies in some countries and the variability in public participation mechanisms indicate a complex landscape where procedural flexibility is both a strength and a challenge. The diversity in content checks, especially the involvement of committees in decision-making, suggests that the robustness of the permit review process varies significantly. This highlights the potential for improving procedural clarity and consistency, particularly in how planning and technical reviews are integrated into the overall process.

Comparison of temporal aspects of main process steps (Table 4)

The temporal aspects of building permit processes reveal that the sequence and timing of steps can differ substantially between countries. For instance, the Slovenian and Montenegrin processes begin with public and agency participation before the formal submission, contrasting with other countries where these steps occur later. This variation affects not only the duration of the process but also the level of stakeholder engagement. Countries that separate planning and technical reviews, such as the UK, may experience more segmented processes that could either streamline or complicate permit issuance depending on the effectiveness of communication between departments. The temporal differences call for a closer examination of how process sequencing impacts overall efficiency and compliance.

Comparison of involved stakeholders in the building permit process (Table 5)

The study finds that the role and composition of committees, boards, and agencies involved in the process vary widely, reflecting different national priorities and administrative structures. For instance, the necessity and composition of review boards differ, which can influence the decision-making process's robustness and transparency. The findings suggest a need for further investigation into the roles and responsibilities of these stakeholders to better understand their impact on the permit process's effectiveness and to identify opportunities for optimization.

Methodological discussion and broader sample representation

This research distinguishes itself from the existing literature by providing a more comprehensive analysis of the building permit process. While the academic literature indicates that most international comparative studies on building permit processes remain at a superficial, high-level overview, this investigation delves deeper into several key aspects, thereby addressing these gaps. Firstly, a broader sample was included compared to previous studies, which often focus on a limited number of processes or on specific, narrowly defined use cases (Fauth & Soibelman, 2022; Jovanović et al., 2016; Marshall et al., 2023; Noardo et al., 2020; Pedro et al., 2011). This broader approach enables to obtain a more comprehensive and diverse representation of European practices. Secondly, the study provided a systematic representation of the building permit process based on data collection prepared in a comparable manner and actively involving experienced process stakeholders, following a principle of the TACT framework (Daniel, 2019), in both data collection and data validation. This methodological rigour overcomes the limitations of many prior studies that relied on data not prepared for systematic comparative analysis. In order to ensure homogeneity in the comparison of processes at the European level, the data in this article pertain to municipalities across Europe with approximately the same population size (i.e. from 50.000 to 500.000 inhabitants), encompassing a total of 17 European nations.

The data analysis has revealed not only the procedural aspects of the building permit process, but also temporal considerations and the stakeholders

involved along with their corresponding activities in the mapped workflow. The existing literature often fails to delineate the responsibilities and roles of stakeholders, thereby limiting the ability to design and implement process evolution that is accepted and supported by all involved parties. The mapping of actors, relationships, and responsibilities within the building permit process can potentially inform the design of more effective regulatory frameworks. By clearly delineating the roles and interactions of various stakeholders, policymakers can identify bottlenecks and areas where accountability may be lacking. This can lead to the creation of more robust regulatory structures that ensure greater oversight and responsibility distribution.

Limitation of the study

A qualitative research method was adopted in this study. Semi-structured interviews formed the foundation for the data collection process and the TACT framework assisted in securing procedures for ensuring rigour in our data collection and analysis. Often attempts to ensure rigour happens implicitly in research, but the framework assisted by providing concrete procedures for this study to follow. Moreover, the semi-structured interview methodology allowed participants to freely express their experiences while still adhering to the primary research objectives. The challenge of some interviewees being hard to channel only underscores the importance of the semi-structured approach. It allowed for flexibility in data acquisition while providing a structured framework. The provision of unsolicited feedback can be credited to the open-ended nature of some of the interview questions. While not specifically targeting problems or suggestions, the design of our interviews created an environment where respondents felt comfortable delving into these topics. However, the interviews, although extensive, may reflect subjective interpretations of the processes by the interviewees, potentially leading to variations in data quality and completeness across different regions. We believe that this kind of qualitative research was necessary for further understanding of building permit processes in Europe and their alignment. The knowledge gained helps to interpret any future studies more accurately.

Furthermore, we were challenged by the wide range of languages in Europe resulting in the need for translation. With the translation, the issue of common terminology occurred and underlined the demand of a shared and consistent knowledge used in a cross-sectoral and multidisciplinary manner. It is important to note that terms for similar processes may vary and not align directly with their translated counterparts. The grouping and clustering of similar aspects for analysis may have led to an oversimplification of certain nuanced differences between countries. Moreover, while BPMN diagrams provide a structured representation of processes, they might not capture all the subtleties of each country's unique regulatory environment. In addition, the study is limited to provide a macro perspective across a large selection of nations. It does not provide intricacies of the processes related to each country based on the collected data set. Additionally, our study focuses on the building permit processes conducted by the building permit authorities. We recognize that the building permit process can extend to the design phase or other stages and can be viewed from different perspectives, such as that of the applicant. This should be noted as a limitation of our study.

Future work

Our research lays groundwork for process evolution, possibly supported by digitalization and automation, by providing an overview of current practices and highlighting their diversity. While this diversity enriches the study, it also complicates the creation of a unified model for building permit processes that can be universally applied or easily interpreted. Future research should delve deeper into the specific aspects of automation, examining how different sub-processes can be streamlined and made more efficient. Furthermore, the role of technology, such as BIM and GeoBIM, in supporting automation efforts deserves continued exploration. Additionally, investigating the role of strategic management in the effectiveness and cooperation of land use systems presents an interesting topic for further research. In conclusion, this research serves as a foundational step towards improving building permit processes on a global scale. By addressing the complexities and variations inherent in these processes, policy and practice could be guided towards more efficient building permit systems, ultimately contributing to the advancement of urban development and economic growth.

What comes clear with this study is that we are facing an increasing need for unified and aligned understanding of the level of detail and granularity for the process description and investigation. This large data set of different countries' processes can help in dealing with this issue. Further analyses will help to go deeper into the data and provide more knowledge to the community. For example, the presented tables form a valuable basis for the investigation and starting points for systematic investigation of the potential for digitalization. Furthermore, future research would need to consider special characteristics of different countries arising

from their cultural, historical, geographical, and governmental background. Another direction for future research is the analysis of special procedures like unauthorized construction and its impact.

For example, a consideration could be given to differentiate the content check into planning review and technical review (such as accessibility and fire safety regulations), the kind of building or the kind of procedure or method (e.g. simplified application) undertaken. However, further investigation is necessary to understand the specific processes encompassed by categories such as 'technical review.' This category could range from a basic verification of required documentation to a comprehensive recalculation of technical aspects. Ts. The observation on the various details underlines the complexity and requires interconnection of all the aspects in the building permit process. In addition, the high-level taxonomy (Fauth et al., 2024) we base the study on at some points could be fed with the level 2 processes as listed and defined in Table 1. The differentiation of the participation of other agencies including the involvement of a review board needs to be further investigated in future, how it differs from each other and what is the actual impact. We see that the intention of having a group decision (as a more robust and less vulnerable decision), practical organizational reasons, or even the qualification and lack of skilled workers might be the difference. Furthermore, the relation of the content check to the committee meeting is a subject for future work.

Deeper understanding of the different stakeholders and their roles is needed. This refers for example to the different boards, councils, and committees involved in the process. What are their tasks, duties and responsibilities? How are they composed? In addition, the participation of the public leaves room for further studies. We did not investigate how the process is undertaken (e.g. are the neighbours contacted personally, is there an announcement of the project in the newspaper or on the municipalities website, is there an official public hearing, etc.). Also, how neighbours are defined differs between the countries and might be depending on the project (e.g. neighbours sharing the same border of the plot of land, neighbours concerned by noise pollution, other emissions over a wider area).

Furthermore, there might be differences in the rights a neighbour has. Public participation does not necessarily provide the right for objection or even for inspection of the building application documents. One of the findings is the difference between the importance and the necessity of some of the process steps, especially steps dedicated to pre phase (such as pre consultation) and post phase (such as inspection). We need to mention once more that our interview guideline was focused on the review phase and that further research focused on pre and post phase is needed for better in-depth understanding.

In summary, multiple aspects are open for further research and fundamental questions need to be investigated. What is an efficient building permit process, and what constitutes appropriate harmonization and optimization and how can that be done while serving the people subject to public artefacts like building permits.

Conclusion

In conclusion, our investigation into the building permit processes across 17 European countries reveals significant variability. We observe clear differences which can stem from many different causes which remain to be explored by future research. However, while we see these different manifestations, even to the conceptualizations of what a building permit process constitutes, the processes can be understood at manifestations of cultural values. Some processes seem to value specific involvement of stakeholders to certain degrees. Some countries seem to value the participation of the public at an early stage, to for example inform the building permit process (Slovenia). Others seem to involve the public to validate the building permit process (e.g. Austria). The right answer to this sequence can be one of values and politics. Both can be right at the same time, but it is the individual and democratic context that is at play. Therefore, a unified process across these countries and cultures can potentially be very problematic in the sense of what determines a process.

The findings do not intend to evaluate if the manifestation of building permit processing is more correct in one country than the other, but acknowledges that, seemingly, each country has its own manifestation of how a building permit process should play out. Future work should acknowledge that while there could be benefits of harmonization between the different countries (especially within the European countries), this should not be assumed. This perspective should raise new questions and dialogues in the scientific community: how should the commonalities of these processes be understood and improved, and what purposes and whose interests it would serve? What constitutes a good or efficient building permit system? Ideally, a system will emerge that fosters a socially beneficial environment tailored to the unique meanings within each of our rich and diverse cultures. However, it is crucial to understand that these processes are not merely objects for optimization but embody significant values. There is a risk that, in our ambition to enhance processes from a

technocratic perspective, we may inadvertently undermine the deeply rooted cultural values that have shaped the sequences, stakeholder involvement, and conceptualizations over time.

By identifying the differences and similarities within the current building permit processes, the necessity for streamlined and aligned procedures is emphasized, potentially achievable through regulatory reforms and technological advancements. Consequently, future research and policy initiatives should concentrate on developing frameworks for integrating regulatory adjustments that address the specific aspects identified in this study. The insights derived can be utilized by policymakers to draft the regulations that aligns building permit procedures across various regions, thereby reducing variability and enhancing predictability. It also provides a solid basis for future research looking deeper into specific sub-processes to extend the findings.

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