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# Aligning Academic Curriculum with the Needs of Facility Management Industry- An Analysis

Wills, N.[1] & Bartels, N.[2]

ABSTRACT

**Background and aim** – Due to a shortage of skilled labor, facility management (FM) is adopting new technologies such as sensor technologies, building information modeling, Virtual Reality, or Artificial Intelligence. Against the backdrop of a shortage of skilled labor in FM, the integration of new technologies creates new professional domains and presents fresh challenges for skilled personnel. Qualified personnel are essential to meet the expectations of future workforce demands. This contribution aims to investigate whether the curriculum contents of German universities align with the needs of the future job market.

**Methods / Methodology** – This study is grounded in a 2023 examination of FM labor market requirements. German universities' curricula and teaching methods are scrutinized to align with the content and methods assessment. The labor market and curriculum analysis outcomes are then juxtaposed in a matrix. Based on this comparison, the final step involves formulating recommendations for adapting curricula and module handbooks to better align with the identified needs of the FM job market.

**Results** – The paper presents an overview of actual curricula and the alignment/gaps with FM industry demands. Recommendations concerning the adjustment of curricula are given on new technologies in education to integrate knowledge required in the future job market into teaching.

**Practical or social implications -** The dynamic development of using new technologies in FM emphasizes the need for academic curricula to adapt and align with the industry's evolving demands. This approach offers a holistic understanding of challenges and opportunities at the FM sector's intersection of technology, education, and workforce dynamics.

**Type of paper** –educational paper.

**Keywords:** curricula and teaching development, digital transformation, FM labor market, skilled worker shortage

## INTRODUCTION

Facility Management (FM), functioning as a lifecycle-oriented management discipline, generates and requires diverse data throughout the building lifecycle (Bartels, 2020). Particularly within the area of Internet of Things (IoT), technology-based tools have emerged to strengthen FM service delivery (Atta, 2021). The integration of IoT sensors (e.g., humidity, temperature, or presence sensors), Building Automation Systems (BAS), and Building Information Modeling (BIM) provides data, enhancing the efficiency of FM service provision (Bartels & Weilandt,2020,).

Several researches in this domain focus on optimizing user comfort based on IoT data (Laftchiev & Nikovski, 2016; Tomat et al., 2020), improving service provisioning (e.g., cleaning services) through demand-oriented approaches (Dahanayake & Sumanarathna, 2022; Wills & Diaz, 2022), minimizing energy consumption, enhancing sustainable operation and maintenance (O&M) (Opoku & Lee, 2022; Serra et

[1] Department of Business and Engineering – Real Estate, University of Applied Sciences Mittelhessen, Friedberg, Germany, Nadine.wills@wi.thm.de

[2] Faculty of Civil Engineering and Environmental Technology, University of Applied Sciences Cologne, Germany

al., 2014; Shah et al., 2019), and enabling data-driven machine-based and deep learning for predictive maintenance (Cheng et al., 2020; Sanzana et al., 2022).

Particularly crucial for the development of FM, especially in the context of emerging concepts like smart buildings, is the enhancement of IT skills among FM staff. To meet future customer needs comprehensively, FM must become the stakeholder and principal user of building data, potentially giving rise to new job roles such as Facility Data Manager or Smart Building Manager (Bartels & Wills, 2023). Concurrently, facility managers providing FM services are obliged to navigate and control data, thereby elevating the importance of IT and IoT skills in their professional repertoire. The FM industry is undergoing a transformative phase, marked by the integration of cutting-edge technologies reshaping the landscape of service delivery and management practices (Lünendonk & Hossenfelder GmbH, 2022; Statistisches Bundesamt [Destatis], 2023). In response to a shortage of skilled labor, the FM sector is increasingly turning to innovative solutions, including sensor technologies, building information modeling (BIM), Virtual Reality (VR), and Artificial Intelligence (AI), to streamline operations and enhance overall efficiency (Wills & Bartels, 2023). Furthermore, discussions with students and employers revealed a palpable interest in leveraging IT tools to enhance sustainability and efficiency in building Operations and Maintenance (O&M). However, the transition from academic settings to the workforce brought a significant discrepancy to light: a perceived lack of essential IT skills in many students' first jobs, leading to disappointment.

As the FM industry transforms towards technologically driven future, the content and methodologies of academic programs become pivotal in shaping a workforce capable of meeting growing demands. This study aims to analyze whether the current curriculum contents of German universities align with these futuristic needs. The paper is rooted in an examination of German study programs, building upon a study conducted in 2023, with additional data incorporated for a holistic perspective, focusing on German universities' curricula and teaching methods and scrutinizing them against the backdrop of the labor market's content and methodological requirements. The outcomes of these analyses are then juxtaposed in an interface matrix, paving the way for the formulation of recommendations to align curricula and module handbooks with the identified needs of the FM job market.

In conclusion, this paper seeks to address the gap between academic curricula and industry demands within the FM sector's technological evolution. By investigating and proposing adjustments to curricula, the study aims to prepare a workforce equipped with the skills essential for the future of FM, aligning academic programs with the dynamic requirements of Smart Buildings and beyond.

## RESEARCH METHODOLOGY

In this paper, a mixed review is employed, combining a scoping study (Arksey & O'Malley, 2005) in the form of a scientometric review and a critical review of the results, seeking to examine the extent and range of study programs in Germany that handle the requirements for the future labor market. The methodology consists of two stages: In stage one, a scientometric review of study programs occurs. Therefore, the following databases are used for research: “Hochschulkompass”, “studieren.de”, and the “overview of gefma-certified universities”. Hochschulkompass provides information on current study programs at German educational institutions and offers further information on studying (Hochschulkompass, 2024). “Studieren.de” is a detailed directory of degree programs for study orientation in Germany (xStudy SE, 2024). The gefma working group “Education and Knowledge” develops guidelines for high-quality training and further education in FM for students and specialists. The working group publishes the education and training courses certified by Gefma in the overview “German-certified education and training courses“ (German Facility Management Association [GEFMA], NN). After finishing the data collection, in stage two, a critical review of the results is conducted. Therefore, first,

a quantitative analysis in the form of screening and a classification of the results identified takes place. Secondly, a qualitative analysis of the identified study programs is done.
The keywords used for the study course research are “digital real estate management”, “real estate”, “civil engineering”, “construction management”, “real estate management”, and “facility management”. The selection of keywords is based on the study by Bartels and Wills (2023), which examined the extent to which IT requirements will be needed by professionals in the labor market of the Architecture, Engineering, Construction, and Facility Management industries (AECO) industry. The choice of keywords aims to identify those academic programs that teach technical skills and knowledge in building operations (FM). The analysis is conducted separately for universities and universities of applied sciences. Next, the identified results and analysed study program names are listed to verify that the programs linked to keywords meet content requirements of FM, real estate, and building operations contexts.
The critical review is separated into two steps: in a first step, a quantitative analysis is conducted to examine how frequently the specified terms occur in the module handbooks. In the second step, a qualitative analysis of the study programs and courses that include the keywords in their curriculum is carried out. Qualitative aspects of this analysis include the scope of the topic in hours, the achievable European Credit Transfer and Accumulation System (ECTS) points, the examination format, the type of teaching method (seminar-based, lecture, or practical), and, finally, the subject-specific, social, methodological, and interdisciplinary competencies. The results are analyzed in an interface table according to the requirements of the industry, based on the contribution by Bartels and Wills (2023).

## RESULTS

### Data collection

The analysis of existing study programs in Germany generated 673 results. Within the scope of data preprocessing, 140 duplications were identified. Duplications arose, for instance, due to the classification of programs in databases with multiple keywords. The results that do not align thematically with the programs under analysis, such as “Railway Engineering”, or those that exhibit a thematic distance from the domains of FM due to excessive specialization (e.g., building protection civil systems engineering, energy or wood engineering) were filtered out. The initial screening for relevance and removal of double occurrences, and exclusion of irrelevant study programs to the purpose of the study left a total sample of 439 study programs relevant for the analysis. The first results are shown in Figure 1.

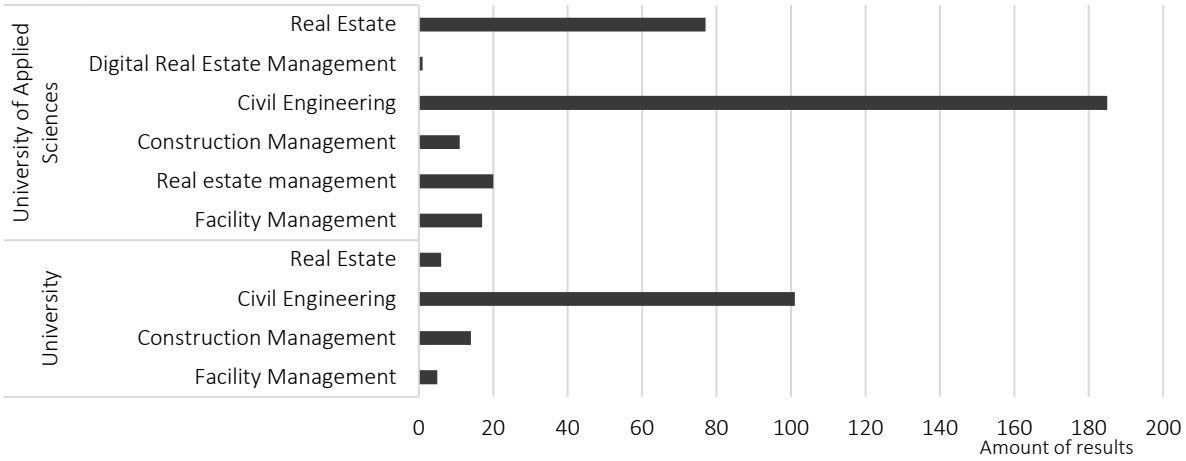


**Figure 1:** FM- and real estate-related study programs in Germany

The examination of academic programs at both universities and universities of applied sciences reveals distinct emphases on various disciplines within the built environment. Notably, “Civil Engineering”

occurs as a predominant focus at universities, with a substantial count of 185 instances, compared to 101 instances at universities of applied sciences. On the other hand, “Real Estate” is a predominant subject at universities of applied sciences, appearing 77 times, while universities exhibit a relatively lower count of 6 instances. “Digital Real Estate Management” and “Construction Management” exhibit limited representation across both university types, with only one occurrence each in programs offered by universities of applied sciences. Regarding property management and facility-related disciplines, both “Real Estate Management” and “Facility Management” demonstrate a presence at universities and universities of applied sciences, though with varying frequencies. “Real Estate Management” is more widespread at universities of applied sciences (20 occurrences), while “Facility Management” is slightly more emphasized at universities (17 occurrences).
In the next step, the identified 439 results are listed, and the designations or names of the study programs are examined more closely. The goal is to determine whether the study programs associated with the keywords meet the content requirements or if the database linkage between programs and keywords also included study programs that are not contextually related to FM, Real Estate, and Building Operations. The final screening left a total sample of 115 relevant study programs for analysis.

## Quantitative analysis

In the quantitative analysis, an examination of the frequency of keywords across the dataset, distinguishing between their total occurrences and their mentions specifically within modules (module handbooks) is conducted. Figure 2 summarizes the findings (where the y-axis is interrupted for the sake of readability).

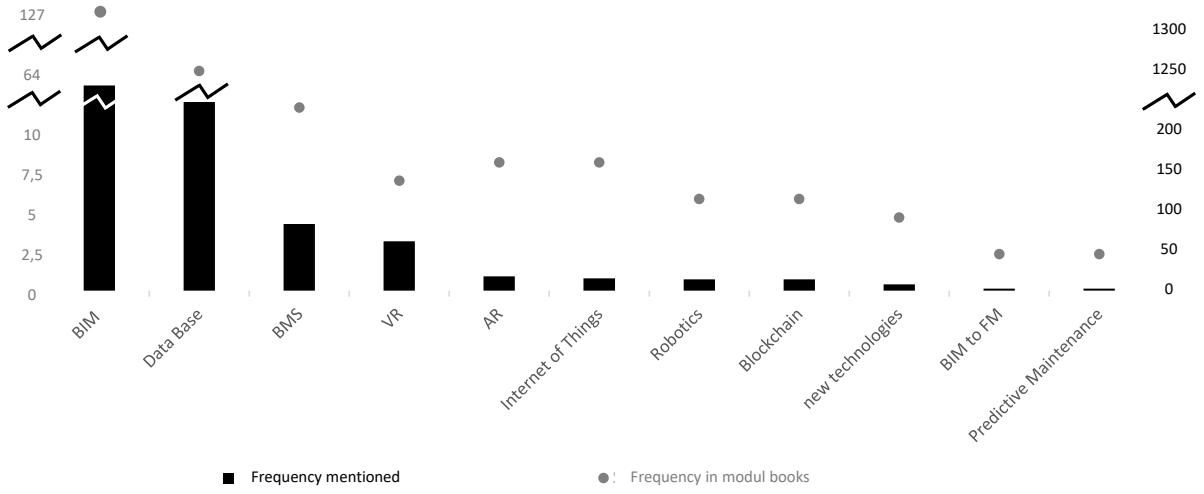


**Figure 2:** Frequency Analysis Across the Dataset: Total Occurrences vs. Module Mentions

The keyword “BIM” receives significant attention with a total frequency of 1,268 mentions. Furthermore, its occurrence extends across diverse contexts, featuring 72 instances within module handbooks, with 21 occurrences in universities and 55 in universities of applied sciences. Keywords such as “Robotics”, “Blockchain”, “IoT”, and “AR” showcase a notable presence, indicating a growing interest in these cutting-edge technologies. Their varied frequency both in the overall dataset and within module handbooks suggests their importance across different contexts. The keyword "Database" is frequently mentioned (184 occurrences) and has 35 occurrences within module handbooks, with a slightly higher presence in universities of applied sciences (29 occurrences) compared to universities (six occurrences). The keyword “predictive maintenance” is not mentioned.

While “Building Management System/Operation” is more often mentioned in module handbooks of universities of applied sciences, “AR” shows a balanced presence across both traditional universities and universities of applied sciences. “IoT” and “Database” underscore their significance, with frequencies of 12 and 184 mentions, respectively. “IoT” finds representation across traditional universities and universities of applied sciences, while “Database” displays a more nuanced distribution. In the subject of robotics, the findings showcase a total frequency of 11 mentions, with three occurrences within module handbooks of universities of applied sciences and an additional mention in traditional universities. Similarly, “Building Automation Systems” received 27 mentions with representation in both traditional universities and universities of applied sciences. The thematic cluster of “new technologies” is distinctly present with six mentions, all found within module books at universities of applied sciences. “Blockchain” and “VR” also exhibit frequencies, emphasizing their relevance primarily within module handbooks of universities of applied sciences. The keywords “Predictive Maintenance” and “BIM to FM” are uniform, totaling two mentions within module handbooks at universities of applied sciences. Figure 4 presents the results.

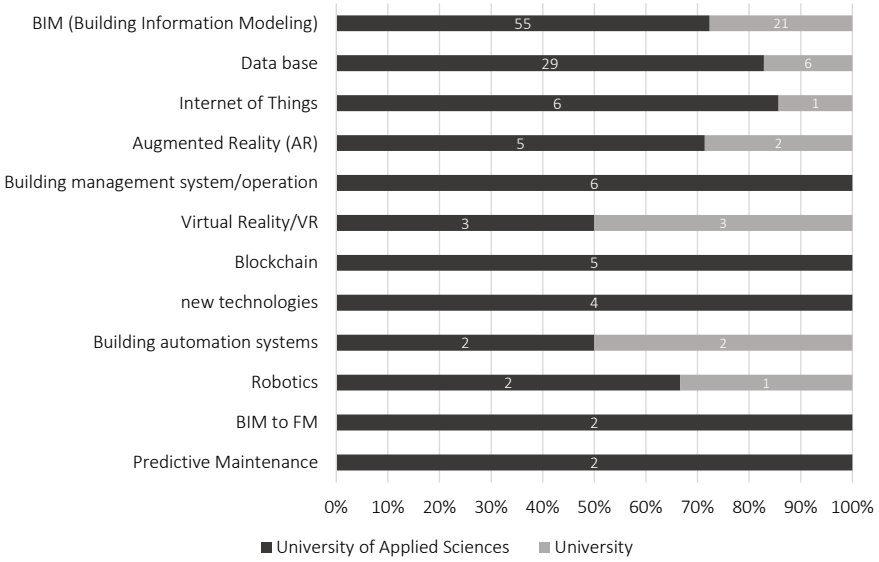


**Figure 4:** Comparative analysis of keyword occurrences in module books

After completing the quantitative analysis, a qualitative investigation is conducted, which aims to examine the thematic areas relevant to the labor market contextually within the module handbooks. This closer look examines the extent to which the teaching format of the individual subject areas is considered. During the quantitative investigation, the term "BIM" was frequently mentioned in the academic programs of various subject areas, with a higher concentration in civil engineering and construction programs. To obtain a more precise statement, the investigation is narrowed down to only civil engineering programs that explicitly address FM and real estate in a broader sense based on their program names. programs

## Qualitative analysis

In line with Mayring's inductive categorization approach, categories were derived directly from the various program names (Mayring, 2022). This data-driven methodology allows an open investigation of the material without predefined structures, facilitating the identification of emerging themes and connections. Based on the names of the degree programs, the following categories shown in Table 1 are formed according to Mayring (2022).

**Table 1:** Inductive categories derived from study course program names according to Mayring (2022)

| Inductive categories | Study course programs |
|---|---|
| Technology-oriented programs | Business Administration; Technology and Management in Construction Operations; Smart Building Engineering; Construction Information Technology; Digital Engineering; IT-Construction; Sustainable Building Planning; Digital Technologies in Construction Operations; Technical Building Planning – Smart Building Engineering |
| Management and Economics programs | Business Administration; Industrial Management; Sustainable Real Estate Management; Real Estate Economics; Banking and Finance; Construction Business Administration; Management (Construction Real Estate Infrastructure). |
| Construction and Civil Engineering programs: | Civil Engineering-Planning, Building, Operating; Civil Engineering (dual); Civil Engineering - Construction in Existing Structures; Architecture; Construction Process Management and Real Estate Management, Construction Management and Construction Operations. |
| Real Estate and FM programs: | Real Estate Management; Facility Management; Real Estate and Facility Management; Building Maintenance and Construction in Existing Structures; Real Estate and Construction Management; Construction and Real Estate Management-Technical Real Estate Management; Facility Management and Real Estate Management; Real Estate, Industrial Engineering-Real Estate. |
| Digital and Information Technology programs: | Construction Information Technology; Digital Real Estate Management; Digitalization and Real Estate Management. |
| Smart Building and Engineering programs: | Smart Building Engineering; Smart Building Engineering and Management; Industrial engineering and management-Sustainability and Smart Building Technology". |
| Cross-Disciplinary programs: | Real Estate and Integral Building Technology; Real Estate Technology and Real Estate Economics; Technology and Management in Construction Operations. |

The keyword BIM is prominently featured in the module handbooks of study courses within “Construction and Civil Engineering” programs and in “Real Estate and Facility Management” programs. 29 modules take the name BIM directly in their title, led by modules from the “Construction and Civil Engineering Program” (N=6). In Real Estate and FM programs, five modules are named BIM. In Figure 5, alongside the relative frequencies of the term BIM (darker bars), the frequency of the term BIM in module names (lighter bars) and the detailed designation of modules related to BIM are presented.

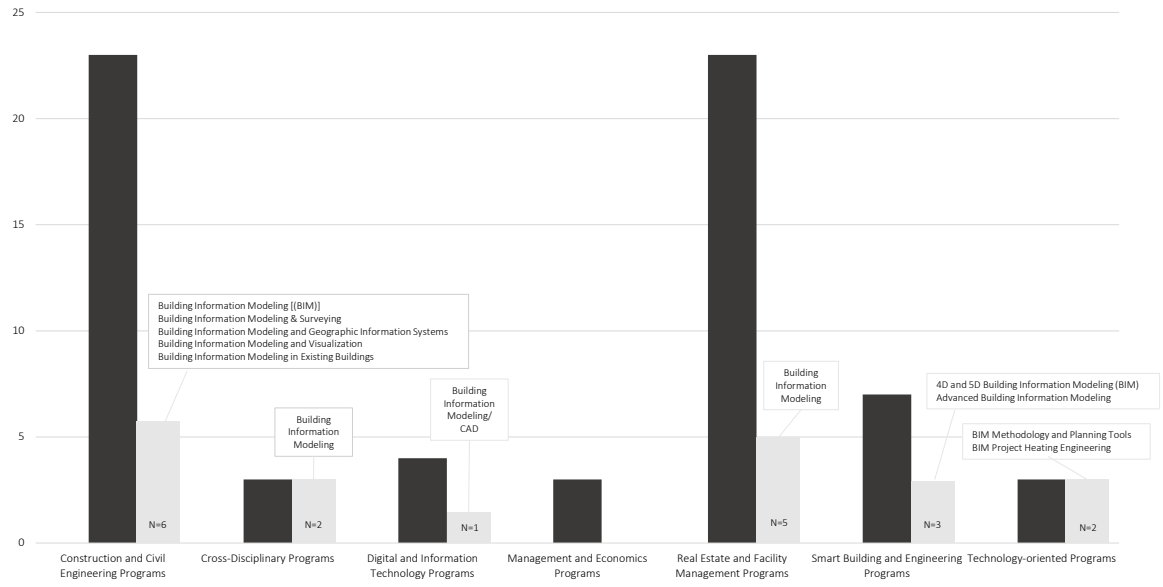


Figure 5: Distribution and characteristics of BIM modules in study programs

The instructional format of modules directly bearing the name BIM consists of lectures and exercises (N=17), supplemented by courses featuring workshops (N=3) or seminars (N=4), as well as project work

(N=3). For two modules, the instructional formats were not further specified. The extent of instruction in this domain varies between 180 hours (N=13), 150 hours (N=10), 90 hours (N=1), and 75 hours (N=1). Taking a closer look at the module handbooks of study courses within “Real Estate and Facility Management” programs, it becomes clear that students learn to articulate BIM definitions, outline associated requirements, and differentiate between Little BIM/Big BIM and Open BIM/Closed BIM, identifying interfaces between these concepts. Additionally, students learn competence in recognizing the utility of BIM across various phases of real estate projects, such as planning, construction, and operation. Students learn to weigh the advantages and disadvantages of BIM in each building lifecycle phase. Furthermore, the analysis shows that students are expert at identifying and shaping BIM processes, including BIM-compliant contract allocation, defining roles in BIM, addressing client information needs as well as exchange information requirements, understanding the creation of BIM execution plans, and modelling subcomponents within BIM. The findings indicate that students can apply BIM elements, principles, and scenarios through practical projects, demonstrating their ability to independently create models, evaluate presented quality models, and utilize exchange formats to ensure consistency in information flow. Students exhibit the capacity to present and discuss the pros and cons of various solutions, collaboratively developing suitable proposals within a team setting. The analysis observes that students critically evaluate and compare these statements, acknowledging the complexity of the overall context.

The keyword "IoT" is mostly mentioned in the module handbooks of Technology-oriented programs, Digital and Information Technology programs, Management and Economics programs, and Real Estate and Facility Management programs. None of the modules has the term “IoT” directly in its name. The lectures covering IoT-related topics include “Mobile Applications”, “Digitalization of the Energy Industry”, “Digital Construction Project and Building Management Operation 2”, “IT Systems in Facility Management”, “Operation”, “Digitalization in Facility and Real Estate Management”, and “Introduction to Digital Planning”. Figure 6 illustrates the frequency distribution of modules that explore IoT within their content. The extent of instruction in this domain varies between 210 hours (N=1), 180 hours (N=1), 150 hours (N=3), and 120 hours (N=1). Notably, the study programs falling under the inductive category of Real Estate and FM each encompass a comprehensive duration of 150 hours.

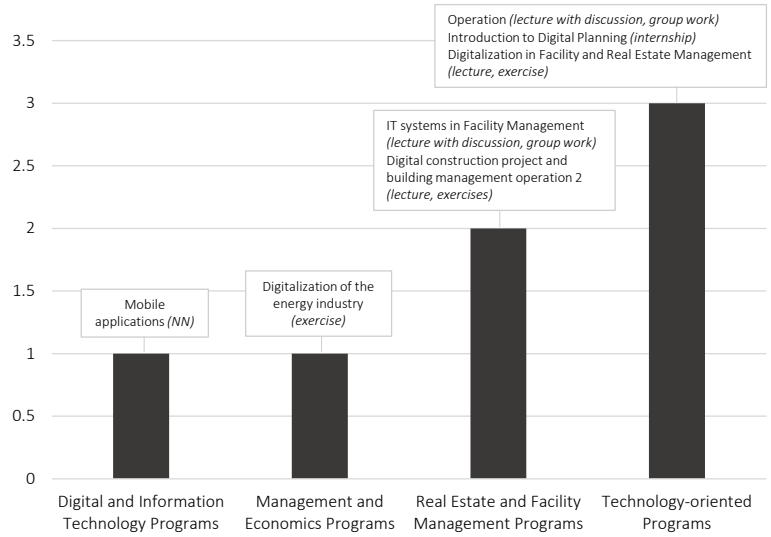


Figure 6: Frequency Distribution and Instructional Formats of IoT Modules

After searching the keyword "database" across various degree programs, it was discovered that several various options are available in the field of databases and information technology. One such option is the construction information technology curriculum, which offers a lecture series on databases. This

program includes group discussions and activities to enhance the learning experience. The course, conducted in the second semester, extends over 150 hours and contributes 5 ECTS credits. Similarly, within the Management and Economics programs, Industrial Management introduces a lecture series coupled with exercises in the second semester, focusing on databases and Supervisory Control and Data Acquisition (SCADA) systems. This module spans 150 hours and carries 5 ECTS credits. Real Estate and FM programs integrate the study of data modeling and databases, delivered through lectures and exercises. This program lasts 150 hours, earning students 5 ECTS credits. Figure 7 shows the distribution and characteristics of database modules in study programs.

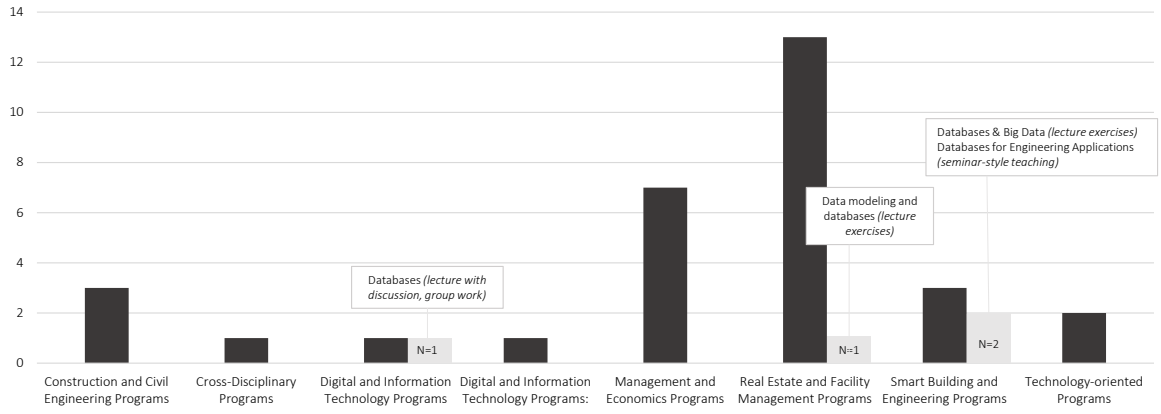


**Figure 7:** Distribution and characteristics of data base modules in study programs

The analysis of study programs incorporating VR and AR reveals diverse lectures across various academic categories, as can be seen from Figure 8.

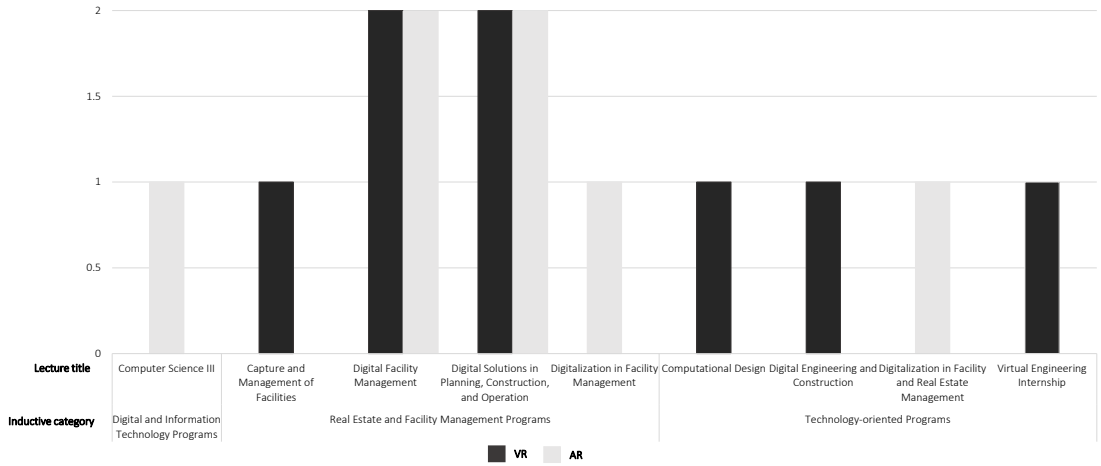


**Figure 8:** Distribution and characteristics of VR and AR modules in study programs

In VR-related courses, the programs encompass a range of lecture formats, including lectures, seminars, discussions, and group work. The extent of these programs varies, spanning two to three semesters, with total workloads ranging from 150 to 200 hours. AR elements are integrated into programs through lectures, discussions, and group work. The extent of AR programs varies, with total workloads ranging from 150 to 200 hours over two to three semesters. The courses equip students with diverse skills related to the evolving field of digitalization in facility management and planning. All modules encompass themes of digitalization in building operations, addressing areas such as VR and AR as data capture and visualization tools.

Moving to “Smart Building and Engineering” programs, the Smart Building Engineering and Management curriculum explores databases and big data through a lecture and exercises format in the first semester. This course spans 150 hours, with an ECTS credit allocation of 5. The curriculum emphasizes databases for engineering applications in the context of Smart Building and Engineering programs with a technical focus on civil engineering. The lecture series, exercises, and seminar-style teaching reveal more than 180 hours, earning students 6 ECTS credits.

## DISCUSSION OF THE RESULTS

To answer the research question of whether academic curricula meet the demands of the FM labor market, an industry-academic alignment analysis is conducted. This analysis involves evaluating the skills, knowledge, and competencies expected by industry professionals and comparing them to the content and structure of the academic curriculum. The goal is to identify gaps or misalignments between what the industry seeks in graduates and what the academic program provides. The results are shown in Table 2. To better prepare students for future labor tasks related to BIM, the authors propose integrating more real-world case studies to module handbooks. This addition to the curriculum ensures that students gain practical depth in analyzing actual occupancy scenarios or facilitating a more practical application of BIM fundamentals in space optimization. Regarding BIM for energy consumption based on occupation, it is recommended that students' exposure to various BIM software tools is expanded. This broader familiarity will equip students with skills in industry standard tools, fostering adaptability in diverse professional environments. In the context of BIM for adaption of service provisioning, there is a suggestion to strengthen interdisciplinary collaboration within the curriculum. For BIM use cases within the design of new buildings, it is recommended to provide additional practical exposure to VR and AR technologies. This exposure will enable students to leverage these technologies more effectively in e.g. the design phase of new buildings.

Moreover, highlighting real-world case studies is essential for providing students with a comprehensive understanding of IoT applications. By training theoretical knowledge in practical scenarios, students can hold the complexities and challenges of real-world implementations. A balanced approach between traditional lectures and hands-on exercises is essential to enhance practical skills further and ensure that theoretical knowledge is coupled with practical experience, preparing students for the dynamic IoT landscape. An example for a real-world case study could be a corporate office building aiming to optimize energy consumption and enhance sustainability through IoT. Students can analyze how sensors are strategically placed to monitor lighting, heating, ventilation, and air conditioning (HVAC) systems. By collecting and analyzing data in real-time, the smart building system adjusts temperature, lighting, and energy usage to ensure optimal comfort for occupants while minimizing energy waste. Challenges to explore include data security, device interoperability, and user acceptance. Hands-on exercises involve designing a simplified IoT energy management solution for a smaller-scale facility. In the area of VR/AR for using data in designing new buildings, recommendations focus on broadening the integration of VR/AR concepts across diverse study programs, as these technologies become integral to various industries, providing students from different disciplines exposure to VR/AR applications fosters interdisciplinary collaboration and prepares graduates for versatile roles. An example could be a case study where a FM team maintains complex facilities. VR/AR technologies can be applied to create immersive training simulations for technicians. Students can examine how virtual scenarios imitate equipment failures or maintenance challenges, allowing technicians to practice troubleshooting and repair procedures in a risk-free environment. The case study could explore the integration of VR/AR into existing training programs, emphasizing its impact on reducing downtime and improving overall maintenance efficiency.

Table 2: Industry-academic alignment analysis

| Industry requirement | Academic Curriculum | Alignment/gap | Strengths | Weaknesses |
|---|---|---|---|---|
| BIM for the use cases of space utilization ratio, energy consumption based on occupancy, adaption of service provisioning, and using data for the design of new buildings. | Students articulate BIM definitions, outline associated requirements, and differentiate between Little BIM/Big BIM and Open BIM/Closed BIM. Recognition of BIM's utility across planning, construction, and operation phases, weighing its advantages and disadvantages. Identification and shaping BIM processes within the context of different life cycle phases. | Alignment | Comprehensive coverage of BIM fundamentals. Practical application within relevant contexts; Clear understanding of BIM's role in service provisioning optimization; Application of BIM data for sustainable design considerations | Potential for enhanced emphasis on real-world case studies for practical depth; Limited exposure to a variety of BIM software tools; Potential for increased emphasis on interdisciplinary collaboration; opportunity for more practical exposure to VR/AR technologies |
| IoT (and sensor data) for the use cases of space utilization ratio, energy consumption based on occupancy, and adaption of service provisioning | Modules provide fundamental knowledge of sensor networks, building automation, and IoT application in FM and Real Estate Management. Students can critically evaluate digitalization technologies and implement simple sensor networks. The curricula include a module on Mobile Applications covering IoT data generation and its applications in the construction industry. | Alignment | Integration of fundamental IoT concepts into the curriculum. Practical experience in assessing optimization potential and implementing sensor networks. Experience to mobile application development aligning with IoT data generation. | Opportunity for deeper exposure to advanced IoT technologies and applications; Emphasis on real-world case studies for a more comprehensive understanding; Potential improvement in the balance between lectures and hands-on exercises for enhanced practical skills development. |
| VR/AR for the using data for the design of new buildings | Relevant courses provide insight into VR fundamentals, including hardware, software, and applications. Hands-on experience in development environments like PolyVR and Blender, culminating in the creation of VR applications in small groups. | Alignment | Practical exposure to VR/AR technologies. Practical experience in developing VR applications. | Opportunities for broader integration of VR/AR concepts across different study programs; Potential for deeper exploration of VR/AR applications in building design. Workloads are substantial, reflecting a commitment to in-depth exploration of VR and AR. |
| Data(bases) for data analysis and therefore the use cases of space utilization ratio and the design of new buildings | Various modules across programs covering databases and data analysis. | Alignment | Practical application of data analysis techniques and SQL Overview of industrial control systems and their integration with SQL. Understanding of modern database systems and their applications. Comprehensive coverage of various database and Big Data concepts. Integration of computer-based solutions for engineering applications. | Limited detailed content information on space utilization and design. Limited information on specific SCADA-related topics. The information provided in the modules lacks detailed content specifically related to space utilization ratio and the design of new buildings. There is a gap in addressing these specific aspects within the context of database usage for data analysis. |

Recommendations for databases and data analysis, particularly in space utilization ratio and building design, focus on enhancing the detailed content within relevant modules. The curriculum should

comprehensively cover space utilization ratio and design considerations within the database context, e.g. exercises that focus on calculating space utilization ratio using SQL queries, considering factors such as floor area, occupancy data, and room functionalities. Due to date, module handbooks only provide general information on database but rarely specified to the real estate sector.

Furthermore, addressing the need for more information on SCADA-related topics is essential for preparing students to work with industrial control systems. Providing insights into SCADA systems and their integration with databases ensures that graduates can handle the complexities of data analysis in real-world scenarios. These recommendations aim to fortify the academic curriculum, ensuring students are well-prepared and adaptable to the intricacies of database applications in diverse industry contexts.

## CONCLUSION

This paper investigates the alignment between academic curricula and the evolving demands of the FM labor market, particularly in the context of emerging technologies such as the IoT, BIM, VR, and AR. The study focuses on German universities and employs a mixed methodology involving a scientometric review and a critical review of the results. The industry-academic alignment analysis highlights areas of alignment and provides recommendations for improving the curriculum to meet industry requirements better. This paper identifies gaps between academic curricula and industry demands in the FM sector and provides actionable recommendations to bridge these gaps. By addressing these recommendations, academic institutions can ensure that their graduates are well-equipped with the skills and knowledge essential for the future of FM.

Nevertheless, despite the analysis of module handbooks and the juxtaposition of these teaching contents with the requirements of the FM job market, the fundamental principle of “freedom in research and teaching” persists. The intensified teaching contents and formats outlined in the module handbooks need to conclusively indicate how the contents are carried through purely analytical examination. The extent to which the examined contents are taught covers only a minimal scope of the overall duration of the studies (both throughout the entire study program and within individual modules). Primarily, when modules occur in earlier semesters, it is crucial to investigate to what extent the teaching contents can be applied in practice.

It is also important that teaching is implemented in accordance with the curriculum. This means, for example that VR or AR applications are taught in a way that meets the needs of the future job market. Further research and concepts are needed for this.

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