ANDREA SIPOS – BÁLINT SZABÓ

EXPLORING THE EXPECTATIONS OF THE PRODUCT MANAGER ROLE: THE CASE OF THE HUNGARIAN SOFTWARE INDUSTRY

A TERMÉKMENEDZSER-SZEREPKÖR ELVÁRÁSAINAK FELTÁRÁSA A MAGYAR SZOFTVERPIAC PÉLDÁJÁN KERESZTÜL

Stakeholder-driven development has become significant in the software industry. As a result, product managers have taken on a crucial role in IT projects by considering the demands of stakeholders, business objectives and knowing available technological solutions. The theoretical section of this article provides an overview of the evolution and characteristics of the product manager role. This paper empirically explored the various expectations towards product managers through the example of the Hungarian software industry by the content analysis of job advertisements (n=212) from LinkedIn. The identified patterns show that the product manager role differs depending on the size of the company. The results show that as the size of a company increases, leadership and active listening skills become increasingly important. On the other hand, micro- and small enterprises demonstrate the highest level of responsibility regarding cooperation. The findings of this article can offer valuable guidance for future product managers.

Keywords: **product manager, software industry expectations, content analysis, competencies, responsibilities**

A szoftverpiacon az érdekelt felek (stakeholder oldal) igényeinek a szem előtt tartása kiemelt jelentőségű lett. Ennek eredményeképpen a termékmenedzserek ma már kulcsszerepet töltenek be az IT-projektekben a stakeholder igények, az üzleti célkitűzéseknek és a rendelkezésre álló technológiai megoldások ismeretek birtokában. Jelen cikk elméleti része a termékmenedzser-szerepkör kialakulásának és feladatainak áttekintését foglalja össze. Ezután LinkedIn álláshirdetések (n=212) tartalomelemzésével tárja fel, hogy az IT-piac milyen elvárásokat támaszt a termékmenedzser-szereplők irányába. Az eredmények részletesen bemutatják azokat az alapvető készségeket és feladatköröket, amelyeket a vállalatok gyakran kiemelnek az álláshirdetésekben, így elsajátításuk kiemelten fontos. Két készség, a vezetés és az aktív figyelem, esetén a statisztikai számítások alátámasztották, hogy ezen készségek a cégméret növekedésével egyre fontosabbak a vállalatok számára. Továbbá az is elmondható, hogy a mikro- és kisvállalatok életében sokkal fontosabb a kooperáció. A cikk eredményei hasznos útmutatást nyújthatnak a jövő termékmenedzsereinek.

Kulcsszavak: **termékmenedzser, szoftverpiaci elvárások, tartalomelemzés, készségek, feladatkörök**

Funding/Finanszírozás:
The authors did not receive any grant or institutional support in relation with the preparation of the study.
A szerzők a tanulmány elkészítésével összefüggésben nem részesültek pályázati vagy intézményi támogatásban.

Acknowledgement/Köszönetnyilvánítás:
We express our gratitude to Dr. Dalma Geszten assistant professor of the Department of Ergonomics and Psychology at Budapest University of Technology and Economics, for her valuable assistance in the statistical analysis of the research findings.
Köszönetünket fejezzük ki Dr. Geszten Dalmának, a Budapesti Műszaki és Gazdaságtudományi Egyetem Ergonómiai és Pszichológiai Tanszékének adjunktusának, a kutatási eredmények statisztikai elemzésében nyújtott értékes segítségéért.

Authors/Szerzők:
Andrea Sipos[a] (andrea.sipos@stud.uni-corvinus.hu) product management & product analytics consultant; Bálint Szabó[b] (szabo.balint@gtk.bme.hu) assistant professor

[a]Sipos Andrea product management & product analytics consultant (Sipos Andrea termékfejlesztési szakértő) Hungary (Magyarország); [b]Department of Ergonomics and Psychology, Faculty of Economic and Social Sciences, Budapest University of Technology and Economics (BME Gazdaság- és Társadalomtudományi Kar) Hungary (Magyarország)

The article was received: 07. 01. 2024, revised: 22. 04. 2024, 22. 05. 2024 and 05. 06. 2024, accepted: 05. 06. 2024.
A cikk beérkezett: 2024. 01. 07-én, javítva: 2024. 04. 22-én, 2024. 05. 22-én és 2024. 06. 05-én, elfogadva: 2024. 06. 05-én.

Software development was officially established as a profession in 1968 when the informal and haphazard code-and-fix approach was replaced by formal Software Development Lifecycle (SDLC) models. These models were implemented in Information Technology (IT) projects to ensure project success (Kneuper, 2018). Since the 1980s, these SDLC models have been increasingly used in emerging developments due to the rise of personal computers. This technological advancement has facilitated the creation of custom software specifically designed to meet users' unique needs due to the growing importance of ergonomics (Szabó & Hercegfi, 2023). In IT projects that could be monitored along streamlined steps, a significant market share could be acquired rapidly by the first company to develop software that satisfies a new user need (Jindal, Sarangee, Echambadi & Lee, 2016).

With the increasing presence of product development activities in the IT industry, solving a problem is no longer sufficient. The company that offers the most optimal solution to potential customers emerges as the leader in the market (Lesser & Ban, 2016). The significance of stakeholder-driven development has increased in the management of IT projects (Kessler & Sweitzer, 2007). Therefore, successful organisations prioritise the comprehensive requirements of users, customers, and decision-makers in their development processes (Berander & Andrews, 2005).

Conscious interaction with various actors within the organisation is necessary to consider the needs of stakeholders. As a result, product managers have become crucial participants in IT projects. They are responsible for all additional tasks related to the software product being developed, such as product strategy and pricing (Kittlaus & Clough, 2009).

The primary responsibility of IT project product managers is to generate value by devising optimal solutions, introducing them to the market, and further improving them while considering user, business, and technological requirements (Ebert & Brinkkemper, 2014). Consequently, a product manager's core responsibility is to monitor a product's whole life cycle. This involves handling various challenging tasks, depending on the nature of the development projects in corporate practice (Steinhardt, 2017). Centralised control over the entire life cycle is critical for achieving project success (Lukassen & Schuurman, 2023).

The theoretical part of this article provides an overview of the emergence of the software product manager role and expectations towards it. The empirical research then uses content analysis of LinkedIn job advertisements (n=212) to identify product managers' expected competencies and responsibilities in the Hungarian IT industry. Academic research has applied content analysis to identify distinct professional expectations, such as those in cybersecurity and journalism (Marta-Lazo et al., 2018; Parker & Brown, 2019). However, implementing this methodology is scientifically novel concerning the role of a product manager.

Theoretical background on the product manager role

The conscious focus on product development commenced during the latter part of the 19th century after the Second Industrial Revolution. According to McGrath (2004), four separate but interconnected generations of product development types have existed since then.

Following the Second Industrial Revolution, initial product developments were undertaken without formal development protocols, prioritising the commercialisation of inventions.

Subsequently, during the 1950s, as the second generation began, there was a growing necessity to rationalise development procedures to attain project success. This was driven by the escalating number of projects to be executed and, more importantly, the substantial resources needed for each development. During this time, several formal SDLC models have emerged based on well-established project management life cycle approaches such as predictive, iterative, incremental, and agile (PMI, 2021).

Following this, starting in the 1980s, the third iteration of improved process models prioritised the acceleration of product development to minimise the time required for delivering products to market. Faster time to market (TTM) is a crucial factor in today's business landscape, as it enables companies to gain a competitive advantage and potentially emerge as industry leaders (Grützner et al., 2016).

Beginning in the 21st century, fourth-generation processes have prioritised research and development (R&D) activities in product development projects. Along with attaining an accelerated TTM indicator, fulfilling stakeholder needs to the greatest extent possible has become the highest priority (Brem & Wolfram, 2014). This has predominantly confirmed the importance of the product manager role in product development projects within organisations (Rauniar, Doll, Rawski & Hong, 2008; Wagenblatt, 2019).

The emergence and the evolution of the product manager role

Although conscious product development originated in the middle of the 20th century, the product manager role was first associated with Neil Hosler McElroy's name in the fast-moving consumer goods (FMCG) sector in the 1930s and later spread to the software industry (Banfield, Eriksson & Walkingshaw, 2017).

McElroy (1931), a former advertising manager at Procter & Gamble, submitted a comprehensive three-page corporate document to the Promotion Department outlining the specific qualifications and characteristics he sought in potential new team members (Aimé, Berger-Remy & Laporte, 2018). McElroy suggested hiring two 'Brand Man' employees to monitor the entire product life cycle rather than being in charge of a department or subtask, as was done previously (Spring, 2013). Brand Man team members were also required to assume complete accountability for promoting their products (Aaker &

Joachimsthaler, 2012). Since the initial Brand Man position encompassed marketing activities alongside various product-focused responsibilities, it significantly influenced the subsequent evolution of marketing and product management disciplines.

After their inception, these Brand Man product managers were primarily focused on devising and executing development and marketing strategies for specific brands and products, predicting and defining financial and operational outcomes for products, consistently monitoring the implementation of development project plans, and adjusting operational activities according to changing circumstances (Fernandes, 2016).

Later, during the 1970s, product managers became the primary source of information for organisations managing product development projects, as evidenced by their diverse responsibilities. According to Luck (1969), product managers possess a comprehensive knowledge of all aspects of the product and its diversified responsibilities. These responsibilities encompassed communicating the exact product requirements and feasible timelines to project managers (Banfield et al., 2017). As a result of this complex, end-to-end responsibility, product managers had to simultaneously maintain relationships with both external and internal stakeholders in the development project, as well as with strategic, managerial, and operational level employees (Steinhardt, 2017). In the 1970s, the product manager role became critical for the successful implementation of the project (Finch, Levallet, McIntyre & Pyde, 2023).

Hise & Kelly (1978) employed a questionnaire (n=198) to explore the job characteristics of product managers. The research revealed that over 90% of participants reported that their daily job responsibilities encompassed tasks such as setting production goals, choosing suitable approaches to accomplish them, devising advertising strategies, and forecasting sales. The findings indicate that in the 1980s, product managers experienced a shift in their daily work focus from promotion and sales responsibilities, which were emphasised during the 'Brand man' era, to product development. However, the primary objective of creating products that satisfy the needs of stakeholders remained unchanged (Aimé et al., 2018).

By the late 1970s, a significant proportion of the largest companies in the FMCG sector had adopted a product-centric approach as a fundamental component of their operations. Specifically, 84% of the largest US companies were equipped with some form of product management (Cummings, Jackson & Ostrom, 1984). The primary factor behind this was the rise of new products and television advertising due to an economic recovery after World War II. The increased focus on products led to a greater emphasis on the strategic management of interconnected brands. Consequently, many companies incorporated product management into their operations to ensure high-quality manufacturing.

Although the conceptualisation of McElroy's 'Brand Man' role originated from marketing responsibilities and business needs, technological pressures within IT companies have necessitated implementing the product manager role at the project level from the 1980s (Kittlaus, 2017). An instance of difficulty that the organisation could not resolve occurred during Microsoft's Excel for Mac product development. The project team needed help strategising how the software would be functional and optimally fulfil user requirements, considering the complexity of the development process. There needed to be more in the project team's ability to accurately interpret and communicate the gathered user requirements to the developers, even though the marketing department was relaying them. The organisation hired a product manager to address this issue, whose primary responsibility was communicating user needs, collecting requirements, designing the user interface, and preparing specifications (Chisa, 2014).

Consequently, during the 1990s, many IT companies incorporated product management into their business operations. However, the value of the product manager's job in development projects was undeniable during this time. Nonetheless, certain modifications were necessary to facilitate its practical implementation. Low & Fullerton (1994) proposed using the proprietary approach, which entails granting product managers increased authority, assigning them a formal managerial role, and directing their efforts on market processes rather than convincing colleagues.

In the early 2000s, there was a shift towards R&D product development projects. Therefore, during the production process, there was a strong emphasis on understanding consumer demands and developing products that effectively fulfilled those needs. This strategy has strengthened the position and significance of product managers in the operations of IT businesses (Pranam, 2018).

Product manager role in the software industry

Given the frequent occurrence of changing business, technical, and stakeholder requirements, product managers in the software industry typically need to make decisions frequently, bringing them close to the software engineering processes (Maglyas, Nikula & Smolander, 2013). This aligns with the definition formulated by Ebert & Brinkkemper (2014), which affirms that product managers are organisational actors who possess comprehensive knowledge of the product's components and are primarily accountable for the value of the software for both the customers and the organisation.

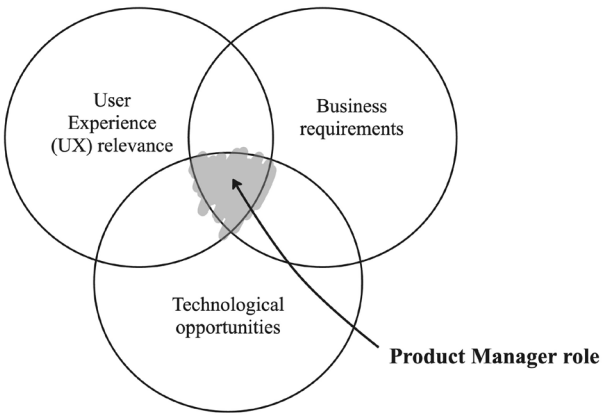
According to Lica (2021), IT product managers ensure that businesses create valuable software products that address usability, feasibility, and viability. These factors became increasingly dominant in software development as a focus on user experience (UX) emerged around the turn of the millennium (Szabó & Hercegfi, 2023). UX includes the overall impressions and emotions a user experiences when interacting with software, making it essential for product managers to address (Quiñones, Rusu & Rusu, 2018).

Considering the significance of UX within the software industry, IT product managers are required to possess a comprehensive understanding of methodologies for product discovery and delivery. Thus, product managers

accomplish an interdisciplinary role across development teams, planning, designing, and consistently introducing better products to the software market (Strader, 2010). Consequently, the IT product manager's role encompasses addressing stakeholder concerns (UX relevance), comprehending the interdependencies among various business requirements, and considering how they can be executed by emulating the most efficient technological opportunities (Figure 1) (Eriksson, 2011).

Figure 1

The interdisciplinary role of a product manager in the software industry



Source: own compilation derived from Eriksson (2011)

Expectations of a product manager in the software industry

The expectations for product managers are diverse, reflecting their interdisciplinary roles. Springer and Miler (2018) state that the responsibilities of a product manager in the IT industry involve having a comprehensive understanding of the business needs and potential of the software product and its associated services. This includes knowledge of the legal and privacy aspects, financial considerations, and marketing and sales implications. It also involves monitoring market trends and competitors and in-depth comprehension of stakeholders' requirements.

Maglyas et al. (2017) conducted a meta-ethnography study to synthesise three empirical studies about the responsibilities of the product manager role. The researchers identified the core and supporting responsibilities of software product managers. All companies should incorporate the core responsibilities of vision creation, product lifecycle management, roadmapping, release planning, and product requirements engineering. Supporting responsibilities, such as strategic planning, portfolio management, product analysis, launches, support, and development, are not the primary responsibilities of product managers. However, these supporting responsibilities are crucial to the project's success, and product managers actively participate in them (Table 1).

Table 1

Core and supporting responsibilities of a software product manager

Core responsibilities	Supporting responsibilities
Vision creation	Strategic planning
Product lifecycle management	Portfolio management
Roadmapping	Product analysis
Release planning	Product launches
Product requirements engineering	Product support
	Product development

Source: own compilation based on Maglyas et al. (2017)

Table 2

Competencies of a software product manager and their descriptions based on the Competence Dictionary of the U.S. Department of the Interior

Competency	Description
Accountability	Holds self and others accountable for measurable, high-quality, timely, and cost-effective results. Determines objectives, sets priorities, and delegates work. Accepts responsibility for mistakes. Complies with established control systems and rules.
Adaptability	Simultaneously accepts and adapts to change while remaining practical and task-focused in a constantly evolving workplace environment.
Communication	Provides timely, concise, and accurate information to others orally and in writing. Helps others effectively communicate and ensures communication occurs between all organisational levels.
Customer focus (User-Centric Mindset)	Anticipates and meets the needs of customers (e.g. users). Seeks feedback from customers (e.g. users) on how services and products are meeting expectations.
Decision-Making	Makes sound, well-informed, and objective decisions; perceives the impact and implications of decisions; commits to action, even in uncertain situations, to accomplish organisational goals; causes change.
Leadership	Motivates and guides others towards goals. Instills commitment to a standard image and shared values. Adapts leadership styles to a variety of situations.
Problem-Solving	Identifies and analyses problems; weighs relevance and accuracy of information; generates and evaluates alternative solutions; makes recommendations.
Strategic Thinking	Formulates effective strategies consistent with the business and competitive strategy of the organisation in a global economy. Examines policy issues and strategic planning with a long-term perspective. Determines objectives and sets priorities; anticipates potential threats or opportunities.
Teamwork	Encourages and facilitates cooperation, pride, trust, and group identity; fosters commitment and team spirit; works with others to achieve goals.

Source: own compilation derived from DOI (2023)

Product management is a critical role that demands distinct competencies (Table 2). Gorchels (2003) and Ebert (2007) highlight the necessity of strategic thinking and customer focus (precisely a user-centric mindset) in the development of a product.

In their day-to-day work, a software product manager must have leadership, communication and decision-making competencies, as they must convince project team members and other organisational stakeholders of the product's vision through the use of data and logical reasoning, despite holding an expert position rather than a managerial one (Rauniar et al., 2008; Tyagi & Sawhney, 2010).

Productive teamwork is also essential for a software product manager as it promotes merging various competencies and perspectives, resulting in increased innovation, productivity, and achievement of common objectives. To develop and deliver software with adequate UX to the market, the IT product manager can collaborate efficiently with other employees (e.g., developers, designers, dedicated UX researchers, and data analysts) within a cross-functional project team (Torres, 2021; Szabó & Hercegfi, 2023).

The product manager is responsible for the outcomes achieved and can handle and overcome issues encountered during development. Therefore, the product manager needs to possess accountability, adaptability, and problem-solving competencies (Wagenblatt, 2019).

The responsibilities and competencies assigned to product managers in their daily work are highly diverse and can differ based on various factors such as the company, target market characteristics, and type of product (Springer & Miler 2018) (Table 2).

Aim of the research and method

This research aims to identify the specific expectations that companies in industrial practice have toward software product managers. Besides analysing the trends of the current IT market, we also look at the differences in expectations depending on the company size. This article utilises content analysis to evaluate the current state of open product manager positions in the Hungarian IT sector. Our study addresses the following research questions:

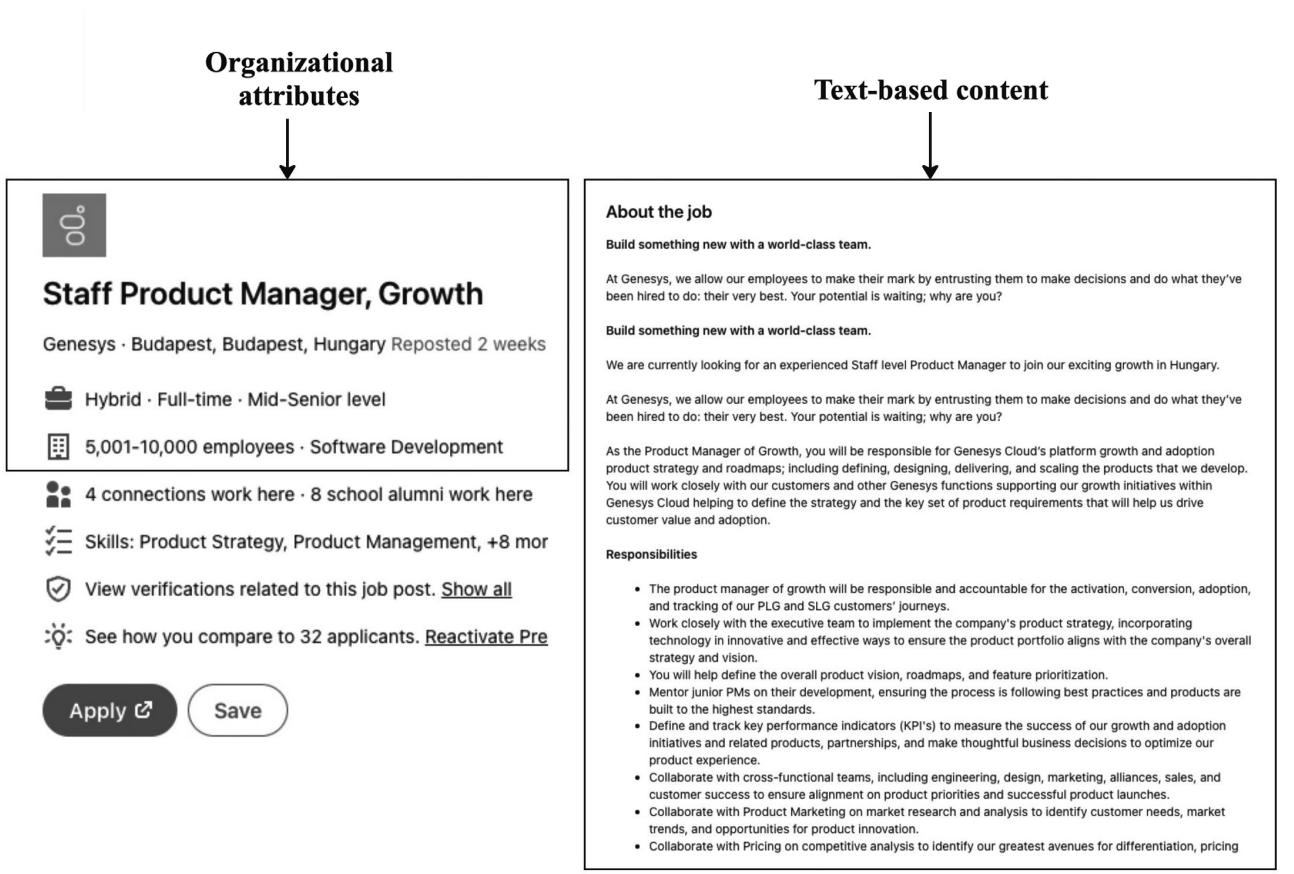
- What are the general expectations toward the software product manager role?
- What are the expected competencies and responsibilities of the software product manager role, depending on the company size?

Characterising the population

Hungary provides an appropriate population for this research because it has a diverse domestic software industry. The Hungarian IT sector comprises various

Figure 2

An example of LinkedIn job advertisements used for content analysis



Source: LinkedIn portal

organisations of different sizes that develop software for widespread sectors, including telecommunications, information services, and computer, electronic, and optical products (HIPA, 2018).

The Hungarian IT market is predominantly dominated by foreign, large companies such as BlackRock, EPAM, Ericsson, Evosoft, IBM, IT Services, Oracle, SAP, and T-Systems, collectively comprising 66% of the market. Additionally, a significant portion (34%) of the IT sector includes micro, small, and medium enterprises (e.g., ApPello, Spend Wize, ARWorks, Tresorit) that have gained global recognition and are renowned for their cutting-edge solutions (Szabó & Hercegfi, 2023).

This suggests that the Hungarian IT industry is sufficiently prominent and diverse, comprising companies of various sizes, making it suitable for our research.

Research method

Marta-Lazo et al. (2018) researched job advertisements from two reputable portals (LinkedIn and Infojobs) specifically targeting journalism graduates. As a similar methodology, content analysis has been addressed in the study. Therefore, we used it as a valuable resource for data analysis on LinkedIn job advertisements for product managers (Soratto et al., 2020). Content analysis aims to derive indicators through systematic and objective methods to describe the content of job offers (Drisko & Maschi, 2016). This allows for the inference of comprehensive knowledge about our research topic.

The job advertisements utilised for the content analysis encompassed two distinct forms of data. At first, LinkedIn advertisements contain various organisational attributes (Figure 2), such as the precise job title, the name and number of employees of the hiring company, the industry sector, the type of employment (office or remote), the work location, and the required level of experience. On the other hand, text-based content encompasses all of the organisation's expectations for product managers. The free-text description provided in a job advertisement on LinkedIn is not bound by strict guidelines, allowing the organisation to determine the quantity and quality of information shared (Figure 2).

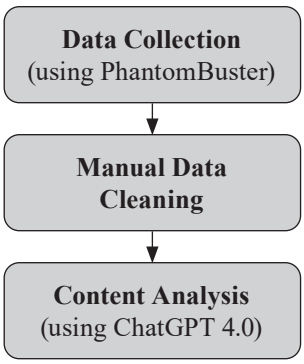
In the current study, we gathered data over an extended duration (from 23 January to 2 July 2023) for content analysis using an automation platform named PhantomBuster (Figure 3).

Nevertheless, owing to the intricate nature of LinkedIn's recommendation algorithm, the outcomes were not limited to 'product manager' advertisements, necessitating the need to refine the results list. Consequently, we cleaned the manual data by reviewing the position titles and descriptions (Figure 3). This allowed us to narrow our focus to job advertising (n=212), specifically for product manager roles.

After examining the advertisement, we initially imported the organisational attributes into an Excel spreadsheet. As part of the content analysis, we applied artificial intelligence (AI) to identify the expectations (e.g., essential competencies and responsibilities) that were in the text-based content (Figure 3). We used OpenAI's ChatGPT 4.0 model to determine the accurate meaning of the parameters being examined, such as essential competencies, in the context of AI. Subsequently, we trained the AI to delineate the criteria for categorising these parameters into groups, such as interpreting leadership as a competence according to the existing competency dictionaries. Following that, we conducted a manual verification of the AI-generated dataset, explicitly examining the set of competencies to ensure the accuracy of the categorisation. In the meantime, we added the new data to the Excel spreadsheet. We created binary variables to signify the presence or absence of predetermined information (such as various competencies) in the advertisement. We employed a similar way in the examination of responsibilities.

Figure 3

Research plan



Source: own compilation

Hypotheses

The research process was devised to utilise the information gathered from the content analysis to address the research questions and examine the following hypotheses:

Hypothesis 1: About the product manager role, companies of varying sizes mention different competencies with varying frequency.

Hypothesis 2: About the product manager role, companies of varying sizes mention different responsibilities with varying frequency.

Results

Characterising the sample

In the present sample (n=212), large companies (e.g. IBM, Morgan Stanley, Revolut) dominate (60.39%), followed by medium-sized companies (e.g. Lensa, Get Bridge) (19.86%), small businesses (e.g. Breezy HR, Carussel) (13.12%) and micro-enterprises (e.g. Deligo Vision Technologies) (6.63%). We classified the organisations by size based on Recommendation 2003/361/EC, which defines micro (less than ten employees), small (between 10 and 50 persons), and medium-sized (between 50 and 250 people) enterprises (EUR-Lex, 2003), while organisations

other than micro (over 250 persons) are considered large companies (Table 3).

Table 3

Composition of the sample by company size

Company size	Number and percentage of job advertisement
Micro-enterprises	11 (6.63%)
Small businesses	28 (13.12%)
Medium-sized companies	42 (19.86%)
Large companies	131 (60.39%)

Source: own compilation

Most (55.66%) of the companies in the sample seeking product managers were from the software development sector. However, there were also companies from telecommunications (5.19%), pharmaceuticals (4.72%), banking (4.25%), automotive (4.25%), human resources (3.77%), education (3.3%), marketing (1.89%), e-commerce (1.42%), insurance (1.42%), and gaming (1.42%) sectors. The remaining organisations, accounting for 12.71% of the total, include sectors such as research, medical device development, international trade, and industrial automation.

Title of the position

Only a minority (16.51%) of the organisations in this sample merely carried the job title 'Product Manager', whereas the majority (83.49%) employed a more precise designation. Therefore, IT organisations seem to supplement the position title with supplementary details that specify the type of product manager they seek. Three distinct categories comprise this additional information.

The first group includes organisations that specify the specific domain in the job title (e.g., 'Product Manager (Software & Cloud Solutions)', 'OpenStack Product Manager'). The second category comprises information that associates the anticipated level of experience required to occupy the position (e.g., 'Senior Product Manager') or explicitly denotes its rank within the organisational structure ('Principal Product Manager', 'Director of Growth Product Management'). Besides that, the third group contains job advertisements in which the job description explicitly outlines the responsibilities of a product manager, despite the absence of a product manager term in the position title. These position titles (e.g., 'IT Product Owner' and 'Product Owner for Automated Driving') are found in IT companies using agile software development.

The current trend in software development is agile methodology, which strongly emphasises ongoing communication with customers and prioritises flexible feedback management regarding evolving requirements (Dingsøyr et al., 2012). Scrum, Kanban, and eXtreme Programming (XP) are the prevailing agile practices in software development, used individually or in combination (VersionOne, 2022). Scrum is an agile framework that provides guidelines for development projects, defining appropriate actions and methods to enhance work efficiency (Szabó & Ribényi, 2018).

In practice, an essential component of the Scrum methodology is the role of the Product Owner (PO), who carries the responsibility for the success of product development. The primary mission of the PO is to discern the software functions that provide the most outstanding value and create a prioritised list of tasks (McGreal & Jocham, 2018). The responsibilities of product managers encompass a more comprehensive array of functions than the Product Owner's role. Depending on the size of the organisation, product managers, in practice, may assume the role of PO. However, in most organisations, it is more effective to distinguish between the two roles (Springer & Miler, 2018).

The role of product manager may be referred to by various titles in the IT industry, which could create challenges for applicants seeking employment. Therefore, as a job seeker, it is not advisable to exclusively filter for 'Product Manager' as this may result in overlooking numerous relevant opportunities.

Experience required

LinkedIn advertisements consistently indicate the level of experience required, offering options such as 'Internship', 'Entry-level', 'Associate', 'Mid-Senior', and 'Director/ Executive' categories. LinkedIn does not provide clear guidelines on the specific level to choose in each situation. Thus, organisations are responsible for determining the appropriate experience level.

Table 4

Average and standard deviation of years expected by organisations towards product managers by experience level

Experience level	Micro-enterprises	Small businesses	Medium-sized companies	Large companies	Total	Average of expected years	Standard deviation
Internship	0	0	0	3	3 (1.41%)	0	0
Entry level	1	3	9	9	22 (10.38%)	3.13	1.46
Associate	2	2	3	20	27 (12.73%)	1.6	1.12
Mid-Senior	4	17	25	81	127 (59.91%)	3.95	1.94
Senior	4	5	5	15	29 (13.68%)	4.22	1.77
Director/ Executive	0	1	0	3	4 (1.89%)	5.5	0.71

Source: own compilation

In most (74.53%) job advertisements, organisations specified the desirable work experience for the product manager position. The mean (M) of 3.66 years and the standard deviation (SD) of 1.97 were obtained for the sample.

For organisations that do not require work experience, internship opportunities were limited (1.42%) (Table 4). Explainable by the larger size of project teams, the current sample consists solely of large companies offering 'Internship' positions. This is because larger businesses are more likely to possess the resources and capability to mentor an intern.

Nevertheless, organisations demand 3.13 years (SD=1.46) of professional experience from entry-level candidates, while associate candidates are expected to possess merely 1.6 years of experience (SD=1.16). Regarding all of this, it is possible that organisations do not understand the distinction between the 'Entry level' and 'Associate' categories. The primary distinction between these two levels is that the 'Entry level' category represents a lower-level entry position, whereas the 'Associate' classification implies an opportunity with a greater likelihood of advancement to a higher position. LinkedIn does not clarify the desired criterion regarding years for various experience levels, causing HR experts to associate them with the typically assumed 1-3 years of junior-level experience in corporate practice.

The 'Mid-Senior' level is the most frequently desired, with 59.91% of organisations advertising in this category. Given the high number (n=127) of 'Mid-Senior level' advertisements, many companies expect more than three years of experience at this level (M=3.95, SD=1.94). The specified 'Mid-Senior' experience values range between 1 and 12 years.

In addition, in the current sample, the 'Senior' level appears with a comparable frequency (13.68%) to the 'Entry level' and 'Associate' category. Organisations require 4.22 (SD=1.77) years of experience for this level (Table 4). Only 1.89% of the sample sought product manager experts for leadership roles at the 'Director/ Executive' level. The lack of representation of higher positions is to be expected, given that most Hungarian IT organisations have relatively small product management teams, which typically require only one leader. The head of product management is generally employed by organisations with international headquarters in most IT-related businesses in Hungary (HIPA, 2018). In Hungarian enterprises, the selection process for senior management positions such as 'Chief Product Officer' or 'Head of Product' involving product managers is predominantly conducted internally, via a network of contacts, or in collaboration with an external human resources agency. The significant degree of accountability and fiduciary responsibilities inherent in these roles are the primary reasons for this.

Qualifications required

Only 49.06% of the organisations specified that a higher education degree was necessary for the product manager role. Out of this sub-sample, 36.54% provided information about the academic discipline in which they expected to obtain a bachelor's or master's degree. The primary disciplines (84.21%) highlighted in this sample were business (e.g., economics, marketing, sales) or IT. Additionally, science (e.g. mathematics) represented 15.79% of the sample. Within the science category, some companies have particular qualification requirements. For instance, McKinsey specifies a Master's degree in Science, Technology, Engineering, and Mathematics (STEM), while having an MBA or PhD is advantageous during the application process.

According to the current sample, it can be inferred that the corporate practices do not definitively establish the specific level of industry knowledge required for a candidate to work as a product manager. Out of the total of 118 job advertisements in the software industry, only 20 mention specific software development knowledge. In addition, only a few job advertisements require specialised industry knowledge. For example, AstraZeneca is specialised in the healthcare industry.

The results show that product management competencies carry more value in the IT market than industry experience and comprehensive domain knowledge. In specific sectors (e.g. healthcare), industry expertise is critical. The findings of this study emphasise the interdisciplinary characteristics of the role of product management.

Language competencies

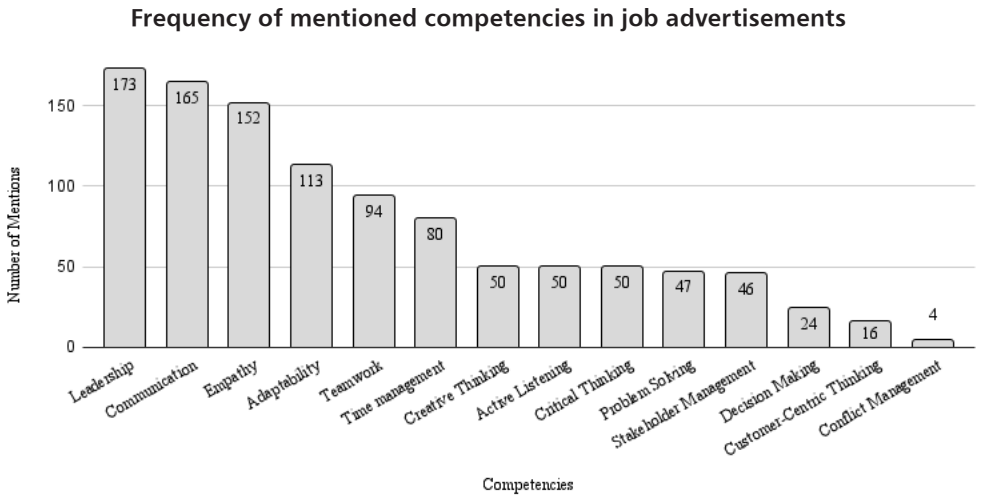
Among the job advertisements in this sample, 45.28% explicitly reference the requirement for language proficiency. English is expressly stated as a requirement in every instance within this subsample. Besides that, German (5.66%), Spanish (0.94%), and French (0.47%) are cited as second languages. In these instances, the second language could be associated with the organisation's location or target market.

The current sample comprised 89.62% of job advertisements written in English, indicating an implicit expectation regarding fluency in English. Furthermore, all job advertisements in Hungarian (10.38%) specified that English language competencies are required. The results show that the product management profession has a clear expectation that candidates possess the ability to operate in English.

Essential competencies

When considering the aggregate frequencies, the competencies that are most frequently referenced as being necessary by organisations in the advertisements are as follows: leadership (81.60%), communication (77.33%), empathy (71.70%), adaptability (53.33%), and teamwork (44.34%) (Figure 4). This implies that companies seek product managers who can inspire and motivate team members, create and communicate a vision for the product under development, and make consequential strategic decisions.

Figure 4



Source: own compilation

Following this, time management (37.74%) is cited as a crucial competence for product managers that requires effectively balancing numerous responsibilities and fulfilling deadlines. Subsequently, creative thinking (23.58%), which involves the application of innovative ideas and solutions, is observed. This is followed by active listening (23.58%), which entails comprehending and being attentive during communication. Next, critical thinking (23.58%) is emphasised, along with problem-solving (22.17%) and stakeholder management (21.69%). These competencies signify the requirement for product managers to possess the ability to examine the encountered difficulties, deconstruct them into components, assess the emerging solutions, and employ logical thinking and reasoning to select the most suitable option. Additionally, they must be capable of effectively communicating altered development directions to the key stakeholders. At the lowest rank on the list are decision-making (11.32%), customer-centric thinking (7.54%), and conflict management (1.88%) competencies (Figure 4). In addition to focusing on customer needs and accepting responsibility for decisions and risks, these underappreciated abilities constitute the fundamental requirements of the product management profession. Consequently, the low frequency of these competencies is not unexpected.

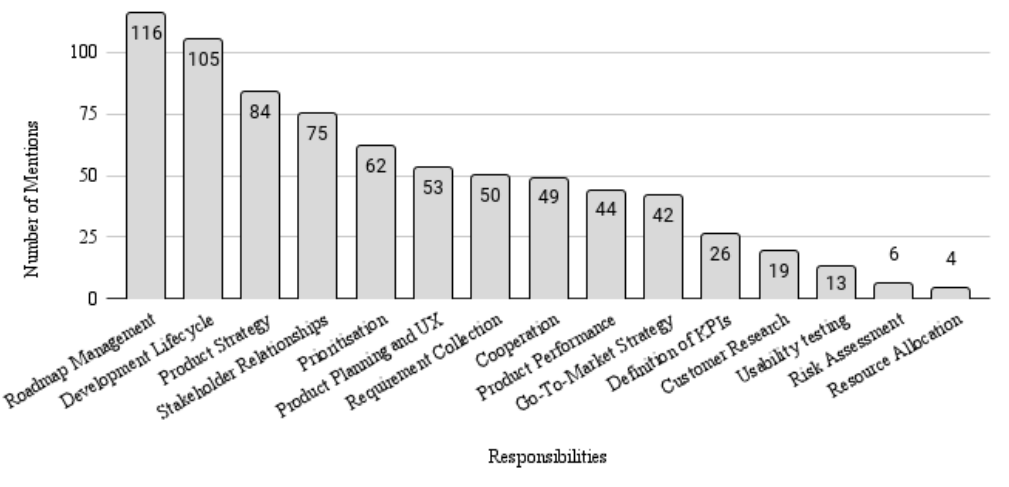
Essential responsibilities

The responsibilities that are most commonly mentioned in job advertisements are roadmap management (54.72%) and development lifecycle (49.53%) (Figure 5). This means that the product manager is in charge of creating a roadmap that specifies the upcoming features that must be developed and the obstacles that must be overcome. Assuring feature delivery through daily close collaboration with developers from concept to launch, the product manager maintains control over the product development lifecycle.

The subsequent task identified was product strategy development (39.62%), ensuring that product objectives align with the organisation's goals. Aside from stakeholder relationships (35.58%), which refers to continuous communication with stakeholders and understanding their expectations, this sample also addressed prioritisation (29.25%), which requires collaboration between product managers and developers to determine the order in which tasks should be implemented, taking into account their business value and user requirements.

The value assigned to product planning and UX is 25%, while requirement collection is valued at 23.58%, both of which are lower. Product planning and UX involve supervising the design of a product while collaborating closely with UX/UI designers. In addition, collecting requirements is one of the primary responsibilities of product managers for comprehensive specifications of the new features. Fulfilling stakeholder demands and considering user requirements are fundamental expectations of the product manager profession. Thus, these respon-

Figure 5



Source: own compilation

sibilities are not expected to be the primary focus of the described criteria.

Cooperation (23.11%) and product performance (20.75%) received comparable ratings in this sample. The product manager's complicated responsibilities require cooperation with individuals and teams throughout product development. Product performance monitoring involves the ongoing process of gathering feedback and analysing data related to the functionality of a software product to understand how the market is responding to it.

The product manager can execute a go-to-market strategy (19.81%), which entails developing a comprehensive plan for launching and marketing a new product or feature.

The job advertisements specify the definition of key performance indicators (KPIs) with a rating of 12.26%. Key Performance Indicators (KPIs) help evaluate product development projects, establish ambitious goals, and quantify the achieved outcomes, making them crucial in the IT industry (Kaganski et al., 2017).

The product manager's role primarily concerns customer research (8.16%) and usability testing (6.13%) activities. In addition, risk assessment (2.83%) and resource allocation (1.89%) were brought up. These responsibilities are related to the efficient allocation of resources such as budget, time, and human resources, as well as identifying potential risks at every stage of the product's life cycle.

Results of the hypothesis tests

Due to their small specimen sizes, microenterprises and small enterprises were merged to conduct the hypothesis tests.

Hypothesis 1 states that companies of varying sizes mention different competencies with varying frequency concerning the product manager role. Because the assessed competencies are binary indicators and the size of the organisation variable is nominal, it is possible to examine the first hypothesis presented in the advertisements by implementing chi-square tests for various competencies. Among the 14 competencies, there were significant differences in the present sample in two cases. These were leadership ($\chi^2(2)=14.843$, $p=0.001$) and active listening ($\chi^2(2)=6.111$, $p=0.047$) competencies (Table 5).

Thus, Hypothesis 1 was partially accepted in the present sample because it was confirmed that companies of different sizes mention leadership and active listening competencies with different frequencies about product managers. The chi-square tests reveal that large companies exhibited a higher prevalence (89.31%) of mentioning leadership competence compared to medium-sized (73.81%) or micro and small companies (64.10%). In addition, it can be observed that the mention of active listening competence was less frequent (10.25%) in micro and small companies compared to medium-sized (33.33%) and large companies (24.43%). Nevertheless, caution should be exercised when interpreting the results pertaining to active listening competence, as the associated p-value is close to 5% (Table 5).

According to Hypothesis 2, companies of varying sizes mention differ-

Table 5

Contingency tables and chi-square test results for leadership and active listening competencies

Company category	Competence	Leadership		Active listening	
		0	1	0	1
Micro and small	Count	14	25	35	4
	Percentage within row	35.90%	64.10%	89.75%	10.25%
Medium	Count	11	31	28	14
	Percentage within row	26.19%	73.81%	66.67%	33.33%
Large	Count	14	117	99	32
	Percentage within row	10.69%	89.31%	75.57%	24.43%
Total	Count	39	173	162	50
	Percentage within row	18.40%	81.60%	76.41%	23.59%
Chi-Squared Tests (α=0.05)	**df**	**X^2**	**p**	**X^2**	**p**
	2	**14.843**	**0.001**	**6.111**	**0.047**

Source: own compilation

Table 6

Contingency table results for cooperation responsibility

Company category	Responsibility	Cooperation	
		0	1
Micro and small	Count	19	20
	Percentage within row	48.72%	51.28%
Medium	Count	34	8
	Percentage within row	80.95%	19.05%
Large	Count	110	21
	Percentage within row	83.97%	16.03%
Total	Count	163	49
	Percentage within row	76.89%	23.11%
Chi-Squared Tests (α=0.05)	**df**	**X^2**	**p**
	2	**21.502**	**0.001**

Source: own compilation

ent responsibilities regarding product manager roles with varying frequency. This hypothesis was also evaluated using a chi-square test for each responsibility. Out of the 15 responsibilities, there was a significant difference in the present sample in cooperation ($\chi^2(2)=21.502$, $p=0.001$) responsibility.

Thus, Hypothesis 2 was partially accepted in the present sample because it was confirmed that companies of different sizes mention the cooperation responsibility with different frequencies towards product managers. The chi-square test indicates that micro- and small enterprises exhibit the highest level (51.28%) of cooperation, whereas it is mentioned less among medium-sized (19.05%) and large companies (16.03%) (Table 6).

Discussion

Our empirical research reveals that companies of diverse sizes offer product manager roles. However, a significant majority of over 60% of the available product manager positions are advertised by large corporations. The dominance of large companies in the sample suggests that product management roles are more prevalent in larger organisations, possibly due to the complexity and scale of their projects.

According to the research findings, it can be concluded that organisations frequently (59.9%) seek 'Mid-Senior' level product managers on LinkedIn. Furthermore, it is a fact that the role of product manager requires a minimum of 3 years of experience, regardless of the level of experience specified in the job advertisement.

In the software market, a small number (1.42%) of internships for entry-level and 'Director/Executive' level opportunities for highly experienced professionals (1.89%). From these, 'Internship' positions are only available at large companies, which is unsurprising, considering that a large company usually has more capacity for mentoring activities. Besides that, instead of posting public job advertisements, companies in the IT market primarily seek product leaders for the 'Director/Executive' level within the organisation through a network of contacts or with the help of an HR agency. This is understandable given the substantial responsibilities of the executive-level product manager position.

According to the analysed job advertisements, product managers must possess professional working proficiency in English and knowledge suitable for effective communication. This could be attributed, on the one hand, to the global scope of the data source and, on the other hand, to the fact that most of the companies operate in an international market, where effective communication with customers and partners requires product managers to have command of proficient English language abilities.

Regarding IT product manager positions, a degree in economics (e.g., marketing, sales) or IT is the most commonly required qualification (84.21%). Product management is multidisciplinary, so these conditions frequently meet the organisation's expectations. In selecting product managers, practical job experience is prioritised over formal education.

Based on this sample, it can also be concluded that the organisations do not specify the precise level of industry expertise that a product manager candidate must have. Based on an examination of the job advertisements, it appears that in the IT market, product management knowledge is more crucial than domain expertise.

The theoretical framework of our work outlined the overarching expectations and competencies related to product management positions in the IT industry. The literature underlines the interdisciplinary aspect, emphasising the necessity of a thorough understanding of business demands, technological opportunities, and stakeholder requirements. Theoretical perspectives emphasise the importance of specific competencies in software product management roles, such as strategic thinking, teamwork, customer focus (user-centred mindset), leadership, communication, problem-solving, decision-making, adaptability, and accountability.

The study's results section presents empirical evidence based on the content analysis of LinkedIn job advertisements (n=212). The findings support all aspects of the theoretical framework except for the competency of accountability. Product managers are responsible for ensuring the success of the products they oversee. Continuously taking ownership of their decisions is necessary for the product manager role, making accountability an implicit competence. Furthermore, empirical research demonstrates that specific additional competencies are essential for job requirements. These competencies include empathy, time management, creative and critical thinking, active listening, and stakeholder management. The results also quantify the frequency of all the mentioned competencies, allowing for the possibility of assigning weights to them to understand better their relative importance to organisations in their recruitment processes for software product managers. Leadership, communication, and empathy emerge as the most frequently cited competencies, mentioned in at least 70% of the advertisements, emphasising product management's interpersonal and strategic aspects.

Regarding responsibilities, there is considerable alignment between the descriptions in the literature and the empirical findings. However, while the core and supporting responsibilities outlined in the theoretical framework primarily focus on internal (organisational) activities (from vision creation to product launch), the empirical results also encompass external responsibilities (such as customer research and defining go-to-market strategy). The significance of UX relevance, as explained in the theory, is affirmed by empirical findings. This is due to the inclusion of feedback collection (specifically related to product performance), usability testing, and customer research as essential responsibilities.

In addition, organisations seeking product managers often use a wide range of job titles, which reflect the diverse nature of product management roles within different organisations and industries. This outcome demonstrates

that the product development company's characteristics, internal procedures, and organisational values can influence the scope of responsibilities of a product manager.

The hypothesis tests conducted on companies of varying sizes revealed significant differences in the frequency of competencies and responsibilities within the current sample. For instance, more giant corporations prioritise leadership and active listening competencies, highlighting the importance of efficient management and communication in bigger teams and projects. Similarly, within responsibilities, cooperation plays a more crucial role in micro and small enterprises, where product managers are expected to ensure that the entire organisation works closely together, ensuring effective teamwork and a strong focus on agile operation.

Consequently, software product managers must possess an all-encompassing understanding of the domain areas where a given organisation's business requirements, user preferences, and technological capabilities intersect to meet the varied expectations that can be placed upon them.

Conclusion

Job seekers in the product management field should be aware of the diverse titles, responsibilities, and qualifications associated with different roles and industries. Understanding potential employers' specific requirements and expectations can help candidates tailor their resumes and applications accordingly, increasing their chances of success in the competitive job market.

Leadership, communication, and empathy are, in general, essential for the success of product managers in the IT industry. The top five responsibilities that a product manager must handle at any company size include roadmap management, development lifecycle monitoring, product strategy development, stakeholder management, and development task prioritisation. Future product managers must also anticipate the need to monitor the product's complete life cycle consistently. Product managers in the software market oversee all UX aspects of product development. Their work begins before creating the product idea and continues even after launching it. The empirical findings demonstrate that software product managers are actively anticipated to acquire and understand user requirements, conduct usability testing, and gather feedback following the release of the product. While the basic principles of the user-centred approach may be readily acquired and are widely embraced by numerous universities in Hungary and worldwide, it is crucial to acknowledge that there are no universally applicable UX research methods for all software products. Therefore, it is vital to thoroughly comprehend the fundamental nature and practicality of different UX research methodologies and to consistently stay informed about the latest technical advancements in the field through resources such as books and online publications. This ensures that one's expertise remains current and relevant.

Given the nature of this career, which involves creativity and problem-solving, software product managers can contribute to the project success of different digital products. As a result, the practical knowledge gained becomes more valuable. Thus, employability may be more time-consuming for those without relevant professional experience. Most companies prefer applicants with at least three years of experience. Hence, while pursuing academic studies, it is advantageous to attempt to gain practical experience at a software market organisation.

To summarise, software product management provides a fulfilling and dynamic career opportunity for individuals with a strong interest in technology, innovation, and creating a meaningful impact. Software product management combines strategic thinking, creative problem-solving, and collaborative teamwork to enable individuals to bring about positive change and influence the future of technology.

The profession of product manager is a beneficial long-term investment, as skilled product managers leverage their extensive expertise and capacity to move between companies and apply their diverse knowledge gained from various industries to ensure the market success of their current product.

Limitations

The job advertisements analysed in this research share a common characteristic: they primarily focus on developing suitable products in response to business and customer requirements in collaboration with various departments, either at a strategic or operational level. This definition excluded similar yet related positions of product manager expertise, such as project manager and agile coach.

Given that our analysis solely focused on LinkedIn ads, it is possible that there were further job advertisements on other Hungarian job portals or technology companies' websites during the reviewed period that were not considered in our analysis.

Further research

Since the content analysis is limited to a shorter time frame and only considers advertisements on LinkedIn, we intend to extend the research using a comparable approach throughout 2023 to expand the dataset. We also seek to investigate the specific practical expectations placed upon IT product managers through qualitative interviews conducted with professionals in this field. Conducting qualitative research on a sample of 20 individuals allows for a comprehensive examination of the topic. This research will compare the competencies and responsibilities mentioned in job advertisements for product managers and the actual expectations in industrial practice.

References

Aaker, D.A., & Joachimsthaler, E. (2012). *Brand leadership.* Simon and Schuster.

Aimé, I., Berger-Remy, F., & Laporte, M.E. (2018). Lessons from nearly a century of the brand management system. *Journal of Historical Research in Marketing*, *10*(4), 420–450. https://doi.org/10.1108/JHRM-06-2017-0026

Banfield, R., Eriksson, M., & Walkingshaw, N. (2017). *Product leadership: How top product managers launch excellent products and build successful teams*. O'Reilly Media.

Berander, P., & Andrews, A. (2005). Requirements Prioritization. In Aurum, A., & Wohlin, C. (Eds.), *Engineering and Managing Software Requirements* (pp. 69-94). Springer. https://doi.org/10.1007/3-540-28244-0_4

Brem, A., & Wolfram, P. (2014). Research and development from the bottom up-introduction of terminologies for new product development in emerging markets. *Journal of Innovation and Entrepreneurship*, *3*(1), 1–22. https://doi.org/10.1186/2192-5372-3-9

Chisa, E. (2014). Evolution of the product manager. *Communications of the ACM*, *57*(11), 48–52. https://doi.org/10.1145/2669480

Cummings, W.T., Jackson Jr, D.W., & Ostrom, L.L. (1984). Differences between industrial and consumer product managers. *Industrial Marketing Management*, *13*(3), 171–180. https://doi.org/10.1016/0019-8501(84)90030-0

Dingsøyr, T., Nerur, S., Balijepally, V., & Moe, N.B. (2012). A decade of agile methodologies: Towards explaining agile software development. *Journal of Systems and Software*, *85*(6), 1213–1221. https://doi.org/10.1016/j.jss.2012.02.033

Drisko, J.W., & Maschi, T. (2016). *Content analysis*. Pocket Guide to Social Work Re.

DOI. (2023). *Competency Dictionary. U.S. Department of the Interior.* https://www.doi.gov/sites/doi.gov/files/competency-dictionary-jan-2023-508-compliant.pdf

Ebert, C. (2007). The impacts of software product management. *Journal of Systems and Software*, *80*(6), 850–861. https://doi.org/10.1016/j.jss.2006.09.017

Ebert, C., & Brinkkemper, S. (2014). Software product management – An industry evaluation. *Journal of Systems and Software*, *95*, 10–18. https://doi.org/10.1016/j.jss.2013.12.042

Eriksson, M. (2011). *What, exactly, is a Product Manager?* Mind the Product. https://www.mindtheproduct.com/what-exactly-is-a-product-manager/

EUR-Lex. (2003). Document L:2003:124:TOC. *Official Journal of the European Union*, *46*(124), 54.

Fernandes, M.F. (2016). *Competency Profiling for Product Managers* [ISCTE University Institute of Lisbon]. https://repositorio.iscte-iul.pt/bitstream/10071/14065/1/Dissertação_Mariana_Fernandes_67880.pdf

Finch, D.J., Levallet, N., McIntyre, S.M., & Pyde, K. (2023). What makes a product manager? A dynamic capabilities view of product management. *International Journal of Product Development*, *27*(3), 213–244. https://doi.org/10.1504/IJPD.2023.133056

Gorchels, L. (2003). Transitioning from engineering to product management. *Engineering Management Journal*, *15*(4), 40–47. https://doi.org/10.1080/10429247.2003.11415224

Grützner, T., Schnider, C., Zollinger, D., Seyfang, B.C., & Künzle, N. (2016). Reducing time to market by innovative development and production strategies. *Chemical Engineering & Technology*, *39*(10), 1835–1844. https://doi.org/10.1002/ceat.201600113

HIPA. (2018). Information and communication technology sector in Hungary. *Hungarian Investment Promotion Agency report*. https://hipa.hu/images/publications/hipa-ict-in-hungary_2018_09_20.pdf

Hise, R.T., & Kelly, J.P. (1978). Product Management on Trial: Its Advantages and Disadvantages… and what can be Done to Improve it. *Journal of Marketing*, *42*(4), 28–33. https://doi.org/10.1177/002224297804200404

Jindal, R.P., Sarangee, K.R., Echambadi, R., & Lee, S. (2016). Designed to Succeed: Dimensions of Product Design and Their Impact on Market Share. *Journal of Marketing, 80*(4), 72-89. https://doi.org/10.1509/jm.15.0036

Kaganski, S., Majak, J., Karjust, K., & Toompalu, S. (2017). Implementation of Key Performance Indicators Selection Model as Part of the Enterprise Analysis Model. *Procedia CIRP*, *63*, 283–288. https://doi.org/10.1016/j.procir.2017.03.143

Kessler, C., & Sweitzer, J. (2007). *Outside-in Software Development: A Practical Approach to Building Successful Stakeholder-based Products*. Pearson Education.

Kittlaus, H.B. (2017). *Software product management: The ISPMA-Compliant Study Guide and Handbook*. Springer. https://doi.org/10.1007/978-3-662-65116-2

Kittlaus, H.B., & Clough, P.N. (2009). *Software product management and pricing: Key success factors for software organizations*. Springer.

Kneuper, R. (2018). *Software processes and lifecycle models*. Springer.

Lesser, E., & Ban, L. (2016). How leading companies practice software development and delivery to achieve a competitive edge. *Strategy & Leadership, 44*(1), 41-47. https://doi.org/10.1108/SL-11-2015-0083

Lica, M.D. (2021). The Art of Product Management – a Practical Guide for Product Value Maximization. *Resilience and Economic Intelligence Through Digitalization and Big Data Analytics*, 412–422. https://doi.org/10.2478/9788366675704-041

Low, G.S., & Fullerton, R.A. (1994). Brands, brand management, and the brand manager system: A critical-historical evaluation. *Journal of Marketing Research*, *31*(2), 173–190. https://doi.org/10.2307/3152192

Luck, D.J. (1969). Interfaces of a product manager. *Journal of Marketing*, *33*(4), 32–36. https://doi.org/10.2307/1248670

Lukassen, C., & Schuurman, R. (2023). *Practical Product Management for Product Owners: Creating Winning Products with the Professional Product Owner Stances*. Addison-Wesley Professional.

Maglyas, A., Nikula, U., & Smolander, K. (2013). What are the roles of software product managers? An empirical investigation. *Journal of Systems and Software*, *86*(12), 3071–3090. https://doi.org/10.1016/j.jss.2013.07.045

Marta-Lazo, C., González-Aldea, P., & Herrero-Curiel, E. (2018). Professional competencies and profiles in journalism demanded by companies: Analysis of offers at LinkedIn and Infojobs. *Communication & Society*, *31*(4), 211–228. https://doi.org/10.15581/003.31.4.211-228

McElroy, N.H. (1931). *Company memo: Marketing – Brand Teams*. https://www.mindtheproduct.com/wp-content/uploads/2015/10/McElroyBrandMan.pdf

McGrath, M.E. (2004). *Next Generation Product Development: How to Increase Productivity, Cut Costs, and Reduce Cycle Times*. McGraw Hill.

McGreal, D., & Jocham, R. (2018). *The professional product owner: Leveraging scrum as a competitive advantage*. Addison-Wesley Professional.

Parker, A., & Brown, I. (2019). Competencies requirements for cyber security professionals: a content analysis of job descriptions in South Africa. In *Information Security: 17th International Conference, ISSA 2018, Pretoria, South Africa, August 15–16, 2018, Revised Selected Papers 17* (pp. 176–192). Springer. https://doi.org/10.1007/978-3-030-11407-7_13

PMI. (2021). *Project management body of knowledge (PMBOK Guide)* (7th ed.). Project Management Institute.

Pranam, A. (2018). *Product Management Essentials*. Apress. https://doi.org/10.1007/978-1-4842-3303-0

Quiñones, D., Rusu, C., & Rusu, V. (2018). A methodology to develop usability/user experience heuristics. *Computer Standards & Interfaces*, *59*(C), 109–129. https://doi.org/10.1016/j.csi.2018.03.002

Rauniar, R., Doll, W., Rawski, G., & Hong, P. (2008). The role of heavyweight product manager in new product development. *International Journal of Operations & Production Management*, *28*(2), 130–154. https://doi.org/10.1108/01443570810846874

Soratto, J., Pires, D.E.P. de, & Friese, S. (2020). Thematic content analysis using ATLAS. ti software: Potentialities for researchs in health. *Revista Brasileira de Enfermagem*, *73*. https://doi.org/10.1590/0034-7167-2019-0250

Spring, D. (2013). The Globalization of American Advertising and Brand Management: A Brief History of the J. Walter Thompson Company, Procter and Gamble, and US Foreign Policy. *Global Studies Journal*, *5*(4). https://doi.org/10.18848/1835-4432/CGP/V05I04/40869

Springer, O., & Miler, J. (2018). The role of a software product manager in various business environments. In *2018 Federated Conference on Computer Science and Information Systems (FedCSIS)* (pp. 985–994). IEEE.

Steinhardt, G. (2017). Defining Product Management. In G. Steinhardt (Ed.), *The Product Manager's Toolkit: Methodologies, Processes, and Tasks in Technology Product Management* (pp. 89–96). Springer International Publishing. https://doi.org/10.1007/978-3-319-49998-7_10

Strader, T.J. (2010). *Digital Product Management, Technology and Practice: Interdisciplinary Perspectives: Interdisciplinary Perspectives*. IGI Global.

Szabó, B., & Hercegfi, K. (2023). User-centered approaches in software development processes: Qualitative research into the practice of Hungarian companies. *Journal of Software: Evolution and Process*, *35*(2), 1–28. https://doi.org/10.1002/smr.2501

Szabó, B., & Ribényi, M. (2018). Az agilis módszertanok megítélése a beosztottak és vezetők szemszögéből. *Vezetéstudomány/Budapest Management Review*, *49*(6), 22–32. https://doi.org/10.14267/veztud.2018.06.03

Torres, T. (2021). *Continuous Discovery Habits: Discover Products that Create Customer Value and Business Value*. Product Talk LLC.

Tyagi, R.K., & Sawhney, M.S. (2010). High-performance product management: the impact of structure, process, competencies, and role definition. *Journal of Product Innovation Management*, *27*(1), 83–96. https://doi.org/10.1111/j.1540-5885.2009.00701.x

VersionOne. (2022). *16th Annual State Of Agile Report* (Vol. 16, Issue 1). https://info.digital.ai/rs/981-LQX-968/images/AR-SA-2022-16th-Annual-State-Of-Agile-Report.pdf

Wagenblatt, T. (2019). Software Product Management: Finding the Right Balance for YourProduct Inc. In *Product Development: The Essential Part of Your Software Product Manager Role* (pp. 227–314). Springer. https://doi.org/10.1007/978-3-030-19871-8_5