Factors Shaping Project Manager Salaries in Hungary: The Role of Certification, Experience, and Other Key Attributes

Bálint Blaskovics[1], Ágnes Csiszárik-Kocsir[2,*] János Tóth[3], László Kremmer[4]

[1] Corvinus University of Budapest, Budapest, Hungary. Email: balint.blaskovics@uni-corvinus.hu ORCID: 0009-0003-4180-6844
[2] Keleti Károly Faculty of Business and Management, Óbuda University, Budapest, Hungary. Email: kocsir.agnes@kgk.uni-obuda.hu ORCID: 0000-0001-5454-7843
[3] Corvinus University of Budapest, Budapest, Hungary. Email: janos.toth@uni-corvinus.hu ORCID: 0009-0003-4180-6844
[4] Corvinus University of Budapest, Budapest, Hungary. Email: laszlo.kremmer@uni-corvinus.hu ORCID: 0000-0003-3359-1997

ARTICLE INFO

ABSTRACT

Research on the determinants of wages remains relatively limited, particularly within Central and Eastern Europe. This study addresses this gap by examining the personal factors that influence both salary levels and overall remuneration of project managers. The investigation employed two perspectives, one centred on corporate positions and the other on the project management discipline. Data were collected from Hungarian project managers using the 11th edition of the Project Management Institute's Salary Survey questionnaire. A total of 257 valid responses were analysed through descriptive statistics and multivariate methods. The results revealed several variables with a significant effect on salary and total compensation. In relation to salary, eight factors were identified: possession of a PMP® certification (13%), length of professional experience (2% per year), years of project management experience (1–2% per year), along with five specific job positions (21–33%). For total compensation, six key determinants were found: PMP® certification (15–16%), work experience (2% per year), project management experience (2% per year), weekly working hours (0.6% per hour), portfolio management competence (12%), non-predictive approaches such as agile, iterative or incremental methods (10–13%), and risk management competence (13–14%). These insights are valuable for project management practitioners when negotiating remuneration and also provide a basis for researchers and human resource specialists to enhance salary and benefits estimation models.

1. Introduction

Projects are regarded as a fundamental source of competitive advantage, forming a crucial component for organizations of every size and across all industries [1; 2; 3]. Recognising this significance, scholars have investigated the reasons that lead to both the success and failure of projects [4]. Broad agreement exists that successful projects require an appropriate organisational framework, skilled and motivated personnel (both project managers and team members), as well as

---

effective planning. Conversely, the absence of these conditions can contribute to project failure [5; 6]. Certain studies stress the importance of risk management at both the organisational and project levels [7; 8], while others place greater emphasis on stakeholder engagement and institutional support [9]. Despite these variations, most scholars concur that the project manager plays a decisive role in determining project outcomes. A competent manager, with knowledge of organisational and industry-specific characteristics, can mitigate the absence of other critical success factors [1; 2; 10].

The responsibilities and skill sets required of project managers have evolved considerably in recent decades. Early contributions, such as those of Gaddis [11], emphasised the necessity of risk-taking behaviour and the ability to manage both senior executives and technical teams. In the present context, project managers are expected not only to oversee planning and implementation but also to deliver business value, manage stakeholders, and assemble effective project teams. However, concerns have been raised regarding compensation, as inadequate remuneration relative to a manager's competencies may result in diminished motivation and dissatisfaction [12]. Motivation theories also underline the role of salary. Maslow [13] noted that adequate remuneration helps individuals satisfy basic physiological and safety needs, which form the foundation of the hierarchy of needs [14]. Later research argued that wages can contribute to fulfilling higher-level needs as well [15]. Herzberg [16] reached a similar conclusion, observing that salary functions as a hygiene factor, where its absence undermines motivation. Globerson [17] was among the first to propose that compensation for project managers should include performance-related elements and reflect project-based competencies.

Defining a universal set of competencies for project managers is challenging, given their diversity and contextual nature [18]. Consequently, the determination of appropriate compensation is shaped by numerous variables. Previous work has demonstrated that experience, position, and specific competencies can influence salary levels [19; 20; 21], although their relative weight has rarely been quantified in detail. Other scholars highlight the value of certification in salary determination [22]. It is now widely recognized that senior positions and professional experience tend to increase expected salaries [23; 24]. Ardis [25] first reported salaries of project managers, showing that managers in Asia and the United States earned above-average wages, while their counterparts in Canada, Australia, Europe, Latin America and the Middle East received below-average salaries. This survey also revealed that certified PMP® holders consistently earned at least 10% more than non-certified managers.

Evidence from prior research underscores the importance of adequate remuneration for project managers [26]. Although numerous studies have addressed determinants of salary [19; 27; 28; 29], these have generally focused on general management rather than project management specifically, often isolating factors such as work experience. Consequently, scholarship on the determinants of project managers' compensation remains limited, particularly within the past five years [19]. The scarcity of comprehensive studies highlights the need for exploratory research to establish causal relationships between key variables [30; 31]. Research in the Central and Eastern European context is especially underdeveloped, with existing findings largely confined to descriptive statistics from Germany and Poland [2; 32]. This limitation underscores the necessity of examining the determinants of project manager compensation in greater detail, particularly regarding variations in salary and total remuneration. The literature distinguishes between total salary and total compensation, prompting the following research questions:

- Which factors significantly influence project managers' annual salaries?
- Which factors significantly influence their annual total compensation?
- What proportion of salary variance is explained by these significant factors?
- What proportion of total compensation variance is explained by these significant factors?

A comprehensive competency assessment model was deliberately excluded from the

questionnaire, as its length and complexity could have discouraged participation. In addition, research indicates that self-reported competencies are prone to subjectivity and bias [33; 34]. Without objectivity, the impact of competencies on salary and compensation cannot be accurately determined. Furthermore, exploratory research benefits from limiting the number of variables to maintain analytical clarity [31]. This paper therefore identifies and quantifies the factors that significantly affect salary and total compensation. Its contribution is threefold. First, it validates the relevance of factors previously identified in the literature and provides measures of their impact. Second, it offers insights for human resource professionals and scholars seeking to refine motivational and compensation frameworks. Third, it supports practitioners, both project managers and employers, in negotiating and structuring remuneration packages more effectively. The findings can guide managers in developing competencies that maximize their earnings, while also equipping employers with data to design competitive compensation schemes that attract and retain highly qualified staff. The study also carries implications for professional organizations, such as PMI, by showing that certifications influence salaries, though the separate effect of underlying competencies remains to be examined in future research.

The paper begins with a review of literature on project management, competencies, remuneration, and motivational theory. It identifies measurable factors suitable for survey research and omits more complex variables such as competencies, which require advanced methodologies. It also reiterates the importance of fair compensation in sustaining motivation among project managers. Section three outlines the methodology, including questionnaire design based on [25] Salary Survey and the multivariate analyses employed. Four regression models were applied, two each for salary and total compensation, to address potential overlap between positions and project management domains (for example, portfolio knowledge and portfolio manager). Section five presents the findings, which show that professional and project management experience, PMP® certification, position, certain project management domains, and actual working hours all exert a significant influence. The paper concludes with a discussion of its contributions, implications, limitations, and directions for future research.

2. Literature Review

A substantial body of research has underscored the decisive contribution of project managers to project success through their competencies (e.g., [18; 32]). Competence itself is acknowledged as a multifaceted construct. Institute [2] defines it as "the combination of ability, knowledge, and skill." Crawford [18] articulated a comparable framework, distinguishing two dimensions: (i) attribute-based competence, encompassing knowledge, skills, and personality traits, and (ii) performance-based competence, referring to demonstrated capability in practice. The first category denotes the underlying attributes that enable an individual to perform a role, while the second reflects the extent to which expected outputs are achieved. These conceptualisations align with the findings of Crawford [18], Spencer and Spencer [35], Midhat Ali et al. [36], and Moghabghab et al. [37], all of whom emphasize that competence represents a fundamental characteristic of employees shaped by both professional experiences and wider contextual influences. Furthermore, competence is inherently situational, developing and being exercised in response to organizational and environmental conditions.

In line with this, Levitt et al. [38] proposed that project managers require intellectual, managerial, and socio-emotional competencies. Other authors [1; 17; 39; 40] summarized the most important competencies, and found three domains: (i) project and technical competencies or the ways of working, covering technical project management skills, (ii) human competencies or power skills, encompassing interpersonal and leadership-related attributes, and (iii) strategic competencies or

business acumen, including strategic and commercial insight. A comparable tripartite structure was also identified by the [32]. Additionally, authors (see e.g., [1; 2; 32]) delineated ten core knowledge areas within the project management discipline: integration, scope, time, cost, quality, resource, communication, risk, procurement, and stakeholder management. The Association for Project Management (APM, 2023) identified a broader set of 29 competencies spanning theoretical knowledge and its practical application.

While overarching frameworks remain influential, several studies have focused on specific competency elements. Haider et al. [41], consistent with the earlier findings of [42], highlighted emotional intelligence as a decisive factor, particularly in agile settings where unique interpersonal challenges emerge, necessitating a re-examination of competency priorities. Similarly, Sverrisdottir et al. [43] identified that agile product owners require distinct competencies to effectively balance client-focused and product-oriented responsibilities. In the IT/IS sector, Sampaio et al. [44] identified leadership, communication, result orientation, emotional intelligence, creativity, and ethics as the most salient behavioral competencies for project success. Given the multidimensional character of competency, scholars have argued for more sophisticated approaches to its measurement. Jensen et al. [45] recommended refined methodological designs, while [3; 46; 47; 48] highlighted the methodological challenges in capturing competencies reliably. Van Laar et al. [34] similarly employed advanced measurement strategies to assess digital skills requiring creativity.

Beyond competency itself, prior studies have pointed to the distinct nature of project management within organisations. Hölzle [20] argued that project management may function as an organisational outlier, requiring senior management to assign higher strategic priority and commensurate rewards to project activities. Their findings also support the establishment of structured career pathways with clearly defined levels. Alongside this, researchers have repeatedly stressed the importance of both tangible and intangible incentives for sustaining motivation. While material incentives include fair and adequate pay, immaterial factors encompass meaningful tasks, recognition, management support, personal development opportunities, good teamwork, and positive stakeholder engagement [49; 50]. Such features are equally relevant in project contexts [51; 52]. Nevertheless, consistent with Maslow [13] and Herzberg [16], research demonstrates that while immaterial factors may weigh more heavily, inadequate compensation or unmet basic needs remains a potential source of demotivation [26; 53; 54].

These findings suggest that project managers expect equitable compensation and that failure to provide it carries a considerable risk of demotivation (cf. [16]). Mask [55], analysing data from 60,000 households with a difference-in-differences approach, showed that wage freezes increase mobility in scarce occupations and argued for greater transparency in publishing initial salary information, which could mitigate gender pay gaps and discourage underutilisation of skilled workers. Fumas [56] demonstrated through a theoretical model that incentives assume greater importance under conditions of limited supervision, with both the extent and form of supervision playing a role. Similarly, Kanagaretnam and Sarkar [57], using real option modelling, and Su et al. [29], based on regression analysis of 24,476 Chinese enterprises, found that equity-based elements in compensation can improve productivity and performance. Thomas and Durai [21], employing ANOVA across 109 SMEs, established a positive association between job roles and salary perceptions, with [58] reaching similar conclusions through a systematic literature review. Other studies employing multivariate analysis have added that salary and total compensation are also shaped by variables such as industry, field of study, quality of higher education, government support for education, personal appearance, skills, organisational tenure, and overall experience [28; 29; 59; 60; 61].

Carden and Callahan [19] analysing survey data from 1,815 project managers, identified four significant determinants of salary: work experience, project management experience, position, and a

degree in project management. While the first, second, and fourth variables had positive effects, position was associated with lower salary levels. Their findings further suggested that job complexity and performance may be stronger drivers of compensation than certification or career path. Bilbo et al. [27], using multivariate regression on a sample of 206 U.S. female project managers in construction, found that age, experience, marital status, parenthood, and age–experience interactions formed the best explanatory model, with experience exerting the greatest influence and age the least. Greer and Carden [62], using PMI's 2018 Salary Survey, identified significant salary disparities between male and female project managers but did not account for project-level or individual project manager attributes. More recent studies by Hays [63] and Institute [2; 32] confirmed that project managers generally receive above-average compensation and that both certification (e.g., PMP®) and extensive experience are associated with higher remuneration, though these analyses relied solely on descriptive statistics.

3. Materials and Methods

The survey participants comprised both past and present members of the PMI Budapest, Hungarian Chapter, along with individuals affiliated through different forms of engagement, such as voluntary roles or academic collaboration. The overall population consisted of 4023 individuals, with a mean age of 42.39 years, a median of 42.06 years, and a standard deviation of 7.16 years. Among them, 25.3% were female and 74.7% were male. All respondents were active in project management-related professions, including project managers, project owners, consultants, team leaders, and academics specialising in project management. A total of 363 completed questionnaires were collected, corresponding to a response rate of roughly 9%. This level of participation is consistent with expectations due to several factors: the inclusion of sensitive questions on income, the voluntary and uncompensated nature of participation, and the administration of the survey online (e.g., [32; 64; 65]). Following data screening procedures, explained in subsequent sections, 261 valid responses were retained for analysis. As shown in Table 1, 24.9% (n=65) of the respondents were female, while 75.1% (n=196) were male. Two participants did not disclose their age, but all other respondents reported being between 20 and 65 years old. Their mean age was 41.19 years, with a median of 41 years. In terms of work experience, the majority had been employed for 11–15 years (n=63; 24.14%), whereas most had accumulated 6–10 years of project management experience (n=87; 33.33%). The average total work experience was 17.95 years, with a median of 16 years, while the average duration of project management experience was 9.55 years, with a median of 8 years.

Table 1
Population and Sample Characteristics (Age and Gender)

	Population	Sample
N	4023	261
Mean (Age)	42.39	41.19
Median (Age)	42.06	41
Std. Deviation (Age)	7.16	8.29
Female	25.3%	24.9%
Male	74.7%	75.1%

The majority of respondents were employed in the information technology sector (n=97; 37.16%) and engineering (n=31; 11.88%), while notable representation was also observed in financial services (n=22; 8.43%), manufacturing (n=15; 5.75%), telecommunications (n=17; 6.51%), and pharmaceuticals (n=11; 4%). A further 79 respondents (30.27%) were employed in other sectors, including healthcare and utilities. The study was conducted in collaboration with the Hungarian Chapter of PMI Budapest and implemented through Survey Monkey, the official platform for PMI

questionnaires. PMI facilitated the questionnaire upload, implemented required modifications, and managed data collection. The research team oversaw the process to ensure adherence to ethical standards (ethical approval number KRH/29/2025 from the first author's university), monitored data handling, and initiated changes to the questionnaire, such as designating questions as compulsory or optional. The survey remained open from 8 March 2022 to 31 May 2022.

The 11th edition of the Institute [32] served as the basis for the questionnaire; however, minor adjustments were necessary to accommodate Hungarian-specific conditions (e.g., [66; 67]). Modifications included the removal of the paid time-off question, as leave entitlements are legally regulated in Hungary, and the elimination of the project management career path question in upper management due to the limited prevalence of PM-related senior management roles. For cross-validation, a question regarding net monthly income was added, reflecting the local convention of employees being more familiar with net rather than gross salary. An exploratory research approach was employed, without pre-defined hypotheses, with the objective of identifying variables significantly affecting project managers' salaries and total compensation (e.g., [68]). The research followed a three-step procedure: (1) data acquisition and preparation for cleaning, (2) data transformation, and (3) statistical analysis. From the initial 363 responses, 102 were excluded due to missing salary information (69 responses), non-full-time employment (7 responses), misalignment with PM positions (8 responses), not working in Hungary (4 responses), or holding positions outside the defined categories of project manager, program manager, portfolio manager, or PM/PMO director (14 responses). These exclusions adhered to the methodological requirements of the 11th edition [32].

Eight acceptable position categories were retained, whereas roles such as chief executive officer, chief information officer, functional manager, or educator/trainer were removed. Position definitions were as follows: a portfolio manager oversees the full set or a subset of projects within an organisation; a program manager manages multiple related projects; project management specialists focus on specific areas (e.g., risk management) to support project managers; PM consultants, internal or external, provide advisory services; PM or PMO directors manage the PMO and integrate consistent project management methodologies; Project Manager I handles small projects or phases of larger projects under senior supervision; Project Manager II oversees one large/complex or multiple projects under portfolio or program management; and Project Manager III manages high-priority, often complex projects under similar supervision [32].

To mitigate the influence of extreme values, only annual salaries ranging from 75% to 500% of the Hungarian average salary for the survey year (4,500,000 HUF to 30,000,000 HUF, approximately $12,000–$80,000; Hungarian Central Statistical Office, n.d.) were considered. Outliers, often explained by individual-specific circumstances, were excluded to enhance the validity and generalisability of the model. Consequently, the final sample comprised 257 respondents. Subsequently, explanatory variables unrelated to individual characteristics, such as industry or company, were removed. Two additional person-related variables, "city" and "other certifications," were also excluded. "Other certifications" encompassed qualifications beyond the PMP®, irrespective of issuing authority, while "city" was removed due to the disproportionate concentration of respondents from the capital, reflecting typical Hungarian project management demographics. Categorical variables were dummy-coded, selecting a reference category and converting remaining categories into binary variables (1 if the response matched the category, 0 otherwise). Following this procedure, the final set of explanatory variables was defined from the questionnaire. The list of variables and the associated scale are presented in Table 2.

Table 2
Variables Analyzed and the Associated Scale

No	Variable	Type of Scale	Recoded into Dummy?
1.	Age of the Respondent	Ratio	
2.	Work Experience of the Respondent	Ratio	
3.	Project Management Experience of the Respondent	Ratio	
4.	Position of the Respondent	Nominal (Project Management Consultant, Project Management Specialist, Project Manager I, Project Manager II, Project Manager III, Program Manager, Portfolio Manager, Director of PM/PMO)	Yes (Reference Category=Project Manager I)
5.	Days of Training the Respondent Received (In the Last Twelve Months)	Ratio	
6.	Required Number of Working Hours (Per Week) by the Respondent	Ratio	
7.	The Respondent is a PMI Member or Not	Nominal (Yes, No)	Yes (Reference Category=No)
8.	The Highest Level of Education of the Respondent	Ordinal (High School or Less, Some College or Associate, 4-Year-College, Masters, Doctoral or Postgrad)	Yes (Reference Category=High School or Less)
9.	Did the Respondent Receive Any Academic Training in Project Management	Nominal (Yes, No)	Yes (Reference Category=No)
10.	Gender of the Respondent	Nominal (Male, Female)	Yes (Reference Category=Male)
11.	PMP Certification Holder	Nominal (Yes, No)	Yes (Reference Category=No)
12.	Years Since the Respondent is a PMP Certification Holder	Ratio	
13.	Experience in Agile/Iterative/Incremental Project Management	Ordinal (No Experience, 1-5 Years of Experience, 6 to 10 Years of Experience, 11 to 20 Years of Experience, Over 20 Years of Experience) – For Every Variable from 13 to 26	Yes (Reference Category=Have Experience)
14.	Experience in Extreme Project Management		
15.	Experience in Process-Based Project Management		
16.	Experience in Event Chain Project Management		
17.	Experience in Project Portfolio Management		
18.	Experience in Program Management		
19.	Experience in Earned Value Project Management		
20.	Experience in Lean Project Management		
21.	Experience in Critical Chain Project Management		
22.	Experience in Waterfall Project Management		
23.	Experience in Risk Management		
24.	Experience in Change Management		
26.	Experience in Resource Management		

Note: Adapted from PMI (2020)

In addition to the previously described modifications, the researchers adapted the measurement of experience within specific project management domains. Rather than using the original five-category format—(i) no experience, (ii) 1–5 years, (iii) 6–10 years, (iv) 11–20 years, and (v) over 20 years of experience—each domain was converted into a binary (dummy) variable, indicating whether the respondent possessed any experience in that domain. This adjustment was implemented because substantial variation can exist within individual categories, particularly those representing lower experience levels. The binary coding was intended to reduce the potential distortion caused by intra-category differences while retaining the valuable information contained in these questions. Excluding these items could have diminished the validity of the analytical model [2; 32; 69; 70]. Both salary and

total compensation exhibited lognormal distributions; accordingly, a logarithmic transformation was applied, consistent with methodological recommendations in the literature. This transformation facilitated more robust statistical analysis and allowed the interpretation of each predictor's effect on salary and total compensation in percentage terms [71].

Subsequently, quantitative analysis was conducted using SPSS version 29.0.1.0, with the objective of identifying variables exerting a statistically significant influence on salary and total compensation. Multiple regression analysis was employed, as it is well-suited for quantifying the impact of both numerical and categorical explanatory variables on a dependent variable [71; 72; 73]. To avoid arbitrary elimination of predictors, the backward elimination procedure was applied [74; 75]. In the initial step, all relevant variables from the questionnaire were included to generate a base model comprising both significant ($p \leq 0.05$) and non-significant ($p > 0.05$) variables. In successive steps, the variable with the highest p-value was sequentially removed until only statistically significant predictors remained. The resulting reduced model was used to estimate the impact of each explanatory variable on project managers' salary and total compensation through the standardized regression coefficients (β). Model performance was assessed using the adjusted R^2 statistic, and ANOVA was employed to evaluate overall model significance.

Two sets of analyses were conducted, generating separate models for gross annual salary and gross annual total compensation (the latter including salary, bonuses, and other monetary benefits provided by the organisation). One model incorporated the first twelve variables, while the second excluded the fourth variable to address potential overlap between position-related characteristics (e.g., Project Management Specialist, encompassing roles, responsibilities, and skills) and experience in specific project management domains (e.g., portfolio manager and portfolio management). Both models included squared terms for "project management experience" and "work experience" to account for potential obsolescence of knowledge over time and age-related effects. It was hypothesised that work experience would positively influence salary and total compensation, whereas the squared term would exert a negative effect, reflecting diminishing returns or age-related disadvantages.

4. Results

The analysis revealed a strong positive correlation between respondents' age and their total work experience ($r = 0.954$). To mitigate the risk of multicollinearity within the regression models, the variable "age" was excluded from all subsequent analyses. Following this, four separate regression analyses were performed. The first two models incorporated position-related variables while excluding project management domain variables, and comprised a total of 20 explanatory variables. Conversely, the latter two models included project management domain variables while excluding position-related variables, comprising 26 explanatory variables. For the annual gross salary model that included position variables, 9 out of 20 predictors were found to be statistically significant, whereas 13 variables were non-significant. Similarly, in the total compensation model with positions, 9 variables reached statistical significance, while 13 did not. Both final models demonstrated overall significance. Specifically, the adjusted R^2 for the gross salary model was 0.305 ($F = 12.697$, df1 = 9, df2 = 231, $p < 0.01$), while the adjusted R^2 for the total compensation model was 0.346 ($F = 15.125$, df1 = 9, df2 = 231, $p < 0.01$). The detailed coefficients for each model are presented in Table 3.

As illustrated in Table 3, several variables exert a significant and positive influence on gross annual salary. Specifically, one additional year of general work experience (ß = 0.020) and one additional year of project management experience (ß = 0.016), the possession of a PMP® certification (ß = 0.013), and the project manager's position (ß for PM/PMO director = 0.212; ß for program manager = 0.267; ß for portfolio manager = 0.328; ß for project manager II = 0.122; ß for project manager III = 0.183)

all positively contribute to salary. Conversely, the squared term of work experience demonstrated a significant negative effect (ß = -0.0005). These results indicate that both general work experience and project management-specific experience incrementally increase salary, with the additional effect of project management experience above and beyond general work experience. Furthermore, advancement to higher-ranking positions and possession of the PMP® certification positively influence remuneration.

Table 3

Significant Variables for Annual Gross Salary and Total Compensation (Position)

Model	Salary					Total Compensation				
Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	ß	Std. Error	Beta			ß	Std. Error	Beta		
(Constant)	15.766	0.079		199.519	0.000	15.827	0.081		195.751	0.000
Work Experience (Years)	0.020	0.008	0.528	2.475	0.014	0.020	0.008	0.511	2.467	0.014
Project Management Experience (Years)	0.016	0.004	0.290	3.530	0.001	0.019	0.005	0.326	4.097	0.000
Have a PMP	0.133	0.038	0.201	3.468	0.001	0.158	0.039	0.225	4.017	0.000
Position is Director of PM/PMO	0.212	0.078	0.180	2.699	0.007	0.208	0.080	0.168	2.587	0.010
Position is Portfolio Manager	0.328	0.099	0.197	3.305	0.001	0.374	0.102	0.214	3.686	0.000
Position is Program Manager	0.267	0.065	0.296	4.079	0.000	0.302	0.067	0.319	4.523	0.000
Position is Project Manager II	0.122	0.060	0.153	2.038	0.043	0.140	0.061	0.166	2.275	0.024
Position is Project Manager III	0.183	0.057	0.262	3.236	0.001	0.173	0.058	0.235	2.985	0.003
Work Experience Squared (Years)	-0.0005	-0.0002	-0.537	-2.743	0.007	-0.001	-0.0002	-0.537	-2.831	0.005

The determinants of total compensation mirror those of gross salary, with identical factors reaching statistical significance (see Table 3). The beta coefficients are as follows: one year of work experience (ß = 0.020), one year of project management experience (ß = 0.019), possession of PMP® certification (ß = 0.158), and position (ß for PM/PMO director = 0.208; ß for portfolio manager = 0.374; ß for program manager = 0.302; ß for project manager II = 0.140; ß for project manager III = 0.173). The squared term of work experience again demonstrated a negative effect (ß = -0.001). These findings suggest that, for total compensation, experience, credible certification, and hierarchical position are critical determinants of remuneration levels. When regression analyses were performed using the variable set containing project management domains while excluding positions, 7 out of 29 variables were significant for gross annual salary, with 22 variables non-significant, and 8 out of 29 variables were significant for total annual compensation, with 21 variables non-significant. Both resulting models were statistically significant. The adjusted R^2 values were 0.343 for the gross salary model (F = 16.006, df1 = 7, df2 = 194, p < 0.01) and 0.388 for the total compensation model (F = 16.960, df1 = 8, df2 = 193, p < 0.01). The details of these models are summarised in Table 4.

As presented in Table 4, seven factors were found to exert a significant influence on annual gross salary. Specifically, one additional year of general work experience (ß = 0.018), one additional year of project management experience (ß = 0.013), and possession of a PMP® certification (ß = 0.127) were

associated with increases in salary. In contrast, the absence of experience in agile/iterative/incremental project management (ß = -0.111), project portfolio management (ß = -0.104), and risk management (ß = -0.145), as well as the squared term of work experience (ß = -0.0004), were linked to reductions in potential gross annual salary. These results indicate that both professional experience and recognized certification, together with expertise in specific project management domains, play a decisive role in determining expected salary levels.

The model for gross total compensation largely reflects the findings for gross salary, with nearly identical significant variables, as summarized in Table 4. In addition to the previously identified factors, total compensation is also positively influenced by the actual number of hours worked per week. The estimated coefficients for this model are: one year of work experience (ß = 0.019), one year of project management experience (ß = 0.015), weekly working hours (ß = 0.006), possession of PMP® certification (ß = 0.154), lack of agile/iterative/incremental experience (ß = -0.111), lack of project portfolio experience (ß = -0.126), lack of risk management experience (ß = -0.131), and squared term of work experience (ß = -0.0004). These findings suggest that, beyond experience, certification, and domain-specific expertise, the workload also exerts a measurable impact on total compensation. The researchers further examined whether the duration since obtaining the PMP® certification influenced salary or total compensation. Two models were constructed for each outcome: one incorporating the number of years since certification (assigning zero to individuals without the PMP®), and another restricted to certified individuals. In both approaches, this factor did not achieve statistical significance.

Table 4
Significant Variables for Annual Gross Salary and Total Compensation (Project Management Domain)

Model	Salary					Total Compensation				
Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	ß	Std. Error	Beta			ß	Std. Error	Beta		
(Constant)	16.087	0.089		180.097	0.000	15.928	0.149		106.766	0.000
Work Experience (Years)	0.018	0.009	0.469	2.136	0.034	0.019	0.009	0.459	2.163	0.032
Project Management Experience (Years)	0.013	0.005	0.220	2.524	0.012	0.015	0.005	0.239	2.823	0.005
Actual Number of Hours Working Typically a Week	-	-	-	-	-	0.006	0.003	0.115	2.031	0.044
Have a PMP	0.127	0.043	0.187	2.970	0.003	0.154	0.044	0.215	3.529	0.001
Lack of Agile, Iterative or Incremental Project Management Experience	-0.111	0.042	-0.157	-2.659	0.008	-0.111	0.042	-0.148	-2.603	0.010
Lack of Project Portfolio Experience	-0.104	0.041	-0.155	-2.549	0.012	-0.126	0.042	-0.177	-2.998	0.003
Lack of Risk Management Experience	-0.145	0.049	-0.188	-2.981	0.003	-0.131	0.049	-0.161	-2.642	0.009
Work Experience Squared (Years)	-0.0004	-0.0002	-0.449	-2.227	0.027	-0.0004	-0.0002	-0.442	-2.267	0.025

Overall, the results indicate that personal objective characteristics substantially affect both salary and total compensation, accounting for between 30.5% and 38.8% of the variation, as indicated by the adjusted R^2 values. Specifically, for the gross annual salary models, adjusted R^2 was 0.305 for the position-based model and 0.343 for the project management domain-based model. For total compensation, adjusted R^2 values were 0.346 and 0.388, respectively. As summarised in Table 5,

possession of PMP® certification, general work experience, and project management experience consistently influence both salary and total compensation across both position-based and domain-based approaches. The actual number of weekly working hours, however, was significant only in the total compensation model focused on project management domains.

Table 5
Impact of the Significant Variables

	Positions		PM Domains	
	Salary	TC	Salary	TC
Work Experience (Years)	0.020	0.020	0.018	0.019
Project Management Experience (Years)	0.016	0.019	0.013	0.015
Have a PMP	0.133	0.158	0.127	0.154
Work Experience Squared (Years)	-0.0005	-0.001	-0.0004	-0.0004
Position is Director of PM/PMO	0.212	0.208	N/A	N/A
Position is Portfolio Manager	0.328	0.374	N/A	N/A
Position is Program Manager	0.267	0.302	N/A	N/A
Position is Project Manager II	0.122	0.140	N/A	N/A
Position is Project Manager III	0.183	0.173	N/A	N/A
Lack of Agile, Iterative or Incremental Project Management Experience	N/A	N/A	-0.111	-0.111
Lack of Project Portfolio Experience	N/A	N/A	-0.104	-0.126
Lack of Risk Management Experience	N/A	N/A	-0.145	-0.131
Actual Number of Hours Working Typically a Week	NS	NS	NS	0.006

As depicted in Figure 1, within the models incorporating positions, work experience initially exerts the greatest influence on both gross salary (Beta = 0.528) and total compensation (Beta = 0.511). However, as experience accumulates, its relative impact diminishes, as evidenced by the large negative standardized betas of the squared work experience term (Beta = -0.537 in both cases). Regarding salary, the role of program manager demonstrates the highest relative importance (Beta = 0.296), whereas the positions of director of PM/PMO (Beta = 0.180) and project manager II (Beta = 0.153) exhibit comparatively lower influence.
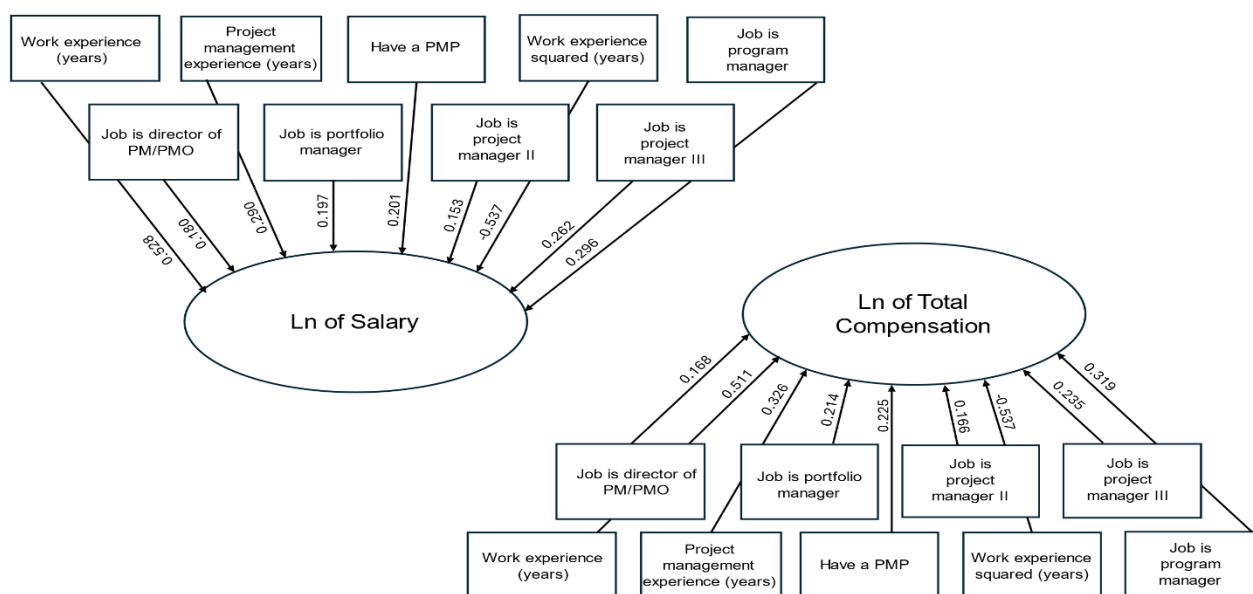

Fig.1: Regression Models for Positions
Note: Standardized betas are presented on the arrows.

The effects of the remaining variables are relatively similar. A comparable pattern is observed for total compensation, where the roles of project manager II (Beta = 0.166) and director of PM/PMO (Beta = 0.168) are less impactful, while the program manager position (Beta = 0.319) retains greater

significance. In this model, project management experience also shows increased relative importance (Beta = 0.326).

Figure 2 illustrates the relative importance, based on standardized betas, for the models focused on salary and total compensation in relation to project management domains. Work experience follows a similar trajectory as in the position-based models, exhibiting a strong initial effect (Beta = 0.469 for salary; Beta = 0.459 for total compensation) that diminishes over time, as indicated by the large negative betas for the squared term (Beta = -0.449 for salary; Beta = -0.442 for total compensation). For salary, the absolute standardized betas for the absence of agile, iterative, and incremental experience (Beta = -0.157), lack of risk management experience (Beta = -0.188), lack of project portfolio management experience (Beta = -0.155), possession of a PMP® certification (Beta = 0.187), and project management experience (Beta = 0.220) are relatively similar. A comparable distribution is observed for total compensation, where the absolute betas for the absence of agile, iterative, and incremental experience (Beta = -0.148), lack of risk management experience (Beta = -0.161), lack of project portfolio experience (Beta = -0.177), and possession of PMP® (Beta = 0.215) remain closely aligned. In this case, project management experience (Beta = 0.239) demonstrates slightly greater relative importance. The number of weekly working hours, which is the only variable uniquely significant in this model, exhibits comparatively lower relative impact (Beta = 0.115).
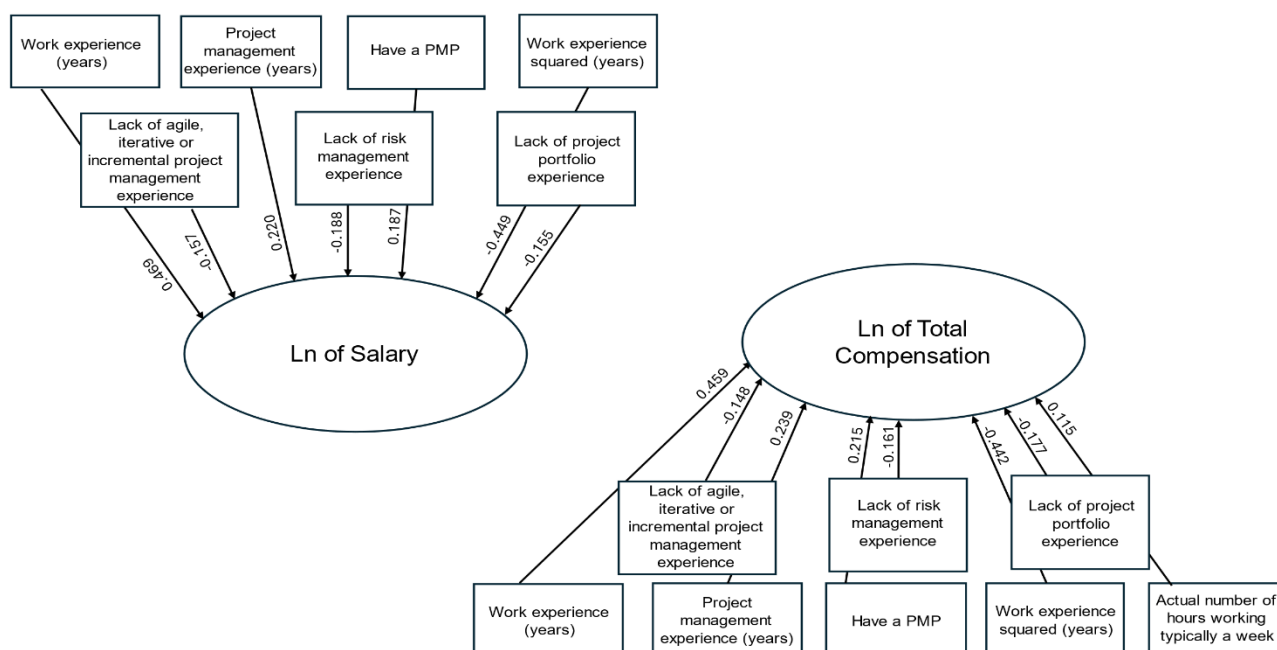

Fig.2: Regression Models for Project Management Domains
Note: Standardized betas are presented on the arrows.

5. Discussion

The findings of this research contribute to the existing literature in multiple significant ways. Firstly, they corroborate the results of Thomas and Durai [21], who identified a strong relationship between position and perceived salary. This supports Hölzle [20] argument regarding the necessity of a clear career path with well-defined higher-level positions. Consistent with these prior studies, the present research demonstrates that achieving a higher position substantially influences both salary and total compensation. Positions exerting the greatest effect on salary, in line with the promotion pathways suggested by Hölzle [20], are those closely associated with strategic decision-making and executive leadership responsibilities, such as portfolio manager and program manager, which aligns with the conclusions of [58].

The study also reinforces earlier findings (e.g., [19; 29]) that both general work experience and project management experience significantly impact salary and total compensation. Notably, the present research further indicates that the effect of general work experience diminishes over time, making it more critical during the early stages of a career. Conversely, no evidence was found to support previous claims that education, age, or sex significantly affect salary or total compensation (c.f., [27; 60; 62]). Additionally, the results highlight that the actual amount of work, representing a component of job performance, can influence total compensation, consistent with [19; 56]. This observation aligns with Crawford [18] assertion that the market rewards performance, thereby reinforcing the significance of performance-based competence. The study further confirms that possessing recognised and valuable certifications, such as PMP®, can be advantageous for project managers, supporting prior findings by [22]. These results also affirm Institute [2; 32] conclusions and reinforce [19] observation that PMP® certification positively affects both salary and total compensation.

Experience in portfolio management, reflecting strategic project-level engagement, was found to be significant, echoing the findings of [39; 76; 77; 78], and similar to the influence of the portfolio manager position. The study also supports Wysocki [79] argument that agile, iterative, or incremental experience is valued in the market due to its alignment with adapting to changing project needs efficiently. Similarly, risk management experience, which enables the mitigation or reduction of project uncertainties, was confirmed to be a key attribute, consistent with [7]. However, experience in other domains identified by Ardis [25] was not found to significantly affect salary, suggesting that the market may consider these skills of lesser importance. Finally, the results reinforce the view expressed in prior research (e.g., [32]) that project managers require a greater emphasis on managerial competencies than technical skills for effective project execution. Project management experience, in addition to general work experience, was found to significantly influence both salary and total compensation. Furthermore, the squared term of project management experience was not significant, indicating that its importance does not diminish over time, thereby highlighting its sustained relevance.

6. Conclusion

This study aimed to identify the key determinants of project managers' remuneration, addressing a relatively underexplored area. The research employed a focused approach, analysing individual-related factors while excluding organisational characteristics such as company size or industry. The analysis demonstrated that general work experience, project management experience, possession of a PMP® certification, and the squared term of work experience consistently exert a significant influence on both salary and total compensation. Among specific roles, portfolio managers, program managers, senior project managers, and lead project managers were shown to have a notable effect on remuneration. In terms of project management domains, absence of experience in agile, iterative, or incremental methodologies, project portfolio management, or risk management was associated with lower salary and total compensation, whereas possessing expertise in these areas contributed positively. The number of hours worked per week was found to significantly affect total compensation, but not salary. The analysis further revealed that many of the significant factors exhibit comparable relative influence. For total compensation, however, the role of program manager and project management experience had greater relative impact, whereas weekly working hours and positions such as senior project manager or director of PM/PMO had comparatively lower significance. Work experience was particularly influential in the early stages of a project management career, but its effect diminished over time, as indicated by the negative impact of its squared term.

These findings suggest that project managers seeking to maximise earnings should pursue PMP®

certification as soon as eligibility criteria are met, as its value in compensation does not depend on the duration of possession. Project management experience contributes more substantially to remuneration than general work experience, which declines in significance over time, highlighting the importance of early professional specialisation in the field. Additionally, acquiring experience in agile, iterative, or incremental approaches, project portfolio management, and risk management enhances compensation potential, reflecting market demands, the evolving nature of projects, and the requirements for successful project outcomes. This underscores the importance for both project managers and organisations to cultivate and support such expertise to secure competitive advantage. A key limitation of the study lies in the sample scope, which was restricted to project managers in Hungary, although the research adhered to the survey framework used for PMI's salary survey. The questionnaire only measured competencies indirectly through experience and certification, and organisational characteristics were excluded due to sample constraints. Future research could enhance the explanatory power of the model by incorporating these factors, exploring interrelationships among variables, and investigating their mutual influence on remuneration. Expanding the study across different geographic regions or conducting comparative analyses with global PMI data could also offer valuable insights.

Author Contributions

Conceptualization, B.B., A.C.K., J.T., L.K.; methodology B.B.; software, B.B.; validation, B.B., L.K.; formal analysis, B.B., L.K.; investigation, B.B., A.C.K., J.T., L.K.; writing—original draft preparation, B.B., A.C.K., J.T., L.K.; writing—review and editing, B.B., A.C.K., J.T., L.K.; visualization, B.B.; supervision, L.K.; project administration, A.C.K., L.K.; funding acquisition, A.C.K. All authors have read and agreed to the published version of the manuscript.

Data Availability Statement

Not Applicable.

Conflicts of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

[1] Görög, M., & PMI-RMP, P.-S. (2013a). Strategic-Oriented Implementation of Projects. https://www.amazon.in/Strategic-Oriented-Implementation-Projects-Mihaly-Gorog/dp/1935589873

[2] Institute, P. M. (2021a). *Project Management Body of Knowledge* (Vol. 7). https://www.pmi.org/standards/pmbok

[3] Szabó, L., & Cserháti, G. (2013). Stratégiai projektek irányítása-a projektvezetés kihívásai. *Vezetéstudomány/Budapest Management Review*, *44*(6), 6-13. https://unipub.lib.uni-corvinus.hu/7167/

[4]   Akzambekkyzy, A., Vasa, L., Forrest, J., Sarkambayeva, S., & Singh, S. (2024). Impact of Projects with Future Potential on the Global Competitiveness Index of Countries. *Emerging Science Journal*, *8*(2), 557-573. http://dx.doi.org/10.28991/ESJ-2024-08-02-012

[5]   Tešić, D., Delibašić, B., Božanić, D., Lojić, R., Pamučar, D., & Balassa, B. E. (2023). Application of the FUCOM-FUZZY MAIRCA model in human resource management. *Acta Polytechnica Hungarica*, *20*(3), 231-249. https://doi.org/10.12700/APH.20.3.2023.3.14

[6]   Wang, T., Xu, J., He, Q., Chan, A. P., & Owusu, E. K. (2023). Studies on the success criteria and critical success factors for mega infrastructure construction projects: A literature review. *Engineering, Construction and Architectural Management*, *30*(5), 1809-1834. https://doi.org/10.1108/ECAM-12-2020-1042

[7]   Fekete, I., & Szontágh, P. (2020). Projektek Programszintű Kockázatmenedzsmentje. *Vezetéstudomány/Budapest Management Review*, *51*(2). https://doi.org/10.14267/VEZTUD.2020.02.04

[8]   Khalilzadeh, M., Banihashemi, S. A., & Božanić, D. (2024). A step-by-step hybrid approach based on multi-criteria decision-making methods and a bi-objective optimization model to project risk management. *Decision Making: Applications in Management and Engineering*, *7*(1), 442-472. https://doi.org/10.31181/dmame712024884

[9]   Mashali, A., Elbeltagi, E., Motawa, I., & Elshikh, M. (2023). Stakeholder management challenges in mega construction projects: critical success factors. *Journal of engineering, design and technology*, *21*(2), 358-375. https://doi.org/10.1108/JEDT-09-2021-0483

[10]   Silvius, G., Magano, J., & Silvius-Zuchi, D. (2025). Integrating Sustainability in Project Management; The Contribution and Interactions of Different Roles. *Procedia Computer Science,* 256, 1534-1541. https://doi.org/10.1016/j.procs.2025.02.288

[11]   Gaddis, P. O. (1959). The Project Manager. *Harvard Business Review*, *37*(3), 89-97. https://www.scirp.org/reference/referencespapers?referenceid=3759020

[12]   M. Jarkas, A., Radosavljevic, M., & Wuyi, L. (2014). Prominent demotivational factors influencing the productivity of construction project managers in Qatar. *International Journal of Productivity and Performance Management*, *63*(8), 1070-1090. https://doi.org/10.1108/IJPPM-11-2013-0187

[13]   Maslow, A. H. (1943). A theory of human motivation. *Psychological review*, *50*(4), 370. https://psycnet.apa.org/doi/10.1037/h0054346

[14]   Seubert, C., Hopfgartner, L, & Glaser, J. (2021). Living wages, decent work, and need satisfaction: an integrated perspective. *European Journal of Work and Organizational Psychology*, 30(6), 808-823. https://doi.org/10.1080/1359432X.2021.1966094

[15]   Asaari, M., Desa, N. M., & Subramaniam, L. (2019). Influence of salary, promotion, and recognition toward work motivation among government trade agency employees. *International Journal of Business and Management*, *14*(4), 48-59. https://doi.org/10.5539/ijbm.v14n4p48

[16]   Herzberg, F. (1987). *One more time: how do you motivate employees?* (Vol. 65). Harvard Business Review Boston. https://werkwelzijnenmotivatie.wordpress.com/wp-content/uploads/2020/05/herzberg-1987.pdf

[17]   Globerson, S. (1983). Developing an incentive scheme for a project. https://www.researchgate.net/publication/284958260

[18]   Crawford, L. (2005). Competition, Comparison, Collaboration - Mapping a Pathway through Project Management Standards. *Procedia - Social and Behavioral Sciences*, *74*, 1-9. https://doi.org/10.1016/j.sbspro.2013.03.004

[19]   Carden, L. L., & Callahan, J. (2006). Project management salary predictors: Career development activities and extrinsic reward. Proceedings of the Seventh International Conference on HRD

Research and Practice across Europe (22-24 May 2006). https://www.ufhrd.co.uk/wp-content/uploads/2008/06/17-1_carden_callahan.pdf

[20] Hölzle, K. (2010). Designing and implementing a career path for project managers. *International Journal of Project Management*, *28*(8), 779-786. https://doi.org/10.1016/j.ijproman.2010.05.004

[21] Thomas, S., & Durai, F. A. P. (2023). Conflict Management in MSME: An Empirical Study. *SEDME (Small Enterprises Development, Management & Extension Journal)*, *50*(2), 146-156. https://doi.org/10.1177/09708464231167952

[22] Mahaney, R. C., & Greer, B. M. (2004). Examining the benefits of project management professional (PMP) certification for IS project managers and organizations. *Journal of International Information Management*, *13*(4), 4. https://scholarworks.lib.csusb.edu/jiim/vol13/iss4/4/

[23] Alananzeh, O. A., Almuhaisen, F., Jawabreh, O., Fahmawee, E., Ali, B., & Ali, A. (2023). The impact of job stability, work environment, administration, salary and incentives, functional justice, and employee expectation on the security staff's desire to continue working at the hotel. *Journal of Statistics Applications & Probability*, *12*(2), 425-439. http://dx.doi.org/10.18576/jsap/120209

[24] Cullen, Z., & Perez-Truglia, R. (2022). How much does your boss make? The effects of salary comparisons. *Journal of Political Economy*, *130*(3), 766-822. https://www.journals.uchicago.edu/doi/abs/10.1086/717891

[25] Ardis, S. L., (2001). Project Management Salaries Worldwide. *Compensation & Benefits Review*, 33(5), 70-72. https://doi.org/10.1177/08863680122098559

[26] Kazaz, A., & Acıkara, T. (2015). Comparison of labor productivity perspectives of project managers and craft workers in Turkish construction industry. *Procedia computer science*, *64*, 491-496. https://doi.org/10.1016/j.procs.2015.08.548

[27] Bilbo, D., Bigelow, B. F., Rybkowski, Z., & Kamranzadeh, A. (2014). Effects of family-related factors on female project managers' salaries in the construction industry in the United States. *International Journal of Construction Education and Research*, *10*(4), 255-267. https://doi.org/10.1080/15578771.2014.886641

[28] Parshakov, P., Gasparetto, T., Votintseva, N., & Shakina, E. (2024). Beyond the pitch: Exploring the role of beauty in soccer player salaries. *Journal of Economic Psychology*, *101*, 102709. https://doi.org/10.1016/j.joep.2024.102709

[29] Su, J., Jiang, J., Zhang, B., & Cao, L. (2023). Industry salary gap incentive and enterprise innovation. *Journal of Asian Economics*, *87*, 101633. https://doi.org/10.1016/j.asieco.2023.101633

[30] Casula, M., Rangarajan, N., & Shields, P. (2020). The potential of working hypotheses for deductive exploratory research. *Quality & quantity*, *55*(5), 1703. https://doi.org/10.1007/s11135-020-01072-9

[31] Sainani, K. L. (2014). Explanatory versus predictive modeling. *PM&R*, *6*(9), 841-844. https://doi.org/10.1016/j.pmrj.2014.08.941

[32] Institute, P. M. (2020). *Earning Power Project Management Salary Survey Eleventh Edition.* . https://www.pmi.org/-/media/pmi/documents/public/pdf/learning/pmi-salary-survey-11th-edition-report.pdf

[33] Karki, S., & Hadikusumo, B. (2023). Machine learning for the identification of competent project managers for construction projects in Nepal. *Construction Innovation*, *23*(1), 1-18. https://doi.org/10.1108/CI-08-2020-0139

[34] Van Laar, E., Van Deursen, A. J., Van Dijk, J. A., & De Haan, J. (2020). Measuring the levels of

21st-century digital skills among professionals working within the creative industries: A performance-based approach. *Poetics*, *81*, 101434. https://doi.org/10.1016/j.poetic.2020.101434

[35] Spencer, L. M., & Spencer, S. M. (1993). *Competence at work : models for superior performance*. Wiley. https://www.wiley.com/en-us/Competence+at+Work%3A+Models+for+Superior+Performance-p-9780471548096

[36] Midhat Ali, M., Qureshi, S. M., Memon, M. S., Mari, S. I., & Ramzan, M. B. (2021). Competency framework development for effective human resource management. *SAGE open*, *11*(2), 21582440211006124. https://doi.org/10.1177/21582440211006124

[37] Moghabghab, R., Tong, A., Hallaran, A., & Anderson, J. (2018). The difference between competency and competence: A regulatory perspective. *Journal of nursing regulation*, *9*(2), 54-59. https://doi.org/10.1016/S2155-8256(18)30118-2

[38] Levitt, R., Pollack, J., & Whyte, J. (2024). Leadership and the dynamics of projects: Ray Levitt's insights on project leadership. *Project Leadership and Society*, *5*, 100131. https://doi.org/10.1016/j.plas.2024.100131

[39] Görög, M. (2013b). Projektvezetés a szervezetekben. *Budapest: Panem Könyvkiadó*. https://m2.mtmt.hu/gui2/?type=authors&mode=browse&sel=10007475

[40] Davies, H. K., Posillico, J. J., & Edwards, D. J. (2025). Soft Skills for Teams in Public Linear Infrastructure: The Development of a Decision Support Tool. *Buildings*, 15(7), 1197. https://www.mdpi.com/2075-5309/15/7/1197

[41] Haider, S. A., Tehseen, S., Koay, K. Y., Poulova, P., & Afsar, B. (2024). Impact of project managers emotional intelligence on megaprojects success through mediating role of human related agile challenges: Project management as a moderator. *Acta Psychologica*, *247*, 104305. https://doi.org/10.1016/j.actpsy.2024.104305

[42] Boyatzis, R., & McKee, A. (2002). Primal leadership: Realizing the power of emotional intelligence. https://www.sidalc.net/search/Record/KOHA-OAI-BVE:32280/Description

[43] Sverrisdottir, H. S., Ingason, H. T., & Jonasson, H. I. (2014). The role of the product owner in scrum-comparison between theory and practices. *Procedia-Social and Behavioral Sciences*, *119*, 257-267. https://doi.org/10.1016/j.sbspro.2014.03.030

[44] Sampaio, S., Wu, Q., Cormican, K., & Varajão, J. (2022). Reach for the sky: analysis of behavioral competencies linked to project success. *International Journal of Managing Projects in Business*, *15*(1), 192-215. https://doi.org/10.1108/IJMPB-09-2020-0276

[45] Jensen, T. M., Metz, A. J., & Albers, B. (2024). Development and psychometric evaluation of the Implementation Support Competencies Assessment. *Implementation Science*, *19*(1), 58. https://doi.org/10.1186/s13012-024-01390-8

[46] Sitohang, Y. F., Pratami, D., & Bay, A. F. (2020). Competency evaluation of project manager performance in network construction projects. 2020 Fifth International Conference on Informatics and Computing (ICIC), 1728180473. https://doi.org/10.1109/ICIC50835.2020.9288580

[47] Sołtysik, M., Zakrzewska, M., Sagan, A., & Jarosz, S. (2020). Assessment of project manager's competence in the context of individual competence baseline. *Education Sciences*, *10*(5), 146. https://doi.org/10.3390/educsci10050146

[48] VakilZadeh, M., Shayanfar, M., Zabihi-Samani, M., & Ravanshadnia, M. (2023). Competency-based selection and assignment for project manager in Iranian railways projects by genetic multigenic programming. *Decision Making: Applications in Management and Engineering*, *6*(2), 808-827. https://doi.org/10.31181/dmame622023727

[49]   Patanakul, P., Pinto, J. K., & Pinto, M. B. (2016). Motivation to perform in a multiple-project environment: The impact of autonomy, support, goal clarity, and opportunities for learning. *Journal of Engineering and Technology Management*, *39*, 65-80. https://doi.org/10.1016/j.jengtecman.2016.02.001

[50]   Procaccino, J. D., & Verner, J. M. (2006). Software project managers and project success: An exploratory study. *Journal of Systems and Software*, *79*(11), 1541-1551. https://doi.org/10.1016/j.jss.2006.01.010

[51]   Pankratz, O., & Basten, D. (2018). Opening the black box: Managers' perceptions of IS project success mechanisms. *Information & Management*, *55*(3), 381-395. https://doi.org/10.1016/j.im.2017.09.005

[52]   Verner, J. M., Babar, M. A., Cerpa, N., Hall, T., & Beecham, S. (2014). Factors that motivate software engineering teams: A four country empirical study. *Journal of Systems and Software*, *92*, 115-127. https://doi.org/10.1016/j.jss.2014.01.008

[53]   Elsahoryi, N. A., Alathamneh, A., Mahmoud, I., & Hammad, F. (2022). Association of salary and intention to stay with the job satisfaction of the dietitians in Jordan: A cross-sectional study. *Health Policy OPEN*, *3*, 100058. https://doi.org/10.1016/j.hpopen.2021.100058

[54]   Fey, C. F. (2005). Opening the black box of motivation: A cross-cultural comparison of Sweden and Russia. *International Business Review*, *14*(3), 345-367. https://doi.org/10.1016/j.ibusrev.2005.03.004

[55]   Mask, J. (2023). Salary history bans and healing scars from past recessions. *Labour Economics*, *84*, 102408. https://doi.org/10.1016/j.labeco.2023.102408

[56]   Fumas, V. S. (1993). Incentives and supervision in hierarchies. *Journal of Economic Behavior & Organization*, *21*(3), 315-331. https://doi.org/10.1016/0167-2681(93)90055-T

[57]   Kanagaretnam, K., & Sarkar, S. (2011). Managerial compensation and the underinvestment problem. *Economic Modelling*, *28*(1-2), 308-315. https://doi.org/10.1016/j.econmod.2010.08.017

[58]   Xu, J., & Lu, W. (2023). How Does Hierarchy Steepness Affect Coordination in Project-Based Organizations? A Social Network Analysis. *Project management journal*, *54*(3), 306-321. https://doi.org/10.1177/87569728221150897

[59]   MEM, J. L. S., Niamat Ullah Ibne Hossain PhD, M., & MEM, L. F. (2022). Project management: engineering vs. Non-engineering. Proceedings of the International Annual Conference of the American Society for Engineering Management., 1-8. https://www.proquest.com/openview/41f50656a7c3079a91d37634740d4232/1?pq-origsite=gscholar&cbl=2037614

[60]   Prakhov, I. (2023). Indicators of higher education quality and salaries of university graduates in Russia. *International Journal of Educational Development*, *99*, 102771. https://doi.org/10.1016/j.ijedudev.2023.102771

[61]   Slaughter, S. A., Ang, S., & Fong Boh, W. (2007). Firm-specific human capital and compensation organizational tenure profiles: An archival analysis of salary data for it. *Human Resource Management: Published in Cooperation with the School of Business Administration, The University of Michigan and in alliance with the Society of Human Resources Management*, *46*(3), 373-394. https://doi.org/10.1002/hrm.20169

[62]   Greer, T. W., & Carden, L. L. (2021). Exploring the gender wage gap among project managers: A multi-national analysis of human capital and national policies. *International Journal of Project Management*, *39*(1), 21-31. https://doi.org/10.1016/j.ijproman.2020.09.004

[63]   Hays. (2023). *2023 U.S. Salary Guide the Great Disconnect*. https://www.hays.com/documents/d/hays-usa/2023-hays-us-salary_guide

[64] Cormier, T. (2023). Salary review of strength and conditioning coaches: 2022 survey results. *Strength & Conditioning Journal*, *45*(3), 367-370. https://doi.org/10.1519/SSC.0000000000000780

[65] Holtom, B., Baruch, Y., Aguinis, H., & A Ballinger, G. (2022). Survey response rates: Trends and a validity assessment framework. *Human relations*, *75*(8), 1560-1584. https://doi.org/10.1177/00187267211070769

[66] Csurgó, B., & Kovách, I. (2016). The LEADER Programme in Hungary–Bottom-up Development with Top-down Control? 1. In *Evaluating the European approach to rural development* (pp. 53-77). Routledge. https://doi.org/10.4324/9781315581194

[67] Oblath, G., & Simonovits, A. (2024). Statistical overstatement of average wages and its impact on pensions: The case of Hungary. *Acta Oeconomica*, *74*(4), 445-461. https://doi.org/10.1556/032.2024.00021

[68] Bryman, A. (2016). *Social research methods*. Oxford university press. https://search.worldcat.org/title/1012878111

[69] Barbosa, M. W., Carrasco, S. I. M., & Abarca, P. C. R. (2022). The effect of enterprise risk management competencies on students' perceptions of their work readiness. *The International Journal of Management Education*, *20*(2), 100638. https://doi.org/10.1016/j.ijme.2022.100638

[70] Dattero, R., Galup, S. D., Kan, A., & Quan, J. (2017). It pays to be agile. *Journal of Computer Information Systems*, *57*(3), 252-257. https://doi.org/10.1080/14659891.2016.1184025

[71] Békés, G., & Kézdi, G. (2021). *Data analysis for business, economics, and policy*. Cambridge University Press. https://gabors-data-analysis.com/files/Ch10_Bekes_Kezdi_draft_2020nov.pdf

[72] Ananth, C. V., & Kleinbaum, D. G. (1997). Regression models for ordinal responses: a review of methods and applications. *International journal of epidemiology*, *26*(6), 1323-1333. https://doi.org/10.1093/ije/26.6.1323

[73] Chatterjee, S., & Hadi, A. S. (2015). *Regression analysis by example*. John Wiley & Sons. http://dspace.lib.uom.gr/handle/2159/30342

[74] García de Soto, B., Adey, B. T., & Fernando, D. (2014). A process for the development and evaluation of preliminary construction material quantity estimation models using backward elimination regression and neural networks. *Journal of Cost Analysis and Parametrics*, *7*(3), 180-218. https://doi.org/10.1080/1941658X.2014.984880

[75] Vu, D. H., Muttaqi, K. M., & Agalgaonkar, A. P. (2015). A variance inflation factor and backward elimination based robust regression model for forecasting monthly electricity demand using climatic variables. *Applied Energy*, *140*, 385-394. https://doi.org/10.1016/j.apenergy.2014.12.011

[76] Locatelli, G., Zerjav, V., & Klein, G. (2020). Project transitions—Navigating across strategy, delivery, use, and decommissioning. In (Vol. 51, pp. 467-473): SAGE Publications Sage CA: Los Angeles, CA. https://doi.org/10.1177/8756972820953976

[77] Stocker, M., & Várkonyi, L. (2022). Impact of market orientation on competitiveness: Analysis of internationalized medium-sized and large enterprises. *Entrepreneurial Business and Economics Review*, *10*(1), 81-95. https://www.ceeol.com/search/article-detail?id=1063265

[78] Willumsen, P. L., Oehmen, J., & Selim, H. M. R. (2024). Project risk management in practice: the actuality of project risk management in organizations. *International Journal of Managing Projects in Business*, *17*(4/5), 593-617. https://doi.org/10.1108/IJMPB-09-2023-0214

[79] Wysocki, R. K. (2019). *Effective project management : traditional, agile, extreme, hybrid* (8th ed.). Wiley. https://onlinelibrary.wiley.com/doi/book/10.1002/9781119562757