VILNIUS TECH
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**JOURNAL of BUSINESS
ECONOMICS & MANAGEMENT**

QUANTITATIVE STUDY OF THE CAUSAL RELATIONSHIPS AMONG THE EFQM MODEL 2020 CRITERIA IN THE GREEK PUBLIC SECTOR CONTEXT

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Abstract. This study aims to apply the European Foundation for Quality Management (EFQM) Model 2020 in the Greek Public Sector context and investigate the causal relationships between the model's criteria. The research uses a structured questionnaire based on the self-assessment tool and the guidelines on the concept and structure of the EFQM Model 2020, translated from English into Greek using forward-backward translation. Two focus groups and a pilot study were conducted to ensure the validity and reliability of the questionnaire. Subsequently, a large-scale quantitative research was conducted using Partial Least Square Structural Equation Modelling (PLS-SEM) to test the research hypotheses on a national sample of 177 managers from public administrative services. The study results indicate that the EFQM Model 2020 is indeed a reliable and valid framework for the study of the public sector and reveal significant relationships between the model's criteria. The study is one of the first comprehensive investigations of the relationships between the EFQM Model 2020 criteria in Europe and, therefore, provides insights into the understanding of the model. As this research was geographically limited, the findings should be treated and generalised with caution, and further research should be conducted in different contexts.

1. Introduction

In today's modern and ever-changing environment, public sector services are called upon to address various emerging challenges. Since achieving quality results is a factor of strategic importance to ensure operational excellence in any organisation, regardless of the sector it belongs to (Oakland, 2014), the adoption of a new philosophy by the public sector is imperative to fulfil its crucial role in the sustainable economic growth and social development of the country. Total Quality Management (TQM) is the management philosophy that aims to continuously improve the efficiency and effectiveness of the organisation (Chen et al., 2016), focuses on the provision of quality services in line with customer needs (Janakiraman &

Gopal, 2006), and is applied to both private and public sector organisations to improve the quality of their outcomes (Enggartyasti & Caraka, 2017).

The literature review shows the development of a large number of models that have TQM principles at their core (Rosak-Szyrocka & Roszak, 2019) and serve as a compass for organisations' journey towards TQM (Øvretveit, 2005; van Schoten et al., 2016). The EFQM Model is one of them and was developed and introduced by the European Foundation for Quality Management in 1991 (Fonseca et al., 2021). The EFQM model has been widely adopted and applied at the European level (van Schoten et al., 2016), because its design is based on the characteristics of the European socio-economic environment, and it is in line with the European mentality and policies for the economic and environmental sectors (Oger & Platt, 2002). In addition, the EFQM Model is characterised by its innovative nature since it has also been adapted for the public sector (Gené-Badia et al., 2001). Since its first presentation to the public, the EFQM Model has been modified to address global challenges and to stay up to date (Fonseca et al., 2021). The most recent revision of the EFQM Model resulted in extensive and substantial changes to the model's structure and criteria. Specifically, the EFQM Model 2020 is the result of the collaborative efforts of a diverse team of people working in the academic and industrial sectors (European Foundation for Quality Management [EFQM], 2021a). The EFQM Model 2020 consists of 7 criteria, divided into three groups. The first group, called Direction, consists of two criteria, Purpose, Vision and Strategy and Organisational Culture and Leadership, the second group, Execution, consists of three criteria, Engaging Stakeholders, Creating Sustainable Value and Driving Performance and Transformation, while the third group, Results, consists of two criteria, Stakeholder Perceptions and Strategic and Operational Performance.

Several studies have used the EFQM Model as a research framework and explored the relationships between the model's criteria and with other factors as well. However, most of the research is related to private sector organisations (Andjelkovic Pesic & Dahlgaard, 2013; Bocoya-Maline et al., 2024; Bou-Llusar et al., 2005, 2009; Calvo-Mora et al., 2014a, 2014b, 2015; Eskildsen et al., 2000, 2002; Giménez Espín et al., 2023a, 2023b; Gómez Gómez, et al., 2011, 2015, 2017; Gómez-López et al., 2017; Hemsworth, 2016; Heras-Saizarbitoria et al., 2012; Kafetzopoulos & Gotzamani, 2019; Kafetzopoulos et al., 2019; Para-González et al., 2021, 2022; Pop & Pelau, 2017; Suárez et al., 2014; Tarí et al., 2023; Vukomanovic et al., 2014) and a limited number of studies focus on public sector institutions in the education field (Anastasiadou, 2018; Anastasiadou & Zirinoglou 2015; Anastasiadou et al., 2014; Calvo-Mora, et al., 2005, 2006; Đorđević et al., 2021; Kaplani & Zafiropoulos, 2022), and healthcare (van Schoten et al., 2016).

All the aforementioned studies applied older versions of the EFQM Model as their framework while quantitative research on the EFQM Model 2020 is scarce since only three studies were identified in the literature that used the EFQM Model 2020 as their framework for quantitative research. Specifically, Turisová et al. (2021), assessed the readiness of Slovak industrial organisations regarding the concept of maintenance management and machine integrated safety by using a questionnaire based on the EFQM Model 2020 with a scoring system and performed a descriptive statistical analysis. Additionally, Sütőová et al. (2022), applied the EFQM Model 2020 in a case study of a Slovak secondary vocational school and conducted a descriptive statistical analysis along with a correlation analysis to explore the relationship between Direction, Execution and Stakeholder Perception but presented no evidence of the reliability and validity of the constructs. Moreover, Tavallaei et al. (2021), applied the SEM approach to explore the relationship between Knowledge Management and the EFQM Model 2020 criteria, Organisational Culture and Leadership, Stakeholder Engagement and Strategic

and Operational Performance in the context of 90 organisations associated with the Executive Headquarters of Imam Khomeini's Command in Iran.

Considering the above, there is a research gap in the literature since the EFQM Model 2020 has not yet been applied as a research framework in the context of a European country and in the field of the public sector to investigate the relationships between the model's criteria and no study provides evidence of the reliability and validity of the EFQM Model 2020 as a research framework in the European context. Hence, this study aims to apply the EFQM Model 2020 as a research framework in the Greek public sector administrative services context to test the reliability and validity of the EFQM Model 2020 and to explore the causal relationships between the model's criteria. To investigate the aforementioned, this study starts by presenting the EFQM 2020 Model, its structure and concepts and empirical findings derived from previous research about the relationships between the model's criteria. Subsequently, the above constitute the foundation for the research model's establishment and hypotheses formulation. Ultimately, the study's methodological approach is presented along with its key findings and conclusions.

2. Theoretical background, research model and hypotheses formulation

As stated by Wheelen et al. (2015), and van Ingen et al. (2021), the Purpose of an organisation is the answer to why the organisation exists while the Vision of an organisation is defined as the organisation's aspirations about its evolvement in the future (Wheelen et al., 2015), and as the projection of the organisation into the future (Altıok, 2011). The Strategy of an organisation is defined as "a high-level plan to achieve one or more goals under conditions of uncertainty" (Barad, 2018, p. 3), and outlines the methods to be used in order to attain the organisation's objectives (Barad, 2018). Also, the Organisational Culture "reflects the values, beliefs, and norms that characterize an organization as a whole" (Ashok, 2016, p. 16) while Leadership is defined as "a process in which a person or persons inspire(s) and motivate(s) the people to meet the shared goals or objectives which may be changed or added as per the needs and challenges. Leadership connects with the people beyond superficial or formal level, and creates a bond that motivates them to do things rather than forcing them." (Malik & Azmat, 2019, p. 25).

Moreover, Engaging Stakeholders plays a vital role to the attainment of goals for every organisation. An organisation's stakeholder is any internal or external group that has an interest in the how the organisation performs (Daft, 2010). The key stakeholders of an organisation are its staff, the regulatory or legislative authorities, its clientele along with its commune at local level (Grafé-Buckens & Hinton, 1998), while in the context of the EFQM Model 2020, key stakeholders are the Customers, the People of the organisation, its Business and Governing Stakeholders, the Society and the organisation's Partners and Suppliers (EFQM, 2021a). Also, Creating Sustainable Value in the context of an organisation is how the organisation addresses the challenges related to sustainable development and incorporates them into its strategic plan for achieving sustainability and pursuing the maximization of the value created for its stakeholders (Hart & Milstein, 2003). Organisational performance refers to the set of procedures and activities that an organisation uses to produce value and provide it to its stakeholders (Gutterman, 2023), as well as to the capacity of the organisation to successfully accomplish its objectives by utilizing its assets efficiently and effectively (Daft, 2010). Organisational transformation is the process of making significant changes or alterations to improve

or evolve an organization (Kotter, 2012). Driving performance involves the effective management of an organisation's current operations to ensure the smooth execution of its daily activities and the attainment of its goals, with a focus on maintaining stability, consistency, excellence, and stakeholder engagement (EFQM, 2021b). Driving transformation is about the adaptation and evolution of an organisation in response to internal and external challenges and involves implementing strategic changes for the organisation to remain relevant in a constantly changing environment (EFQM, 2021b). In essence, Driving Performance and Transformation means that an organisation must deliver on its current commitments while preparing for future challenges and opportunities. This balance ensures the organisation remains robust and competitive now, as well as adaptable and forward-thinking for sustainable success in the future. Also, Driving Performance and Transformation refers to the management efforts to achieve the continuation of the organisation's daily operation and to address the challenges of its constantly changing environment (EFQM, 2021b). Furthermore, organisational performance is thought to be the most crucial factor for all entities regardless of whether they are for profit or not (Akpa et al., 2021). In addition, operational performance reflects "the performance of internal operations in terms of cost/waste reduction, improvement in quality, flexibility, delivery and productivity" (AL-Majali, 2013, p. 66), and the organisation's "internal operating efficiency (i.e. input and output measures) and efficacy (i.e. service quality and customer service indicators)" (Sole, 2009, p. 6). Strategic performance, on the other hand, concerns the organization's progress in executing its strategic initiatives and evaluating their success in achieving intended outcomes. Consequently, in the context of the EFQM Model 2020, Strategic and Operational Performance refer to an organization's effectiveness in achieving its strategic and operational objectives (EFQM, 2021b). Furthermore, a stakeholder is any person or group that has an interest in the attainment of the organization's goals (Freeman, 1984), and can belong to the organization's internal or external environment (Clarkson, 1995). Donaldson and Preston (1995), state that stakeholder perceptions encompass the various views stakeholders hold about the organization's obligations and responsibilities, and how well the organization fulfills these expectations. Additionally, Stakeholders Perceptions refer to the views of the organisation's stakeholders based on what they have experienced from their interactions with the organisation (EFQM, 2021b).

The organisation's purpose, as it is explained in the mission statement, serves as the base for identifying the organisation's values that define the organisational culture (Babnik et al., 2014), and along with vision are the cornerstones of the organisational culture. Also, strategy according to Marx (2015), affects leadership. Moreover, Akparep et al. (2019), state that leadership is found to be one of the main drivers for the organisational performance and Addin (2020), underlines the powerful connection between leadership and organizational performance. Also, leadership has an effect on people's motivation (Addin, 2020), hence, it can be argued that leadership can affect the stakeholder's engagement. In addition, leadership plays an important role in the transformation of an organization since it is through leadership that an organisation is able to foresee the change in its environment and provide guidance when it occurs (Albert et al., 2022). Furthermore, Laszlo (2008), argues that leadership that achieves stakeholder engagement and manages stakeholders' concerns in advance is able to foresee change and plays a crucial role in creating sustainable value for all the stakeholders.

According to Ashok (2016), organizational culture directly affects the people in an organization and the organisation's growth while Schein (2004), argues that leadership and organisational culture are cut from the same cloth. Also, Tsai (2011), supports that the organisation's culture and leadership can affect the actions and the perspectives of its people (Tsai,

2011). Additionally, Akpa et al. (2021), argue that everyone associated with the organization is impacted by the organisation's culture while according to Chelangat (2022), the ways that organisational culture is oriented results in different impacts on organisational performance. Moreover, Leal Filho and Brandli (2016), argue that Stakeholder Engagement is vital for the organisation's effort towards sustainable development while Daft (2010), argues that the engagement of the organisation's people can affect Organizational Performance through the development of their knowledge and capabilities. Also, stakeholder engagement is essential for the organisation's ability to find new ways and transform in order to create value in a sustainable manner (Laszlo, 2008). In addition, creating sustainable value for all stakeholders is vital for the organisation's development (Laszlo, 2008). Furthermore, the study of Hart and Ahuja (1996), shows that creating value in a sustainable way had a positive effect on the strategic and operational and performance. In addition, Peloza et al. (2012), state that there is a positive linkage between stakeholder relationships with an organisation and the organisation's attitude towards sustainability, and that various stakeholder groups declare sustainability as a key element for their decisions. Therefore, it can be argued that creating sustainable value can affect stakeholders' perception about an organisation. In addition, there is an obvious connection between the way an organisation carries out its strategic plan for engaging stakeholders and the stakeholders' perceptions about the organisation (EFQM, 2021b). Moreover, strategic and operational performance affects the stakeholders' perception since the views of stakeholders are formed by how they have experienced their interaction with the organisation (EFQM, 2021b). Also, Fombrun and Shanley (1990), state that all organizations, regardless of their profit or non-profit nature, are interested in their organisation's repute and put effort to form their stakeholders' perceptions about how the organisation performs.

The current study proposes and applies the EFQM Model 2020 to investigate the relationships between model's criteria and formulates seventeen hypotheses. Specifically, the study explores the relationship between Purpose, Vision and Strategy (PVS), Organisational Culture and Leadership (OCL), Engaging Stakeholders (ES), Creating Sustainable Value (CSV), Driving Performance and Transformation (DPT), Strategic and Operational Performance (SOP) and Stakeholders Perceptions (SP) as shown in Figure 1.
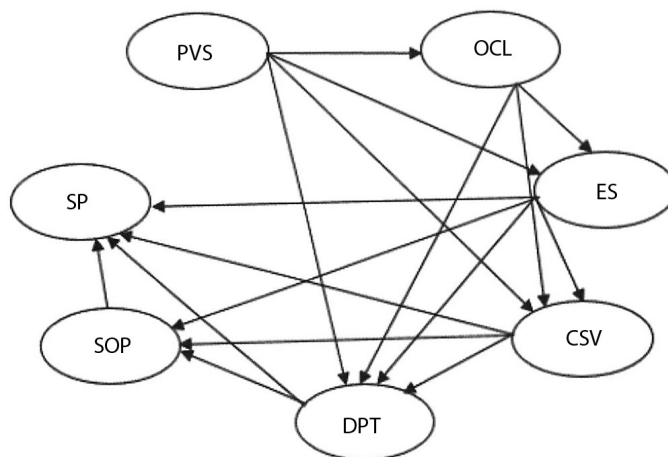

Figure 1. The proposed research model and hypotheses

Taking under consideration the above the hypotheses between the EFQM Model 2020 criteria are formulated as follows:

H1. Purpose, Vision and Strategy have a positive effect on Organisational Culture and Leadership.

H2. Purpose, Vision and Strategy have a positive effect on Engaging Stakeholders.

H3. Purpose, Vision and Strategy have a positive effect on Creating Sustainable Value.

H4. Purpose, Vision and Strategy have a positive effect on Driving Performance and Transformation.

H5. Organisational Culture & Leadership have a positive effect on Engaging Stakeholders.

H6. Organisational Culture & Leadership have a positive effect on Creating Sustainable Value.

H7. Organisational Culture & Leadership have a positive effect on Driving Performance & Transformation.

H8. Engaging Stakeholders has a positive effect on Creating Sustainable Value.

H9. Engaging Stakeholders has a positive effect on Driving Performance and Transformation.

H10. Engaging Stakeholders has a positive effect on Strategic and Operational Performance.

H11. Engaging Stakeholders has a positive effect on Stakeholders Perceptions.

H12. Creating Sustainable Value has a positive effect on Driving Performance and Transformation.

H13. Creating Sustainable Value has a positive effect on Strategic and Operational Performance.

H14. Creating Sustainable Value has a positive effect on Stakeholders Perceptions.

H15. Driving Performance and Transformation has a positive effect on Strategic and Operational Performance.

H16. Driving Performance and Transformation has a positive effect on Stakeholders Perceptions.

H17. Strategic and Operational Performance have a positive effect on Stakeholders Perceptions.

3. Research methodology

After the research methodology was designed, the authors submitted the research protocol for approval to the University's Committee for Research Ethics and to the Ministry of Education, Religious Affairs and Sports of Greece and approval was granted from both parties (Decision No. 37/17-07-2023 and Decision No. 86346/N4/31-07-2023 respectively). To attain the research objectives, the study applied qualitative methods to improve the questionnaire and quantitative research techniques during the analysis which are presented below in detail.

3.1. Creation, adaptation and validation of the research questionnaire

For the study's purposes, a structured questionnaire was created based on the guidelines, concept and structure of the EFQM Model 2020 and its self-assessment tool which is freely available after registration. The questionnaire has eight different sections, one section dedicated to each one of the seven criteria-constructs of the EFQM Model 2020, and a last section dedicated to the respondents' demographics. The scale that was used for the seven criteria-constructs was the scale of the self-assessment tool of EFQM Model 2020 that is a Likert scale ranging from 1 (Nothing in place) to 11 (Best in class).

Since the initial questionnaire was available in English, it was translated to Greek by using the forward-backward method following the guidelines of Beaton et al. (2007). Specifically, two independent translators fluent in both languages, whose mother tongue was Greek, were involved in the forward translation while one of them had the necessary scientific expertise and knowledge on the questionnaire's constructs. Subsequently, the two translators and one of the authors compared, discussed and synthesised the two forward translations into the first version of the questionnaire in Greek. Then, two other independent translators, who were bilingual and had no expertise and knowledge about the questionnaire's constructs, produced the two back translations in English. In addition, the original questionnaire in English, the two forward and the two back translations and the first version of the questionnaire in Greek were shared with an expert in methodology, the four independent translators and one expert in the research topic and based on their feedback the Greek questionnaire was produced. Apart from the back translation of the questionnaire that tests the validity of the research instrument (Beaton et al., 2007), two focus groups were conducted to check the content and face validity. The focus groups consisted of 7 managers and 7 staff members of Greek public administrative services selected by applying the convenience sampling method. During the focus groups, the participants were asked to discuss about each questionnaire item and provide their feedback about its fitness in the context of their services. After the focus groups' data analysis, some adaptations were made that resulted into the study's questionnaire. To provide some insight into the questionnaire, two indicative items belonging to the construct "Purpose, Vision, and Strategy" are presented below:

1. "Your public service has a clearly defined purpose".
2. "Your public service understands the challenges and opportunities in the environment in which it operates".

3.2. Pilot study

A pilot study was carried out to check the questionnaires' reliability. Specifically, the questionnaire was administered to a convenience sample of 50 Managers who worked at public administrative services in Greece. After collecting the data, the Cronbach's α coefficients were produced for the seven questionnaire constructs and all had a value above 0.70. Hence, the questionnaires' reliability was checked.

3.3. Main research

After checking the questionnaire's validity and reliability the main research took place. The study population were the managers of public administrative services in Greece, specifically, of the regional services of the Ministry of Education, Religious Affairs and Sports of Greece. The questionnaire was created online, and its link was sent via e-mail to the e-mail addresses of all the regional services of the Ministry of Education, Religious Affairs and Sports of Greece. After collecting the data, the authors checked the questionnaire's reliability and conducted descriptive statistical analysis for the demographics.

Subsequently, the study applied the Partial Least Square Structural Equation Modelling (PLS-SEM) approach by using the SmartPLS 4 software to test the models' reliability and validity along with the research hypotheses. The PLS-SEM approach was selected because it is highly efficient in estimating the model's parameters (Hair et al., 2021), regardless of the study sample size and the model's complexity (Hair et al., 2019). Moreover, PLS-SEM does not assume anything about the distribution of data (Hair et al., 2019), and it can be applied

to predict or confirm theoretical frameworks (Hair et al., 2011). Also, PLS-SEM was chosen due to its widespread application in previous social science research (Purwanto & Sudargini, 2021), and its increased use in the field of quality management (Magno et al., 2024). For this purpose, the measurement model was created that consisted of seven constructs-EFQM Model 2020 criteria (PVS, OCL, ES, CSV, DPT, SOP, SP) designed as first order reflective constructs measured by multiple indicators. Additionally, the structural model was established by defining the paths that represented the cause-effect relationships between the constructs. To assess the measurement model the indicators' loadings, the Cronbach's α, the rho_a, and rho_c, the composite reliability, the Average Variance Extracted (AVE), the Fornell-Larcker criterion, the analysis of cross-loadings and the heterotrait-monotrait ratio of correlations (HTMT) were calculated along with a bootstrap of 10000 replications to produce the HTMT confidence intervals. Lastly, to assess the structural model, the path coefficients and the coefficients of determination R^2 were calculated and a bootstrap of 10000 replications was conducted to test the significance levels.

4. Results

In this section the results of the quantitative analysis are presented, specifically, the descriptive statistics results about the study sample, the results of the questionnaire's reliability and validity tests and the results of the measurement and structural model assessment.

4.1. Sample demographics results

The study's sample comprised of 177 managers from public administration services in Greece, specifically, from the regional services of the Ministry of Education, Religious Affairs and Sports of Greece. The majority of participants were male (56.5%), and more than half of the respondents were 51–60 years old (67.8%). Also, almost three out of four participants (73.5%) have completed postgraduate studies while the majority of respondents (52%) had 0–5 years of management experience (Table 1).

Table 1. Demographics

Demographic Category	Frequency	Percentage (%)
Gender	177	100.0
Men	100	56.5
Women	77	43.5
Age	177	100.0
24–30	0	0.0
31–40	3	1.7
41–50	33	18.6
51–60	120	67.8
Over 60	21	11.9
Education Level	177	100.0
Secondary education degree	5	2.8
Bachelor	36	20.3

Demographic Category	Frequency	Percentage (%)
2nd Bachelor	6	3.4
Master	109	61.6
PhD	21	11.9
Management experience (in years)	177	100.0
0–5	92	52.0
6–10	40	22.6
11–20	18	10.2
Over 20	27	15.2

4.2. Questionnaire's reliability, convergent and discriminant validity and results of the measurement model assessment

All the Cronbach's α coefficients for the questionnaire's scales measuring the EFQM Model 2020 criteria had a value above 0.70 (Table 2). Therefore, reliability of the research tool was established. Also, the results of Unidimensionality analysis showed that for each scale only one dimension was produced. The results are not included in the presentation of the present study's findings.

To evaluate the reliability and validity of the study's reflective measurement model the PLS-SEM approach was applied and the guidelines of Hair et al. (2021), were followed. Specifically, to assess indicator reliability the indicator loadings were calculated and all of them except one had values above the 0.70 threshold. The only indicator whose loading was below 0.70, specifically 0.68, remained in the model because its value was between 0.40 and 0.70 and due to the fact that its deletion did not increase the value of internal consistency reliability or convergent validity (Hair et al., 2017; Hair et al., 2021). The indicator loadings are presented in italic font in Table 4. Subsequently, the internal consistency reliability was assessed and all Cronbach's α, rho_a, and rho_c, composite reliability's values were found to be above the threshold 0.70 (Table 2). Therefore, the reliability and internal consistency were ensured. In parallel, the Average Variance Extracted (AVE) values were greater than 0.50 (Table 2), hence convergent validity was established (Hair et al., 2017, 2021).

Table 2. Reliability and convergent validity

Construct	Cronbach's α	Composite reliability (rho_a)	Composite reliability (rho_c)	Average Variance Extracted (AVE)
OCL	0.909	0.911	0.943	0.847
PVS	0.928	0.929	0.945	0.776
ES	0.836	0.853	0.891	0.672
CSV	0.900	0.902	0.937	0.833
DPT	0.906	0.925	0.928	0.684
SOP	0.946	0.950	0.957	0.790
SP	0.919	0.920	0.937	0.714

Additionally, discriminant validity was established according to the Fornell-Larcker criterion since the square root of the AVE for all constructs was found to be greater than their correlations with all the other constructs (Table 3).

Table 3. Discriminant Validity according to Fornell-Larcker criterion

	OCL	PVS	CRV	DPT	ES	SOP	SP
OCL	0.920						
PVS	0.805	0.881					
ES	0.779	0.788	0.819				
CSV	0.821	0.796	0.772	0.913			
DPT	0.807	0.775	0.739	0.774	0.827		
SOP	0.223	0.236	0.363	0.271	0.206	0.889	
SP	0.784	0.756	0.812	0.740	0.743	0.438	0.845

Moreover, to assess discriminant validity the analysis of cross-loadings was conducted. The results (Table 4) show that each indicator presents a higher loading on its designated factor compared to its loadings on any of the other model's factors. Additionally, each factor shows the highest loadings with its own indicators. According to Chin and Dibbern (2010), the above observations combined indicate discriminant validity. Hence, discriminant validity was verified based on the cross-loadings analysis.

Table 4. Cross loadings Matrix

	OCL	PVS	ES	CSV	DPT	SOP	SP
OCL_1	*0.895*	0.710	0.698	0.721	0.721	0.040	0.735
OCL_2	*0.946*	0.741	0.692	0.734	0.735	0.224	0.705
OCL_3	*0.919*	0.767	0.758	0.806	0.770	0.340	0.723
PVS_1	0.660	*0.869*	0.659	0.669	0.619	0.221	0.638
PVS_2	0.735	*0.906*	0.738	0.705	0.704	0.257	0.697
PVS_3	0.770	*0.901*	0.718	0.730	0.735	0.122	0.673
PVS_4	0.680	*0.845*	0.625	0.676	0.721	0.143	0.649
PVS_5	0.692	*0.882*	0.725	0.724	0.631	0.300	0.671
ES_1	0.707	0.759	*0.889*	0.702	0.699	0.387	0.777
ES_2	0.596	0.548	*0.792*	0.564	0.510	0.098	0.519
ES_3	0.692	0.700	*0.857*	0.699	0.646	0.232	0.739
ES_4	0.543	0.541	*0.731*	0.544	0.541	0.452	0.584
CSV_1	0.755	0.728	0.644	*0.907*	0.721	0.081	0.591
CSV_2	0.743	0.756	0.700	*0.940*	0.740	0.211	0.684
CSV_3	0.749	0.697	0.765	*0.891*	0.661	0.433	0.745
DPT_1	0.598	0.574	0.591	0.581	*0.751*	−0.060	0.486
DPT_2	0.739	0.696	0.679	0.699	*0.890*	0.246	0.719

End of Table 4

	OCL	PVS	ES	CSV	DPT	SOP	SP
DPT_3	0.633	0.679	0.667	0.666	*0.850*	0.378	0.700
DPT_4	0.742	0.674	0.657	0.696	*0.887*	0.189	0.643
DPT_5	0.727	0.705	0.613	0.703	*0.879*	0.221	0.668
DPT_6	0.543	0.478	0.414	0.444	*0.680*	−0.123	0.377
SOP_1	0.291	0.289	0.454	0.279	0.289	*0.724*	0.389
SOP_2	0.277	0.298	0.349	0.376	0.284	*0.904*	0.472
SOP_3	0.166	0.181	0.236	0.217	0.137	*0.948*	0.382
SOP_4	0.168	0.182	0.291	0.201	0.119	*0.915*	0.369
SOP_5	0.091	0.102	0.196	0.146	0.055	*0.923*	0.312
SOP_6	0.126	0.138	0.326	0.155	0.133	*0.902*	0.354
SP_1	0.701	0.652	0.670	0.629	0.636	0.381	*0.898*
SP_2	0.705	0.668	0.687	0.641	0.651	0.412	*0.852*
SP_3	0.614	0.575	0.657	0.539	0.584	0.277	*0.831*
SP_4	0.704	0.644	0.698	0.612	0.616	0.410	*0.915*
SP_5	0.533	0.528	0.687	0.550	0.573	0.349	*0.779*
SP_6	0.696	0.740	0.706	0.756	0.689	0.378	*0.787*

Furthermore, the heterotrait-monotrait ratio of correlations (HTMT) results showed that all HTMT values were below the 0.90 threshold except two that were slightly above the threshold, specifically, 0.906 and 0.912. The bootstrap of 10000 replications showed that the value 1.0 was not present in any of the confidence intervals, and all the HTMT values were significantly different from 1.0 (Table 5). Therefore, discriminant validity was established (Henseler et al., 2015; Hair et al., 2021).

Table 5. Heterotrait-monotrait ratio (HTMT) and HTMT confidence intervals

	HTMT	HTMT 95% CI (Bootstrap 10000 rep.)	
PVS <-> OCL	0.874	0.820	0.920
CSV <-> OCL	0.906	0.844	0.966
CSV <-> PVS	0.871	0.819	0.923
DPT <-> OCL	0.885	0.814	0.949
DPT <-> PVS	0.837	0.758	0.904
DPT <-> CSV	0.848	0.772	0.920
ES <-> OCL	0.888	0.832	0.938
ES <-> PVS	0.883	0.839	0.925
ES <-> CSV	0.881	0.827	0.933
ES <-> DPT	0.834	0.754	0.903
SOP <-> OCL	0.239	0.176	0.328

	HTMT	HTMT 95% CI (Bootstrap 10000 rep.)	
SOP <-> PVS	0.239	0.154	0.341
SOP <-> CSV	0.284	0.221	0.374
SOP <-> DPT	0.282	0.226	0.350
SOP <-> ES	0.394	0.319	0.499
SP <-> OCL	0.854	0.799	0.904
SP <-> PVS	0.814	0.746	0.878
SP <-> CSV	0.806	0.714	0.896
SP<-> DPT	0.793	0.711	0.870
SP <-> ES	0.912	0.857	0.963
SP <-> SOP	0.457	0.345	0.552

4.3. Results of the structural model assessment and hypotheses testing

To assess the structural model and its explanatory power, the coefficient of determination (R^2) was calculated for each endogenous construct (Table 6). To evaluate the R^2 values, the study followed the guidelines of Hair and Alamer (2022), and Hair et al. (2021). The results demonstrate that five out of the six endogenous constructs (OCL, ES, CSV, DPT and SP) had strong explanatory power while only one endogenous construct (SOP) presented weak explanatory power since its R^2 value was 0.124, yet it is considered satisfactory according to Hair et al. (2021).

Table 6. Coefficients of determination (R^2) of the model's endogenous constructs

Construct	R^2	t-values (Bootstrapping 10000 replications)	p- values (Bootstrapping 10000 replications)
OCL	0.648	13.449	0.000
ES	0.681	16.830	0.000
CSV	0.741	17.769	0.000
DPT	0.716	11.840	0.000
SOP	0.142	2.874	0.002
SP	0.742	19.503	0.000

Additionally, as suggested by Hair and Alamer (2022), a one tailed bootstrapping of 10000 replications was conducted to test the research hypotheses. The results showed that thirteen out of the seventeen research hypotheses were supported since their path coefficients' t-values were above 1.96 and their p-values were found to be less than .001, .01 and .05 respectively (Table 7). Moreover to assess the effect size of the path coefficients the study followed the guidelines provided by Hair and Alamer (2022), that suggest when the value of the path coefficients (β) falls between 0 and .10 this indicates a weak size of effect, if it ranges from .11 to .30 then it is considered as modest, if it is between .30 and .50 then the effect size is moderate and if it has values above .50 then a strong effect size is present.

Considering the above, the results revealed that PVS has a significant strong effect on OCL, a significant moderate effect on ES and significant modest effects on CSV and DPT respectively. Also, OCL significantly and moderately influences ES, CSV and DPT. In addition, the results showed that ES has a significant modest effect on CSV and significant moderate effects on SOP and SP. Moreover, CSV significantly and modestly effects DPT while the latter one has a significant modest influence on SP. Lastly, the findings indicate that SOP has a significant modest effect on SP.

Table 7. Structural model results

Hypothesis	Path	Path Coefficient (β)	t-value (Bootstrapping)	p-values	Hypothesis Supported
H1	PVS → OCL	0.805***	26.712	0.000	Yes
H2	PVS → ES	0.456***	6.022	0.000	Yes
H3	PVS → CSV	0.284***	3.731	0.000	Yes
H4	PVS → DPT	0.225*	2.311	0.010	Yes
H5	OCL → ES	0.412***	5.073	0.000	Yes
H6	OCL → CSV	0.419***	4.849	0.000	Yes
H7	OCL → DPT	0.368***	4.230	0.000	Yes
H8	ES → CSV	0.221**	2.421	0.008	Yes
H9	ES → DPT	0.121^{ns}	1.355	0.088	No
H10	ES → SOP	0.439***	3.590	0.000	Yes
H11	ES → SP	0.427***	4.356	0.000	Yes
H12	CRV → DPT	0.199*	2.344	0.010	Yes
H13	CSV → SOP	0.059^{ns}	0.510	0.305	No
H14	CSV → SP	0.147^{ns}	1.331	0.092	No
H15	DPT → SOP	−0.164^{ns}	1.440	0.075	No
H16	DPT → SP	0.275**	2.880	0.002	Yes
H17	SOP → SP	0.186***	4.936	0.000	Yes

Note: * $p < .05$, ** $p < .01$, *** $p < .001$, ns = not significant, based on one-tailed test Bootstrapping 95% confidence interval based on 10,000 replications.

5. Discussion

The EFQM Model's previous versions have been used as research frameworks in Europe and beyond, but the number of studies focused on public administration services is limited. Moreover, the review of literature revealed that research on the novel version of the model, the EFQM Model 2020, was extremely limited and on the causal relationships between the EFQM Model 2020 criteria was scarce. In addition, no research data was found on the reliability and validity of the EFQM Model 2020 in the European context. Therefore, the purpose of this study was to investigate the reliability and validity of the EFQM Model 2020 in the context of a European country and to gain a better understanding of the causal relationships between the model's criteria.

The study results provided evidence that the proposed research model is reliable and valid for the study's context. Moreover, according to the findings the vast majority of the research hypotheses was confirmed and at high significance levels (H1, H2, H3, H4, H5, H6, H7, H8, H10, H11, H12, H16, H17). The results showed that PVS had the strongest positive effect on OCL (0.805) which is consistent with previous literature (Babnik et al., 2014; Marx, 2015). This indicates that the services must pay great attention in formulating a clear purpose, vision and strategic plan since these act as a compass for the services' leadership in the decision-making process and promote the creation of an organizational culture where every action is aligned with the attainment of the services' goals.

The results indicate that PVS had a positive influence on ES (0.456) which is supported by literature (Peloza et al., 2012). Therefore, the public sector services should form a purpose and a vision that will be meaningful for their stakeholders and incorporate stakeholders' engagement in their strategy by developing effective ways to involve them in their activities. Also, PVS had an effect on CSV and DPT respectively which is to be expected if one considers that an organization's purpose, vision and strategy influences its attitude towards sustainability and change and directly affects its performance.

Also, the findings provided evidence that OCL had a positive effect on ES which is aligned with literature (Addin, 2020; Carataș & Spătariu, 2018; Laszlo, 2008; Tsai, 2011). Therefore, the public sector services must create a culture that will engage and develop their people, attract the best staff and promote sustainable relationships with their partners and local communities. Moreover, the services' leadership must work towards achieving their stakeholders' engagement by motivating their people and cultivating their sense of belonging and by promoting the active involvement of their customers, partners and local community to the attainment of the services' goals.

Moreover, OCL were found to positively influence CSV and DPT which come as no surprise if someone considers that organizational culture has been found to directly affect the organisation's growth (Ashok, 2016), impacts every party associated with the organization (Akpa et al., 2021), and influences organisational performance (Akpa et al., 2021), while leadership is one of the main drivers for organisational performance (Addin, 2020; Akparep et al., 2019), transformation (Albert et al., 2022), and for the creation of sustainable value for all stakeholders (Laszlo, 2008). In addition, organisational culture and leadership can affect the actions the organisation's people (Tsai, 2011). Hence, it is essential that leadership is present in every aspect of the public sector services, not in the form of a manager but as a collective attitude and a united effort guided by the services' purpose, vision and strategy with the aim to the keep updated the organisational culture, drive change and promote creativity and innovation in the services' contexts.

Also, the results showed that ES had effects on CSV, SOP and SP which are supported by Daft (2010), the EFQM (2021b), and Leal Filho and Brandli (2016). Moreover, the effect of ES was stronger on SOP and SP, therefore, it is important for the public services to further evolve their strategy and include all aspects of engaging stakeholders since the stakeholders' active involvement can affect their perceptions about the public sector services along with the services' performance. Lastly, the results revealed that CSV had an influence on DPT which is consistent with Laszlo (2008), therefore, since sustainability is one of the main goals of the national and international Agenda, the public sector services must include the creation of sustainable value in their strategic plan and declare sustainability as a key factor in their decision-making.

6. Conclusions

The present study is a first attempt to apply and validate the novel EFQM Model 2020 as a research framework and investigate the causal relationships between the models' criteria in the European context. The research findings provide evidence that the EFQM Model 2020 is indeed a reliable and valid model in the context of the study and reveal positive and significant relationships between the vast majority of the EFQM Model 2020 criteria. This study enhances our understanding of the novel EFQM Model 2020, contributes to the existing body of literature and aspires to provide stimulus for future research in this area. The EFQM Model and derived models, including the one examined in this paper, assume a causal relationship between essential variables. It is important to analyse and quantify these causal relationships only when they are supported by relevant theories. Statistical analysis validates a proposed framework but does not introduce it. Linking the quantitative approach to theory not only enhances the credibility and validity of the findings, but can also provide valuable insights into organisational performance and facilitate informed decision making. This study also presents limitations. Firstly, although the study sample is nationwide, it comprises managers from certain types of services, specifically from the regional services of the Ministry of Education, Religious Affairs, and Sports of Greece. Thus, the sample is not representative, as it does not reflect the diversity of Greek public sector services, including differences in size, function, and geographic location. Secondly, the study findings are directly relevant to Greek public administrative services since they are detailed and context specific. As a result, the findings may not easily transfer to public administrative services in different countries due to cultural and public sector differences. Additionally, the study's findings may be time-bound and require replication over different periods to ensure consistency. To address these limitations, future research should include various types of public services across different regions and functions in Greece. Moreover, since this study was restricted to Greece and focused only on public sector administrative services, comparative studies in different countries or contexts should be conducted to test the applicability of the findings beyond Greece. By addressing these points, future research can build on the current study's findings, enhancing the overall credibility and applicability of the research in the field of public sector services.

Funding

Author contributions

D.M. and K.Z. conceived the study and designed the research methodology. D.M. was responsible for data collection and analysis. D.M. and K.Z. were responsible for data interpretation. D.M. wrote the first draft of the article while K.Z. provided revised advice and edited it. K.Z. supervised the research. Both authors have read and agreed to the published version of the manuscript.

Disclosure statement

The authors don't have any competing financial, professional, or personal interests from other parties.

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