ISSN: 2147-5121 / E-ISSN: 2717-7610

İstanbul Nişantaşı Üniversitesi Sosyal Bilimler Dergisi

Bilimsel Hakemli Dergi

Yıl: 2024 Cilt: 12 (Özel Sayı)

İSTANBUL NİŞANTAŞI UNIVERSITY NEW

NUSBD

Yayın Aralığı: Yılda 2 Sayı - Başlangıç: 2013

İstanbul Nişantaşı University Journal of Social Sciences

Scientific Refereed Journal

Year: 2024 Vol.: 12 (Special Issue)

A R A Ş T I R M A M A K A L E S İ / R E S E A R C H A R T I C L E

DOI: 10.52122/nisantasisbd.1473005

SCALE FOR DETERMINING THE VIRTUAL MANAGEMENT LEVEL OF AN ENTERPRISE [1]

Dr. Öğr. Üyesi Meriç Esat BEBİTOĞLU

İstanbul Nişantaşı Üniversitesi. İİSBF, İşletme Bölümü

e-posta: meric.bebitoglu@nisantasi.edu.tr

ORCID 0000-0001-5013-913X

ABSTRACT

The soaring rise of the information age, the postmodern management approach, the instantaneous state of the era, the speed, and the processing of big data with different methods, and the compulsory of remote working under the conditions of the pandemics have granted vital importance to virtualization. The study aims to propose a scale that will determine the virtual management levels of enterprises by transforming traditional management functions into virtual management functions with the contribution of four factors: adaptability-flexibility, teamwork, communications-leadership, and strategic vision. In the study, which was conducted with the participation of 265 people working in 45 different sectors and approved by the ethics committee, four main features were confirmed by factor analysis. Confirmatory factor analysis was used to test the validity of the four-factor structure obtained by exploratory factor analysis.

Keywords: virtual management, digital management, remote working, teamwork, strategy

Jel Codes: M10, M13, M15

BİR İŞLETMENİN SANAL YÖNETİM DÜZEYİNİ BELİRLEME ÖLÇEĞİ

ÖZ

Bilgi çağının hızlı yükselişi, postmodern yönetim anlayışı, çağın anlık hali, büyük verinin hızlı ve farklı yöntemlerle işlenmesi ve salgın koşullarında uzaktan çalışma zorunluluğu sanallığa yaşamsal önem kazandırmıştır. Bu çalışma, geleneksel yönetim işlevlerinin; uyum sağlama-esneklik, ekip çalışması, iletişim-liderlik ve stratejik vizyon faktörlerinin katkısıyla sanal yönetim işlevlerine dönüşeceği öngörüsüyle işletmelerin sanal yönetim düzeylerini belirleyecek bir ölçek önermeyi amaçlamaktadır. 45 farklı sektörde çalışan 265 kişinin katılımıyla gerçekleştirilen, etik kurul onayı bulunan, araştırmada dört temel özellik faktör analizi ile doğrulanmıştır. Açımlayıcı faktör analizi ile elde edilen dört faktörlü yapının geçerliliği, doğrulayıcı faktör analizi ile test edilmiştir.

Anahtar Kelimeler: sanal yönetim, dijital yönetim, uzaktan çalışma, takım çalışması, strateji

Jel Kodları: M10, M13, M15

Geliş Tarihi/Received: 24.04.2024	Kabul Tarihi/Accepted: 13.12.2024	Yayım Tarihi/Printed Date: 30.12.2024

Kaynak Gösterme: Bebitoğlu M.E., (2024). Scale for Determining the Virtual Management Level of an Enterprise, *İstanbul Nişantaşı Üniversitesi Sosyal Bilimler Dergisi*, 12 (Özel Sayı) 84-105.

[1] Bu çalışma; yazarın Anadolu Üniversitesi Sosyal Bilimler Enstitüsünde, Prof. Dr. Mehmet ŞAHİN danışmanlığında, 2003 yılında tamamladığı 'Sanal Yönetimin İşletme Verimliliği Üzerine Etkisi ve Digiturk'te Bir Uygulama' başlıklı doktora tezi esas alınarak hazırlanmıştır.

INTRODUCTION

Virtuality is defined as a technology-enabled interaction between two or more people (Dixon & Panteli, 2010). Virtuality can also be defined as the ability of something which does not exist physically, to fulfill its functions in an environment that does not exist. We define virtual environments that are real-like, which do not exist, but whose effects are perceivable. Virtuality, one of the most popular concepts of today, has started to be used in a wide variety of areas. Virtual reality, virtual company, virtual classroom, virtual office, virtual surgery, virtual diving, virtual organization, virtual shopping, virtual flying, and virtual stores are many of them. Virtuality and virtual reality are often used synonymously. In virtual reality, there is a misleading of the human brain in some way. Synchronizing the senses with the virtual environment is aimed at making people feel that they are part of that (virtual) environment. This study contributes to the literature by proposing a scale for determining the virtual management level of the organisation.

As a result of the interaction of virtual environments created by information systems and their derivatives, the conventional management functions of planning, organizing, coordinating, executing, and controlling are converted into virtual ones by digitalization. In other words, managing the business with the contribution of virtual environments can be defined as virtual management, consisting of virtual planning, organizing, coordination, leading, and controlling.

Information systems, which are one of the fundamental tools that facilitate virtuality, are insufficient to define the concept of virtual management. Communication and information sharing constitute one of the vital dimensions of virtual management, which takes the concept of management beyond physical constraints and makes it independent of time and space. The development of information technologies, particularly the internet, changed the era with the dimension of communication emerged. The advent of internet technology and digitalization has enabled individuals who are geographically dispersed to engage in teleconferences, communicate via internet-based technologies, and transfer information. Consequently, all information technology equipment must be capable of functioning in an interactive manner in order to perform virtual management functions. The Internet of Things (IoT) systems, which are composed of all software and hardware instruments that can be in communication today, are about to transform the World once again. A literature review was conducted to support the claim of virtual management in the following parts of the study. An attempt has been made to make inferences about what factors influence and virtualize management by merging similar and close concepts in the literature. The conclusions were corroborated by the results of the questionnaire administered to the participants, who were employed in 45 different industries.

1. The Concept of Virtual Management

The concept of virtual management is a new proposition that has not been claimed before. Under the challenging conditions of the digital era, it is possible to suggest a virtual management approach to businesses to increase corporate productivity and competitive advantage in the market. The concept of management will be explored in a virtual environment or through the use of technological devices, with a view to investigating the impact of virtuality on competition and productivity. It is anticipated that the phenomenon of management will evolve towards a virtual management as a consequence of the virtualization of management functions. The prediction in this study that the evolution of technology will lead to the virtualization of management functions has been subject to criticism. While virtual management claims that the management phenomenon will evolve to the current conditions, it does not claim that the previous management approaches have come to an end, they will no longer exist, and that a definite and clear transition occurs. However, during the COVID-19 pandemic, it has been observed that businesses started to be managed virtually very soon because of accepting the virtuality culture and concept while starting remote working out of the offices.

Virtual management can be defined as the virtualization of the traditional management functions. It can be argued that the changing and evolving aspect is limited by technological capabilities; the

foundation and core of management functions have not changed. This proposition is correct in terms of management functions, but with the cooperation of technology-integrated systems, the management functions have not accelerated and changed. Also, different dynamics have emerged in the field of management, and organizational cultures have started to change toward virtualization. The most tangible indicator was that businesses were managed virtually without any employees coming together for months during the COVID-19 pandemic. As a result of not being able to be physically together, a different culture was created with mandatory remote working conditions; whatever had happened in the business during the "old" (pre-pandemic) day-to-day management of the business continued similarly, but the results had to be more clearly achieved. With the statement declared as the "new normal," a new culture begins to form with its unique symbols and images. The main differences between traditional and virtual management can be summarized in Table 1.

Table 1. Main Differences between Traditional and Virtual Management

Traditional Management	**Virtual Management**
Physical resources stay together	Digitally linked resources are widely dispersed
Serial working	Parallel working
Periodic communication	Continuous communication
Face-to-face communication	Online communication
Physical objects	Digitally generated (virtual) objects
Distribution of information	Access to information
Hard copy information	Digital information
Distribution of pre-designed tasks among employees	Continuous sharing of incomplete tasks among employees
Accumulation of information	Sharing of information
Transparent process	Digitally traceable process
Common tasks	Unique tasks
Top management decisions	Decentralized decisions
Focus on org. levels from top to bottom	Focus on all processes
Prototypes are hard to make	Working with prototypes and simulators

Source: Grenier & Metes, 2000.

When we consider the differences between traditional management and virtual management, it is possible to delineate that virtual management has the following features (Grenier & Metes, 2000). Virtual management;

- converts the business independent from the physical space,
- accelerates the flow of information and provides unlimited access to information,
- allows faster use of the information obtained in line with the business purposes and to make experiments on the scenarios produced,
- makes decision mechanisms work faster. Decision support systems achieve higher efficient results by providing the right information at the right time,
- contributes to the creation of a synergy environment,
- creates a bureaucracy-reducing effect with the convenience of creating and rearranging documents,

- improves the transfer of authority and the ability to use initiative,
- plays an effective role in reducing the management levels,
- provides optimum use of resources by saving time and energy,
- encourages teamwork.

Virtuality affects many factors that influence the quality of team communication, such as the size of the team size, member competencies of the team, tenure of the team, distance between members of the team, cultural differentiation, configuration, time allocation, contextual diversity of team members, time dispersion, and the nature of the task. All of these factors are related to virtuality, and their influence on team communication determines the degree of virtuality (Krawzyck, 2017). The organizational culture must be fully established for virtual teams to be successful. The risk-posing features of the virtual office environment, which have not been fully realized today, but are expected to be completely real soon, can be listed as follows (Norton & Smith, 1997);

- Management has difficulty controlling an invisible workforce,
- There are problems in sharing the common goals and objectives of the company and ensuring loyalty to the company by employees working far from each other,
- Remote Working can create a sense of isolation among employees so many people still prefer to work in a traditional office,
- There are problems in determining social status for young people who are taking the first steps in their careers.

In February 2020, before the full impact of lockdowns, 1,300 CEOs were surveyed by the research company KPMG. A follow-up 'pulse' survey was conducted with 315 CEOs in July. According to the survey; working from home can cease to be a temporary situation and turn into a permanent model of business life. Almost three-quarters of CEOs stated that they plan to spend more money on digitizing their operations and creating next-generation working models. Two-thirds stated that they aim to invest in the creation of new workforce models that increase the use of automation and artificial intelligence, as well as human employees. 72 % of CEOs stated that they expand their potential talent pool with the contribution of the remote working model. While companies reduce their office expenses, they will not have to choose their employees from those who live in the city or are willing to move for work[2].

While examining the survey, most of the factors seem positive through the company's scope, but there is one strong constraint against the employees. In certain instances, the practice enables companies to offer employees remuneration at relatively lower levels. In smaller cities, salaries may be comparatively lower, given the elevated living costs associated with metropolitan areas.

About the future of digitalization and virtual management Metaverse can be a new frontier. Contraversly, it is ealso expected the virtual management can be frontier for Metaverse. Feifei et. al., (2023)states the Metaverse depicts a parallel digitalized world where virtuality and reality are fused. It has economic and social systems like those in the real world and provides intelligent services and applications.The metaverse is realized as the next big technology and currently attracting online game makers, internet finance businesses, social networks, and other technology leaders (Thien et. al., 2023). As the virtual environment of the Metaverse increasingly reflects the business world, it is anticipated that it will evolve into an invaluable tool and environment for virtual management. We can expect artificial intelligence and its extensions to be another accelerating factor that will enable the development and further adoption of Virtual management practices in enterprises. As Loureiro et al., (2021) stated that; the advent of artificial intelligence

2 The KPMG 2020 CEO Outlook COVID-19 Special Edition, (https://assets.kpmg.com/content/dam/kpmg/xx/pdf/2020/09/kpmg-2020-ceo-outlook.pdf last retrieved December 24th, 2024)

(AI) has had a profound impact on business, the economy, and society more broadly, with the technology transforming the ways in which stakeholders and citizens interact with one another and with the world around them. Also in their study, Duan et. al., (2019) identified key issues and challenges surrounding the use of AI for decision-making in the context of big data. They proposed theoretical developments and the implementation of AI in this domain.

1.1 Virtual Management Level of an Organization

In the contemporary business environment, the phenomenon of virtualization has become a ubiquitous reality. Consequently, it is reasonable to posit that a diverse range of organisations are engaging with virtualization to varying degrees. Not all organisations will necessarily possess the same characteristics associated with the concept of virtualization. In the literature, Travica (2005) has delineated a model with the initials consisting of its constitutive extensions such as Interoperability, Switching, Special Product, Aggregation, Anchoring, and Cybernization, referred to as ISSAAC. The model is meant to be used to clarify virtual organizations and determine the degree of virtualization.

In Travica's (2005) study *Interoperability* refers to the synchronization of an organization among its partners. *Switching* refers to the flexibility of the organization. *Special Product* corresponds to 'out of the standards' goods and services delivered by the organization. *Aggregation* property refers to the virtual organization that is digitally connected to other organizations as well as individuals. *Cyberization* refers to the existence of an organization within the field of information systems and electronic information flows, whereas Anchoring can be defined as the support that Cybernization provides to virtualization in the management, structural, process, cultural, political, and strategic aspects of an organization. This study, in conjunction with Travica's (2005) model, identifies a number of additional concepts that must be investigated in order to ascertain the extent of virtualization within organisations. The objective of this study is to enhance the model by incorporating further features that will enable a more accurate assessment of the virtual management level of businesses. In the literature, Batırlık et al., (2022) also sought to contribute to the understanding of virtual teams and the concept of virtual team leadership. They aimed to gain insight into the leadership perceptions of individuals employed by multinational companies in organizations held in virtual environments and to develop a scale for virtual team leadership.

1.2 Related Concepts that Define the Level of Compliance with Virtual Management

This study claims that the determination of the virtualization of businesses might consist of the concepts of *flexibility and adaptability*, *leadership and communication, teamwork,* and having a *strategic vision*. Businesses need an advanced technological infrastructure to use virtuality. This advanced infrastructure does not only consist of hardware but especially valuable software that is also needed for the installation and development of reporting and decision support systems. Concurrently, it is of paramount importance to ensure that human resources are compatible with the concept of virtualisation. In other words, it is believed that it is not enough to acquire the most advanced technology, but also to harmonize these technological innovations with each other, to ensure the contribution of human resources, and to make them work efficiently. The relationship between the terms can be stated in Figure 1.

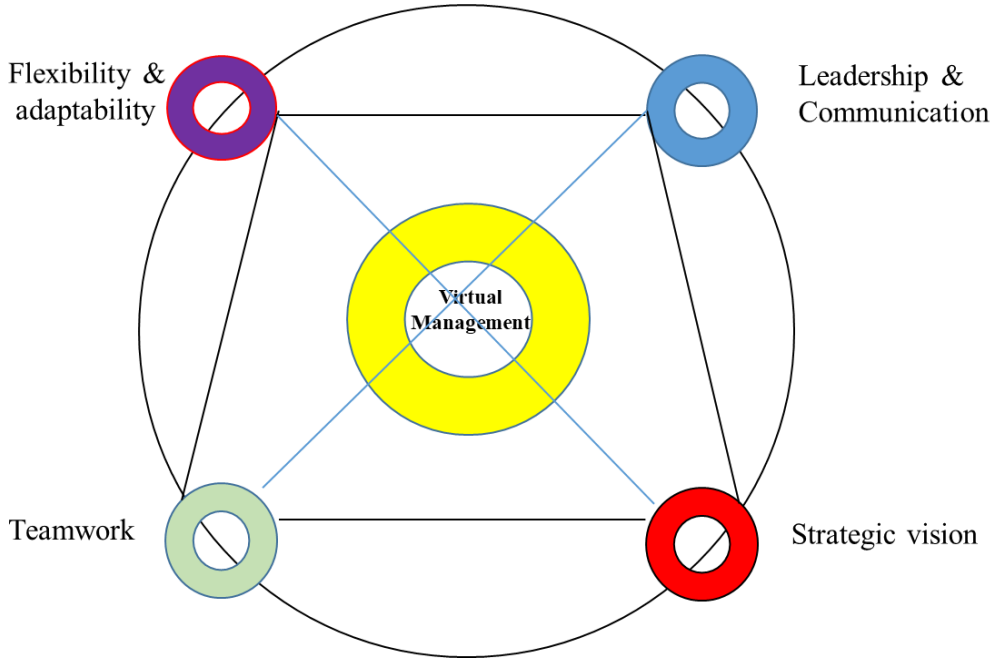

Figure 1. Possible Features that Determine the Level of Virtualization

Source: Illustrated by the author.

The concepts of flexibility, participation, teamwork, adaptability, and virtualization have been in existence for some time, yet their importance in modern business is increasing daily. This study suggests that these concepts form the basis of virtualization.

1.2.1 Flexibility and Adaptability Features

Virtual teams are predicted to be more flexible than traditional teams (Bakshi and Krishna, 2009). Virtual organizations are understood to be electronically networked teams of organizations that may not necessarily adhere to the typical organizational structure (Grabowski & Karlene, 2011; Berger, 1996; Rogers, 1996). In this era, we can convert the term "electronically" to "digitally" networked. Virtual Organizations consist of a set of unbiased organizations which have a value chain in common, Participants of the group are in different locations although they are connected by electronic (digital nowadays) networks and information systems (Jarvenpaa & Leidner 1999; Palmer & Speier 1997; Chesbrough & Teece 1996; Benjamin & Wigand 1995). Furthermore, it is worth noting that virtual organizations are often geographically dispersed, electronically connected, and comprised of individuals from different cultural and functional backgrounds. They often operate in a lateral manner, rather than in a hierarchical structure (DeSanctis & Monge 1998). Grabowski and Roberts (1999) suggested that the traditional advantages attributed to virtual organizations may include adaptability, flexibility, and the ability to respond quickly to change (Bezpartochnyi, 2020). A study of virtual teams undergoing a rapid transition to remote work was developed and categorized under six overarching themes: norm-setting, performance monitoring, leadership, support mechanisms, communication, and flexibility (Kilcullen et al., 2021).

According to the definitions and studies mentioned above, we can say that; the organizational structure is redefined with flexibility making the organization independent from time and space with the contribution of virtualization. Within the scope of the study, after defining these concepts, a survey-based field study was conducted on the compatibility of the researched enterprises with virtual management.

1.2.2 Leadership and Communications Features

The establishment of a conducive virtual team environment and the coordination of the team are significant challenges for the team leader. The main factors influencing virtual team performance are a clear mission and clear goals, engagement and identification of team members, roles and

responsibilities, monitoring and empowerment, and supporting mutual trust by promoting open communication, integration, team culture, and communication rules (Krawczyk, 2017; Scannell et. al., 2014; Mortensen & Leary, 2012; Lepsinger & DeRosa, 2010). Early leadership researchers recognized that effective leadership depends on leader characteristics and the situation (Jones & George, 2009). The communication process is also important in the model of virtuality whereas virtual teams have geographical dispersion, and asynchrony features with the reliance on information communication technologies (Housseini et. al., 2015). Unquestionably, communication technologies have drastically changed the work environment (situation) and presented new challenges for effective leadership. The virtual work environment is one of the many situations forever changed by technology evolution (Salter et. al., 2010). It is imperative that team leaders adapt their leadership styles to the demands of remote leadership. Although the expeditious deployment of teams to remote locations may not permit the preparation of leaders for remote leadership, it is recommended that organizations provide team leaders with training for the management of virtual teams, where feasible (Ford et al., 2017; Rosen et al., 2006). As has been observed in the literature, several team-level issues can impact employee performance in virtual environments. These include leadership and support mechanisms. It seems that in the case of fast-start virtual teams, leaders may play a particularly important role in modifying team norms to accommodate virtual work environments. Support mechanisms may manifest in a multitude of forms, including the implementation of a team charter, the incorporation of team-building exercises, and the provision of regular feedback (Kilcullen et. al, 2020). Furthermore, it is recommended that team leaders communicate with their teams frequently, particularly in one-on-one settings (Kirkman et al., 2002). It would be beneficial for leaders to consider ways to make check-ins with their team members as engaging as possible (Feitosa & Salas, 2020). In almost every aspect of life, including the workplace, communication technologies have become commonplace (Colbert et. al., 2016), so employees often interact virtually regardless of geographic distance (Kirkman et. al., 2012). As leadership emerges throughout the virtual team lifecycle, the strengths and competencies of the collaborative members can be leveraged to generate creative solutions based on the expertise of the leaders (Chemiakiotis, et. al., 2013).

In their study, Antonacopoulou and Georgiadou (2021) define the concept of "leadership from home" and "homecoming" as an act of leading on leadership. Leadership through social distancing represents an invitation to relate to each other not only by recognising the 'other' as a respected position/perspective, but also by embracing the 'other' as a foundation for serving the common good. Leadership through social distancing entails a rediscovery of inter-connectedness, not merely through interdependence (and an acknowledgement of shared circumstances), but rather through an understanding of the nature of inter-relating. These conceptualisations provide novel foundations for the interpretation of meaning in professional contexts, as they advocate for a new social consciousness and a set of principles that can facilitate the future of work and corporations with leadership that serves the common good (Clavijo, 2020).

1.2.3 Participation, Virtual Working Groups, and Teamwork Features

To provide collection and sharing of knowledge to turn into added value, management and teamwork are required. A virtual team is a group of interdependent people who are accountable for team results, interact with each other, and feel like a social unit, but function across organizational boundaries, are geographically dispersed, and rely on and use interactive communication technologies to communicate (Gibson & Cohen, 2003; Krawczyk, 2017). Grosser & Baumöl (2017) define two main virtuality criteria: asynchrony and geographic dispersion, describing a virtual team as a team that collaborates asynchronously (same locations and different schedules or different locations and time zones) and geographically dispersed (distance between team members). However, the percentage of time spent virtually and the percentage of team members working virtually are also important in assessing the virtuality of the team (Krawczyk, 2017). Virtual teams are dynamic, adaptive, and complex systems that are influenced by the social context, the task context, the technology context, and the setting context (Gilson et. al., 2014). Virtual management and virtualization care more about participation than individuality. Certainly, leaders and staff members shaping the future still exist in virtual management.

However, what is essential is the fast and effective realization of common goals throughout the enterprise by using virtuality. Not only certain levels of management but also all employees should participate in virtual management. As technology continues to evolve, facilitating communication between employees and team members, the concept of "virtuality" has become an important topic in management and applied psychology (Brown et. al., 2020).

Virtual organization refers to the temporary teaming of enterprises. A virtual organization is a group of organizations that have banded together to achieve a common goal (Camarinha-Matos et. al., 2006). The summary that emerges while examining the classical and neo-classical theories of management and organization within their historical development on the way towards virtual management is that development is gradually shifting from the human-machine combination towards the human-knowledge axis. Thus, in classical management, with the great effect of the Industrial Revolution, business administration is mostly defined by the number, location, availability, and efficiency of production and production tools, while business administration has become more known for human resources and human productivity, especially with the influence of the neo-classical approach. In other words, in the modern management period, human and human-based concepts have gradually gained importance, and teamwork, cooperation, the delegation of authority, and taking initiative have also been granted. In contrast to earlier experimental studies that focused on the potential drawbacks of computer-mediated communication, modern technologies are often used to facilitate team functioning. For instance, Dixon & Panteli (2010) observed that technology-mediated communication may offer a potential avenue for teams to navigate discontinuities (e.g., locational or organizational differences) among team members (Brown, et al. 2020).

Teamwork is not just an issue specific to virtualization. In modern business life, teamwork has been supported and practiced for many years. If teamwork flexibility and participation are considered primarily, it is noticeable that they represent the indispensable conditions of virtual management. In other words, if teamwork is not sufficiently supported and implemented, virtual management fails. Teamwork is inevitable, as the basis of virtualization is to come together independently of time and space. Today, teamwork is a necessity for organizational success.

Virtual Management requires participation due to its nature. Virtual management, where technology and rapid communication are the main components, has a structure that allows everyone to speak and initiative. This democratic and participatory management environment is in high demand. Many workplaces have new technology tools, such as Slack and Microsoft Teams, in place to facilitate communication between team members (Bunce et. al., 2018; Perkel, 2016) These tools, along with other traditional means of communication (e.g., email or instant messaging), have the potential to facilitate more diverse interactions within teams with similar levels of objective dispersion. Consequently, two teams performing the same task with an equally dispersed membership may utilize a disparate combination of tools and experience markedly disparate levels of virtuality (Laitinen & Valo, 2018). *The disappearance of time and space limitations increases participation*. As the effect of time and space differences disappears; the formation of working, commerce, education, and entertainment are changing in dimensions not previously imagined. More participatory governance and direct democracy via the Internet environment are on the agenda for the near future. New opportunities are vital to become more transparent in public administration and provide faster and more respectful service to citizens. The most important feature of virtual environments, which we can define as interactive, is to create a participatory and accommodating environment such as more than one employee working at the same time. Since virtual environments provide opportunities such as transparency, being open to information and sharing, and working independently from time and place, the executive function will be realized in a more democratic and participatory environment. The results of the controlling function, together with the reasons for deviation, should be shared online and transparently with all relevant employees (Wildemeersch & Jütte, 2017; Voinov et. al., 2016).

About the contribution of artificial intelligence to tamworking consist of the facilitation of conditions and provision of training have the potential to result in the development of a certain level of attachment (bond) between human workers and AI, particularly if the need for attachment

or dependency is expressed by the AI robot. This can provide a sense of confidence to human workers (Gillath et al., 2021). Ultimately, one of the most significant challenges for the HR function in organisations pertains to performance evaluation dynamics, particularly in instances where humans and AI-enabled robots are collectively engaged in the same team (Arslan et al., 2022).

1.2.4 Strategic Vision Feature

Strategic decisions are taken to determine the long-term goals, policies, and resources of the organization (Laudon & Laudon, 2000). In the virtual management process, planning in the classical sense has turned into strategic planning over time, whereas strategic thinking has emerged. Planning also has vital importance for virtual management.

The rapid changes and developments experienced today, the situations in both internal and external competition, also lead to more innovations in the organizational structure of the enterprises. Going virtual in organizations occurs in several ways. The formation of strategic alliances, joint ventures (JV) outsourcing contracts, and informal cooperation efforts can be considered examples of virtualization. Thus, outsourcing has started to take out some of the services that the company needs, while the strategically important businesses remain within the company. Companies are structured to focus only on areas of their expertise in their organizations. New organizational structures can be defined as networks, strategic partnerships, and virtual organizations (Hatch, 1997). Virtual organization structure needs flexibility. This helps to establish cross-organizational relationships between teams, to create strategic alliances, and to experience permanent mergers between organizations. Strategic information systems contains information compiled from internal or external sources for senior managers to make their strategic decisions. Future five-year employment plans, sales forecasts, and budgeting are in this system. Strategic decisions involve long-term policies, practices, and resources of the organization (Saether et. al., 2021).

While the company needs to establish an effective extranet system with external partners as a requirement of the network organization, it is beneficial to establish an intranet system that will enable the (internal) employees to interact with each other and the system. Similarly, it is extremely important to use the internet better than competitors, to benefit from it in marketing activities, and to use it as a tool in internal or external communication. For virtual management we can assume that; using IOT (Internet of Things) technology, smartphones, cameras, barcode readers, sensors, voice, and image recognition systems, and whatever is to be developed in the future, such systems must be kept compatible and communicating with each other. The virtual organization needs a common space to interact (Poth & Heimann 2018).

The formation of a unified organisational vision can be conceptualised as an instance of a knowledge-creating and organisational learning process that facilitates the transformation of individual and organisational visions through a dialectical process towards a shared organisational vision (Kaiser et al., 2021).

2. Scale Development Process

The primary objective of this study is to develop a scale for measuring the extent to which a business utilizes virtual management features. The scale development process is defined by Churchill (1979) as follows;

1. Specify the Domain of Construct
2. Generate Sample of items
3. Initial Data Collection
4. Purify Measure
    A. Initial Coefficient Alpha
    B. Exploratory Factor Analysis

C. Confirmatory Factor Analysis

5. Additional Data Collection

6. Assess Reliability with Additional Data

A. Coefficient Alpha

B. Test-Retest

7. Assess Validity

A. Content

B. Criterion

C. Construct

(I) Discriminant

(2) Nomological

The study followed the scale development stages as described by Churchill (1979). Focus groups were organized with participants from industry and academia to formulate the questions.

2.1 Focus Group Study Results

To specify the domain of construct, a qualitative research tool, focus group interviews methodology is used. It is commonly believed by researchers that focus group interviews were developed as a way to address some of the limitations of traditional in-depth interviews (Hennik, 2014). Focus group interviews aim to gain a diverse range of insights on the research topic within 60–90 minutes, while creating a supportive environment where participants feel at ease sharing their thoughts (Hennik et. al., 2011). A typical focus group discussion is conducted with a small number of participants, with the guidance of a skilled moderator. In such interviews, the moderator's role is to facilitate an open dialogue among the group members, allowing them to express their ideas and thoughts on the current topic (Batırlık et. al., 2022). In his study, Casey & Krueger (1994) suggests that the optimal number of people to be included in the focus group is seven, to ensure a productive and manageable discussion. For this study, 17 people employed in a variety of sectors were involved in the focus group interviews. Item pool generation is finalized by experts and academics after the results obtained from focus group interviews. The demographics and seniority of the participants of the focus group interview are given in Table 2.

Table 2. Focus Group Interview Participants

Partici-pant ID	Gender & No	Age	Education Level	Job Title	Years of Exp.	Location
1	M1	40	Bachelor	Director	16	İstanbul
2	M2	42	MSc	Deputy GM	17	İstanbul
3	F1	32	MBA	Consultant	7	İstanbul
4	M3	47	Bachelor	Director	23	Ankara
5	M4	51	MBA	General Manager	26	İstanbul
6	M5	50	PhD	Vice President	20	İzmir
7	F2	36	MSc	Expert	12	İstanbul
8	M6	48	Bachelor	Director	23	Eskişehir
Partici-pant ID	**Gender & No**	**Age**	**Education Level**	**Job Title**	**Years of Exp.**	**Location**
9	F3	43	Bachelor	CMO	21	İstanbul
10	F4	39	MBA	Director	15	İstanbul

11	M7	45	Bachelor	Production Manager	21	Ankara
12	F5	51	PhD	CMO	23	İstanbul
13	M8	53	MBA	CEO	27	İstanbul
14	M9	42	Bachelor	Manager	20	Çerkezköy-Tekirdağ
15	F6	45	PhD	Director	17	İstanbul
16	M10	44	Bachelor	Plant Manager	19	Kocaeli
17	M11	41	MBA	Director	15	İstanbul

The topics emphasized during the focus group study and the questions asked to the participants are presented in Table 3.

Table 3. Focus Group Interview Topics and Questions

Ques. Type	**Questions/Opinions and perspectives**									
Opening	What do the concepts of virtuality and virtual management mean to you?									
Introducti-on	How do you think the management functions go virtual?									
	Planning function		Organizing function		Coordination function		Leadership function		Control function	
Transition	What is the difference between traditional and virtual management?									
	Planning function		Organizing function		Coordination function		Leadership function		Control function	
	Short-term	Long-term	Stable	Flexible	Static	Dynamic	Verbal direction	Written direction	Detailed job description	Focused job descr.
	Periodic-al	Continious	Individual-oriented	Team-oriented	Daily work	Depending on process	Directing sub-ordinates	Directing everybody	Supervising sub-ordinates	Self - supervisi-on
	What is the difference in mentality?									
	Whose job is the planning function?		Type of working		Communication levels of hierarchy (with)		Leadership performed at		Authority depends on	
	Manager	Everybody	Strict hours	Flexible	Certain levels	Everybody	Office	Virtual	Position	Expertise
Key Factors	What are the significant features and key factors of virtual management?									
	Team Work		Leadership and comm.		Strategic Vision (shared with)		Flexibility & Adaptability			
	Individual working by job titles	Group Working by tasks	Daily events	Shared vision	Managers only	Everybody	Certain place, strict hours	Revisability, flexible place and time		
Closing	Please describe how virtual management can be successfully and appropriately implemented.									

Source: Author; (Batırlık, et. al., 2022)

2.2. Generating Sample of Items

As a sub-objective, it is aimed to determine the level of virtual management by properties such as adaptability-flexibility, participation, teamwork, and strategic vision. Sources of the scale properties are given in Table 4

Table 3. Sources of Scale Factors

Factor	Source
Flexibility and adaptability	(Salter et. al., 2010)
	Bakshi & Krishna, (2009)
	Grabowski & Roberts, (1999)
Leadership & Communications	(Kilcullen et. al., 2020)
	(Ford et. al., 2017)
Teamwork	(Brown et. al., 2020)
	Laitinen & Valo, (2018)
Strategic vision	Laudon & Laudon, (2000)

Source: Compiled by the author.

To clarify the extent to which all these features, properties, software, and hardware essentials exist within the enterprise, which is necessary for the realization of virtual management, research has been conducted to measure the virtual management level of the enterprise. Methods and results are demonstrated in the following sections. A pre-test study was conducted with a group of 10 experts and academics formed shortly before the survey was conducted in February 2020. Minor changes were made with the feedback from the pretest. The questionnaire was applied with the online questionnaire technique about virtual management functions and features 22 questions in total were asked by a 7-point Likert scale.

2.3 Data Collection

The research was conducted, with the approval of İstanbul Nişantaşı University Ethics Committee reference no: 2022/17, on 265 respondents who are employed in 45 different sectors listed in Table 4. While selecting the sectors, no specific criteria were applied to conduct comprehensive research on a new subject such as virtual management. Thus, it was aimed to determine the level of virtual management practices in a variety of sectors. For further studies, the research can be expanded by conducting surveys specific to sectors. Surveyed data is collected via Google Forms online and processed by IBM SPSS 25 and AMOS 18 software. Easy sampling method is used. Gender, age, and seniority characteristics and employed sectors of the research sample are given in Table 5 & Table 6.

Table 5. Gender, Age, and Seniority of the Participants

Gender			**Age**			**Seniority**		
	Participants	Ratio	Age Group	Participants	Ratio	Experience	Participants	Ratio
Female	108	40,8%	20-30	125	47,2%	0-5 years	187	71%
Male	157	59,2%	31-40	108	40,7%	6-10 years	51	19%
			41-60	32	12,1%	11yrs & above	27	10%
Total	**265**	**100%**		**265**	**100%**		**265**	**100%**

Female responders consist of an app. 41%, whereas 59% are male. Despite 12.1% are between 41 and 60 years old, the ratio of the participants who are younger than 40 is 88%. The dominant experience level of the respondents is between 0-5 years at the same company.

Table 6. Distribution of Respondents Employed in Manufacturing or Service Sectors

Manufacturing Sectors		**Service Sectors**	
Aircraft maintenance	Metallurgy	Aviation/ Cabin services	Information technologies
Automation	Mining	Banking	Insurance
Construction	Packaging	Business Intelligence	Job security and health
Cosmetics	Petroleum	Call Center	Logistics/transportation
Defense & Space	Pharmaceuticals	Consultancy/law/audit	Public service
Durable Goods	Plastics	Digital Platform/media	Publishing
FMCG	Robotics	Education	Retail
Hydraulics	R&D	E-trade	Technology
Machinery carpet	Textile	Finance /Fintech	Telecommunications
Manufacturing		Health	Tourism

The analysis results of the research are given in the following section.

2.4 Reliability and Validity Analysis

For the reliability of the research Cronbach's Alpha Analysis was used. For factor analysis, the test statistics of "KMO & Bartlett's" have been examined to identify whether the data group is convenient. Due to the verification of the survey conducted, Cronbach's Alpha Analysis reached the value of 0,809 consisting of 22 variables for reliability. The scale used is reliable because it is greater than the lower limit (0.70) of the scale. (Hair et. al., 1998).

Table 7. The Reliability of the Survey Conducted

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Std Items	N of Items
0,809	0,811	22

Table 8. The Validity of the Survey Conducted

KMO & Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0,79
Bartlett's Test of Sphericity	Approx. Chi-Square	1632,862
	Df	231
	Sig.	0

With the values of 0,79 for Kaiser-Meyer-Olkin and 1.632,9 chi-square value of Barlett's test was p≤0.01 thus the tested data set is appropriate for factor analysis.

2.5 Factor Analysis

Factor analysis is a statistical technique that aims to reduce the number of variables by grouping correlated variables into categories. This process results in fewer factors and a reduction in the number of variables. As shown in Table 9. factor analysis was performed for the components of flexibility and adaptability, participation and teamwork, and strategic vision in the study conducted to determine the virtual management levels of the enterprises surveyed.

Table 9. Rotated Component Matrix for Factor Analysis

		Components				
Q	**Matrix**	**1**	**2**	**3**	**4**	
20	In the company I work for coordination function is done by (individuals - teams)	0,752				TEAMWORK (F1)
26	In the company I work for the leading function is based on… (daily events - shared vision /strategy)	0,719				
19	In the company I work for coordination function is done according to.. (daily work - processes)	0,708				
15	The company I work for gives priority to… (individuals teams/groups)	0,652				
24	In the company, I work for leading function depends on … (verbal guidance - written guidance, given via e-mail)	0,514				
14	In our company work to be done is defined by… (titles -tasks)		0,651			LEADERSHIP & COMMUNICATION (F2)
13	The organizational structure of the company I work for is flexible.. (no/yes)		0,627			
21	Coordination in the company I work for is… (static, does not change - dynamic, depends on the situation)		0,618			
12	The organizational structure of our company is... (static.-dynamic).		0,595			
22	Coordinating function in our company depends on communication.. (with certain levels - with all employees)		0,576			
7	The planning function in the company I work for is… (short-termed, medium, or long-termed)			0,691		STRATEGIC VISION (F3)
11	Plans at the company I work for are… (not always computer-supported - always computer-supported.)			0,688		
6	Planning Function in the company that I work for is… (periodical - continuous).			0,682		
17	The company I work for has… (strict- flexible) working hours				0,785	FLEXIBILITY, ADAPTABILITY (F4)
18	In the company, we work… (in a specific - - independently) time and place)				0,775	
28	The company I work for we have... (strict – flexible) rules and procedures				0,691	

Extraction Method: Principal Component, Analysis. Rotation Method: Varimax with Kaiser Normalization. a. Rotation converged in 7 iterations.

The table above indicates that 16 of the questions asked within the scope of the research are grouped under four factors, all of which are above the value of 0.5. It is confirmed that four components; flexibility-adaptability, participation, teamwork, and strategic vision are verified by factor analysis to propose a scale.

2.5.1 Confirmatory factor analysis

The construct validity of the four-factor structure obtained by exploratory factor analysis was tested with confirmatory factor analysis via IBM SPSS Amos. Fit indices of the confirmatory factor analysis are given in Table 10.

Table 10. Fit Indices of the Confirmatory Factor Analysis

	Good Fit	Acceptable Fit	Value	Status
CMIN/DF	≤3	≤4-5	4,063	Acceptable
GFI	≥0,90	0,89-0,85	0,947	Good Fit
CFI	≥0,97	≥0,90	0,963	Acceptable
RMSEA	≤0,05	0,06-0,08	0.108	NA
NFI	≥0,95	0,94-0,80	0,951	Good Fit

The confirmatory factor analysis values of the study were generally within good fit or acceptable margins and were found to be compatible.

2.6 Level of Virtual Management

Sixteen questions constituting the four factors were of equal value. The total score that determines the level of virtual management is obtained by multiplying the average point of the answers on the Likert scale by 16, which is the total number of questions constituting the factors. Figure 2 demonstrates the level of virtual management level of an enterprise depending on the factors.

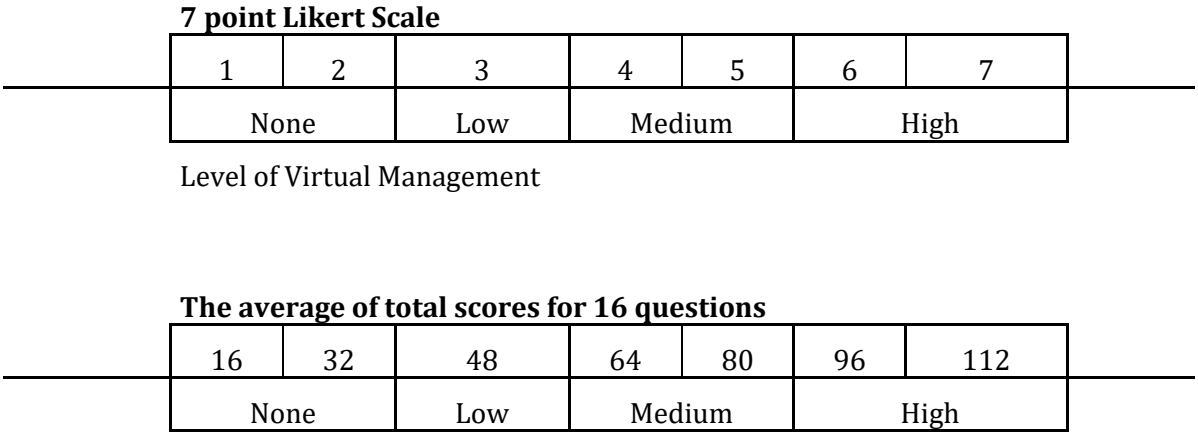

Figure 2. Determining the Level of Virtual Management Based on the 7-Point Likert Scale

Source; Illustrated by the author

The average of the 16 questions subject to the factor analysis of the survey conducted with 265 people employed in 45 sectors is 4.22 points on the Likert scale, which is slightly above the average level. Thus, the overall score is slightly above average at 68,5 as given in Table 11.

Table 11. Average and the Sum of Points of the Factors

	Factors	**Related Questions**					**7-Likert Average**	**Number of Questions**	**Sum of Points**
1	Teamwork	20	26	19	15	24	4,45	5	22,3
2	Leadership & Communications	14	13	21	12	22	4,51	5	22,6
3	Strategic Vision	6	7	11			4,1	3	12,3
4	Flexibility & Adaptability	17	18	28			3,81	3	11,4
	Total						**4,22**	**16**	**68,5**

The opinion of the participants in the surveyed companies is that there is a medium level of virtual management in the business they work.

CONCLUSIONS and DISCUSSIONS

The basis of virtual management forms the virtualization of the traditional five basic functions of management science. Although the essence of the concept of management remains the same, the fulfillment of functions by digitalization describes a new management approach. The integration of technologies, including Metaverse, is crucial for optimising operational efficiency and customer satisfaction (Buhalis et al., 2023). Features such as adaptability and flexibility, teamwork, communication, leadership, and strategic vision are believed to reinforce the concept of virtual management. It is thought that it is important to determine how widespread virtual management practices are within the business. In other words, the level of virtualization of business management, in general, is a question worth investigating. It is predicted that the prevalence of the concepts of flexibility and adaptability, strategic vision, teamwork, and participation are effective in determining the level of virtual management of the enterprise. Thus, it is aimed to determine the extent of the mentioned concepts in the business with the expressions in the survey. In conclusion, it was observed that the expressions about flexibility, adaptability, participation, teamwork, and strategic vision were clustered in factor analysis as was confirmed. It is thought that it might be possible to use the scale in future studies.

In case the business does not have a flexible structure, probably will have difficulty adopting a radical change such as virtualization. Flexibility is a vitally important feature of virtualization. Virtualization cannot be expected to easily take the shape of the business without significant changes in the business structure, especially in the organizational culture. Also, teamwork, participation, leadership, communication, and strategic vision are required properties for successful virtual management practices. The factors determined because of the analysis are considered indispensable for the realization of virtual management. Within the scope of the study, the factors were accepted as equally weighted. By changing the weights of the factors in the total, it is possible to compare how much the general average score has changed and to determine the weakest feature. Within the scope of the study, the opinions of the employees were consulted through a survey to determine the virtual management level of the enterprise. This is because the mentality of the employees must also be suitable for virtual management to be realized and virtual management can be carried out through human resources. Whether other non-human-based scales can be developed for virtual management may be the subject of future studies. It may be considered in future studies to assign different weights to the factors. Giving different weights to the questions that make up the factors, by the requirements of the task, can increase the consistency of the analysis. Since this study is preliminary, the weights of the factors were accepted as equal. The survey applied to 45 different sectors serves to determine a general level of virtual management. When the study is repeated with more participants specific to businesses, it will be able to give an idea about the virtual management level of the relevant business.

The survey was conducted in the period just before the COVID-19 pandemic when concepts such as virtual management, remote work, and the new normal were not yet known enough. Undoubtedly, the rapid change experienced in pandemic conditions has made the concept of remote working, digitalization, virtuality, and virtual management one of the indispensables of daily life a necessity. With the pandemic, the importance of the virtual management concept has been internalized and the uncertainty about the concept has decreased. Repeating a similar study during or a year or two after the COVID-19 pandemic is likely to strengthen the survey results. Survey participants with increased experience in virtuality and virtual management are expected to give clearer answers to the statements. Thus, it can be predicted that the transition between components will decrease, and the values of the analysis will increase further.

Although four of them were global, the research was entirely conducted with participants from companies operating in Türkiye. In terms of development in virtual management levels of the companies, it is unknown whether the conditions of Turkish companies compared to the other

developing countries' establishments are relevant and coherent or not. The study may be subject to expansion by being conducted in different countries with a variety of cultural differences as well as different levels of economic development. Because of this feature, it can be said that the study is preliminary on virtual management and its functions. With the rising effect of virtuality in almost every environment, the management phenomenon is also influenced by this transformation whereas traditional management practices are rapidly evolving into virtual management features. The Covid-19 pandemic period has been the acceleration of virtual management which has increased its importance in our lives. We live together in a virtualized world, feeling the weight of virtual management, but we have not yet determined the limits and dimensions of this management style. We do not have certain criteria about how virtual businesses are and how virtual they are managed. The study is a preliminary study on the definition of these criteria. It is possible for researchers and practitioners to take this work further with more participants in more countries and more sectors, and to achieve more clear results. It will also be possible to compare the results by renewing the research conducted at the beginning of the COVID-19 pandemic during and after the pandemic period.

REFERENCES

Arslan, A., Cooper, C., Khan, Z., Golgeci, I., & Ali, I., (2022). Artificial intelligence and human workers interaction at team level: a conceptual assessment of the challenges and potential HRM strategies. *International Journal of Manpower*, *43*(1), 75-88.

Bakshi, S. & Krishna, S., (2009). "Empirical Analysis of the Impact of Virtuality on Flexibility of Virtual Teams in Software Development Projects" *AMCIS 2009 Proceedings*.

Bangemann M., (1994). Bangemann Report: Europe and the global information society. *European Council*, 24-25 June, Corfu.

Batırlık, S.N., Gencer, Y.G. & Akkucuk, U., (2022). Global Virtual Team Leadership Scale (GVTLS) Development in Multinational Companies. Sustainability 14, 1038. https://doi.org/10.3390/su14021038

Bebitoglu M.E., (2003). *Sanal Yönetimin İşletme Verimliliği Üzerine Etkisi, Digiturk'te bir Uygulama*, Yayımlanmamış Doktora Tezi, Eskişehir, Anadolu Üniversitesi Sosyal Bilimler Enstitüsü,

Bebitoglu M.E., (2019). Is Virtual Management Possible? A Research In D-Smart Company. *3 rd International EMI, Entrepreneurship Social Sciences Congress*. Lefkosa

Benjamin, R. & Wigand, R., (1995). Electronic markets and virtual value chains on the information superhighway. *Sloan Management*, 36, 62–72.

Berger, M., (1996). Making the virtual office a reality. Sales Market Management, *SMT Supplement,* 18–22.

Bezpartochnyi, Maksym (ed.) (2020). Pandemic Economic Crisis: Changes and New Challenges to Society: scientific monograph. Sofia, Bułgaria: VUZF Publishing House "St. Grigorii Bogoslov"

Brown, M. I., Prewett, M. S., & Grossenbacher, M. A., (2020). *Distancing ourselves from geographic dispersion: An examination of perceived virtuality in teams. Group Dynamics: Theory, Research, and Practice,* 24(3), 168.

Buhalis, D., Lin, M.S. and Leung, D., (2023), "Metaverse as a driver for customer experience and value co-creation: implications for hospitality and tourism management and marketing", International Journal of Contemporary Hospitality Management, Vol. 35 No. 2, pp. 701-716, doi: 10.1108/IJCHM-05-2022-0631.

Bunce, M., Wright, K., & Scott, M., (2018). "Our newsroom in the cloud": Slack, virtual newsrooms, and journalistic practice. *New Media &Society*, 20,3381–3399.

Camarinha-Matos, L. M., Afsarmanesh, H., & Ollus, M. (Eds.). (2006). Virtual Organizations: systems and practices. Springer Science & Business Media.

Casey, M. A., & Krueger, R. A., (1994). Focus group interviewing. In Measurement of food preferences (pp. 77-96). Boston, MA: Springer US.

Chemiakiotis, P., Dekonick, E. A. & Panteli, N., (2013). Creativity and Innovation Management

Chesbrough, H. W. & Teece, D. J., (1996). When is virtual virtuous? Organizing for innovation. *Harvard Bus. Rev*, (Jan.-Feb.), 65–73.

Churchill, G. A., (1979), "A Paradigm for Developing Measures of Marketing Constructs," Journal of Marketing Research, 16 (February), 64-73.

Colbert, A., Yee, N., & George, G., (2016). The digital workforce and the workplace of the future.

Academy of Management Journal, 59, 731–739.

DeSanctis, G., & Monge, P., (1998). Communication processes for virtual organizations. *Journal of Computer-Mediated Communication*, *3*(4), JCMC347.

Dixon, K. R., & Panteli, N., (2010). From virtual teams to virtuality in teams. *Human relations*, *63*(8), 1177-1197.

Duan, Y., Edwards, J.S. and Yogesh K Dwivedi, Y.K., (2019). Artificial intelligence for decision making in the era of Big Data – evolution, challenges and research agenda, International Journal of Information Management, Volume 48, pp.63-71.

Feifei S., Huansheng N., Xiaohong Z., Rongyang L., Qiaohui T., Shiming Z., Yuanyuan Z., Yudong G. & Mahmoud D., (2023). A new technology perspective of the Metaverse: Its essence, framework and challenges, Digital Communications and Networks.

Feitosa, J., & Salas, E., (2020). Today's virtual teams: Adapting lessons learned to the pandemic context. *Organizational Dynamics*. https://doi.org/10.1016/j.orgdyn.2020.100777

Ford, R. C., Piccolo, R. F., & Ford, L. R., (2017). Strategies for building effective virtual teams: Trust is key. *Business Horizons*, 60, 25–34. https://doi.org/10.1016/j.bushor.2016.08.009

Gibson, C. B. and Cohen, S. G., (2003). Virtual teams that work: Creating conditions for virtual team effectiveness, Jossey-Bass.

Gillath, O., Ai, T., Branicky, M.S., Keshmiri, S., Davison, R.B. and Spaulding, R., (2021), "Attachment and trust in artificial intelligence", Computers in Human Behavior, Vol. 115, 106607.

Gilson L. L., Young M. T., Vartiainen M. and Hakonen M., (2014). Journal of Management 41, 1313

Grabowski, M. & Roberts, K. H., (1999). Risk mitigation in virtual organizations. *Organization Science* 10, 6, 704–721.

Grabowski, M. & Karlene, R., (2011). High-Reliability Virtual Organizations: Co-Adaptive Technology and Organizational Structures in Tsunami Warning Systems. Le Moyne College, Rensselaer Polytechnic Institute, University of California, Berkeley, *Computer-Human Interaction*, Vol. 18, No. 4, Article 19.

Grenier, R. & Metes, G., (1995). *Going Virtual Moving Your Organization into 21 Century*. New Jersey, Prentice-Hall.

Grosser, B. & Baumöl, U., (2017). Organizational Structures for an Implementation of Virtual Teamwork – A Case Study Analysis, Perspectives of Business Informatics Research, Proceedings of 16th International Conference.

Hair, J.F., Anderson, R.E., Tatham, R.L., Black, W.C., (1998) - *Multivariate Data Analysis: A Global Perspective.* Upper Saddle River, NJ,

Hatch, M. J., (1997). *Organization Theory, Modern Symbolic and Postmodern Perspectives*. Oxford University Press.

Hennink, M.; Hutter, I.; Bailey, A., (2011). Qualitative Research Methods; Sage Publications Ltd.: London, UK,

Hennink, M.M., (2014) Understanding Focus Group Discussions; Oxford University Press: Oxford, UK, 2014.

Hosseini, M. R., Zuo, J., Chileshe, N. & Baroudi, B., (2015). Technology Analysis & Strategic Management 27 (4) 385

Jarvenpaa, S. L. & Leidner, D. E., (1999). Communication and trust in virtual teams. *Organization Science* 10, 6, 791–815.

Jones, G., & George, J., (2009). *Contemporary Management* (6th ed.). New York: McGraw-Hill.

Kaiser, A., Fahrenbach, F., & Martinez, H., (2021). Creating Shared Visions in Organizations – Taking an Organizational Learning and Knowledge Management Perspective. In Tung X. Bui (Ed.), *Proceedings of the 54rd Hawaii International Conference on System Sciences. Hawaii International Conference on System Sciences (HICSS)* (pp. 5186 - 5195). ScholarSpace University of Hawaii at Manoa. https://scholarspace.manoa.hawaii.edu/handle/10125/71250

Kilcullen, M., Feitosa, J., & Salas, E., (2021). Insights from the virtual team science: Rapid deployment during COVID-19. *Human Factors*, 0018720821991678

Kirkman, B. L., Rosen, B. E. N. S. O. N., Gibson, C. B., Tesluk, P. E., & McPherson, S. O., (2002, February). Seven challenges to virtual team performance: Lessons from Sabre, Inc. *17th Annual Conference for the Society for Industrial and Organizational Psychology, Toronto, Canada*.

Kirkman, B. L., Gibson, C. B., & Kim, K., (2012). Across borders and technologies: Advancements in virtual teams research.

Krawczyk-Bryłka, B., (2017). Comparative Study Of Traditional And Virtual Teams. Task Quarterly, 21(3), Article 3. https://doi.org/10.17466/tq2017/21.3/o

Laitinen, K., & Valo, M., (2018). Meanings of communication technology in virtual team settings: Framing technology-related interaction. *International Journal of Human-Computer Studies*, 111,12–22

Lepsinger, R. & DeRosa, D. M., (2010). Virtual Team Success: A Practical Guide for Working and Learning from Distance, John Wiley & Sons, Inc.

Laudon, K. C. & Laudon. J. P., (2000). *Management Information Systems; New Approaches to Organization & Technology*. 51th Ed. Prenhall.

Lipnack, J. & Stamps, J., (2000). *Virtual Teams, People Working Across Boundaries*. 2nd Ed., John Wiley, and Sons.

Loureiro, S.M.C., Guerreiro, J. and Tussyadiah, L., (2021). Artificial intelligence in business: State of the art and future research agenda, *Journal of Business Research*, Volume 129, pp. 911-926

Mortensen M. & O'Leary M., (2012). Managing a Virtual Team [Online] https://hbr.org/2012/04/how-to-manage-a-virtual-team [Accessed: 27-Mar-2024]

Norton, B. & Smith, C., (1997). Understanding the Virtual Organization. New York: Barron's Educational Series.

Palmer, J. W. & Speier, C., (1997). A typology of virtual organizations: An empirical study. In Proceedings of the *Association for Information Systems Conference*.

Perkel, J. M., (2016). How scientists use Slack. Nature, 541,123–124. http://dx.doi.org/10.1038/541123a

Poth, A., & Heimann, C., (2018, September). How to innovate software quality assurance and testing in large enterprises? In *European Conference on Software Process Improvement* (pp. 437-442). Springer, Cham.

Rogers, D. M. A., (1996). The challenge of fifth-generation R&D. *Research-Technology Management*, *39*(4), 33-41.

Salter, C., Green, M., Duncan, P., Berre, A., & Torti, C., (2010). Virtual communication, transformational leadership, and implicit leadership. *Journal of Leadership Studies*, *4*, 6-17.

Saether, E. A., Eide, A. E., & Bjørgum, Ø., (2021). Sustainability among Norwegian maritime firms: green strategy and innovation as mediators of long-term orientation and emission reduction. *Business Strategy and the Environment*, 30(5), 2382-2395.

Scannell, M., Abrams, M. & Mulvihill, M., (2014). The Big Book of Virtual Team Building Games, Wolters Kluwer ABC Pub.

Tanaka, N., Winslett, M., Lee, A. J., Yau, D. K., & Bao, F., (2013, February). Insured access: an approach to ad-hoc information sharing for virtual organizations. In *Proceedings of the Third ACM Conference on Data and Application Security and Privacy* (pp. 301-308).

Thien H., Quoc-Viet P., Xuan-Qui P., Thanh T., Zhu Han & Dong-Seong K., (2023). Artificial intelligence for the metaverse: A survey, Engineering Applications of Artificial Intelligence, Volume 117, Part A,

Travica, B., (2005). Virtual organization and electronic commerce. *ACM SIGMIS Database: the DATABASE for advances in information systems*, *36*(3), 45-68.

Voinov, A., Kolagani, N., McCall, M. K., Glynn, P. D., Kragt, M. E., Ostermann, F. O. & Ramu, P., (2016). Modeling with stakeholders–next generation. *Environmental Modelling & Software*, 77, 196-220.

Wildemeersch, D., & Jütte, W., (2017). Digital the new normal-multiple challenges for the education and learning of adults. *European Journal for Research on the Education and Learning of Adults*, 8(1), 7-20.

EXTENDED ABSTRACT
GENİŞLETİLMİŞ ÖZET

BİR İŞLETMENİN SANAL YÖNETİM DÜZEYİNİ BELİRLEME ÖLÇEĞİ

Bilgi çağının hızlı yükselişi, postmodern yönetim anlayışı, çağın anlık hali, büyük verinin hızlı ve farklı yöntemlerle işlenmesi ve salgın koşullarında uzaktan çalışma zorunluluğu, sanallığa yaşamsal önem kazandırmıştır. sanallaştırma. Literatürde uzaktan çalışma, dijitalleşme ve teknolojik gelişimler hakkında çok sayıda çalışma bulunmaktadır. Ancak işletmelerin sanallaşma düzeyini belirleyecek bir çalışma literatürde bulunmamaktadır. Çağın bir gereği olarak birçok İşletme bir biçimde sanallaşmak zorunda kalmaktadır ancak ne düzeyde sanallaştıklarının belirsizliği kadar işletme özelinde ne düzeyde sanallaşmanın gerekli olduğu konusu da tam bir soru işaretidir. Çalışma hangi işletmenin ne düzeyde sanallaşması gerektiğine yanıt aramak amacı gütmese de işletmelerin sanallaşma düzeylerinin belirlenmesinde bazı ortak kriter grupları (faktörler) ortaya koymayı hedeflemektedir. Böylelikle işletmelerin sanallaşmaları için nelerin gerekli olduğunun belirlenmesi de hedeflenmektedir. Bu durum teknolojik alt yapının kurulmasının ötesinde bir durumu ifade etmektedir. Örneğin, eğer kuruluş esnek bir yapıya sahip değilse, sanallaştırma gibi radikal bir değişikliği benimsemekte muhtemelen zorluk çekecektir. Esneklik sanallaştırmanın son derece önemli bir özelliğidir. Kurumun yapısında, özellikle de kurum kültüründe önemli değişiklikler olmadan sanallaştırmanın kolayca kurumun şeklini alması beklenemez. Ayrıca ekip çalışması, katılımcılık, liderlik, iletişim ve stratejik vizyon başarılı sanal yönetim uygulamaları için gerekli niteliklerdir.

Çalışma kapsamında geleneksel yönetim işlevlerinden geliştirilmiş olmakla birlikte sanal yönetim işlevleri önerilerek bu işlevelere ilave olarak uyarlanabilirlik-esneklik, ekip çalışması, iletişim-liderlik ve stratejik vizyon özelliklerinin katkısıyla sanal yönetim işlevlerine dönüşeceği öngörüsü uyarınca işletmelerin sanal yönetim düzeylerini belirleyecek bir ölçek önerilmesi amaçlanmaktadır. Çalışma kapsamında yukarıda belirtilen dört faktör (uyarlanabilirlik-esneklik, ekip çalışması, iletişim-liderlik ve stratejik vizyon) Etik kurul onayı alındaıktan sonra anket ile ölçeğe dönüştürülmüştür. 45 farklı sektörde çalışan 265 kişinin katılımıyla gerçekleştirilen araştırmada 4 temel özellik faktör analizi ile doğrulanmıştır. Açımlayıcı faktör analizi ile elde edilen dört faktörlü yapının geçerliliği, doğrulayıcı faktör analizi ile test edilmiştir.

Dördü küresel olmakla birlikte, araştırma tamamen Türkiye'de faaliyet gösteren şirketlerin katılımcıları ile gerçekleştirilmiştir. Şirketlerin sanal yönetim düzeylerindeki gelişim açısından, Türk şirketlerinin diğer gelişmekte olan ülke kuruluşlarına kıyasla koşullarının ilgili ve tutarlı olup olmadığı bilinmemektedir. Çalışma, farklı kültürel farklılıkların yanı sıra farklı ekonomik gelişmişlik düzeylerine sahip farklı ülkelerde yürütülerek genişletilebilir. Bu özelliğinden dolayı çalışmanın sanal yönetim ve işlevlerine yönelik bir ön hazırlık niteliğinde olduğu söylenebilir. Çalışmanın sanal yönetim sürecini tanımlayarak ve sanallaştırılmış işletmelerin nasıl olduğu hakkında fikir vererek literatüre katkı sağlanması amaçlanmaktadır.

KATKI ORANI BEYANI VE ÇIKAR ÇATIŞMASI BİLDİRİMİ

Sorumlu Yazar *Responsible/Corresponding Author*	Meriç Esat BEBİTOĞLU
Makalenin Başlığı *Title of Manuscript*	Scale for Determining the Virtual Management Level of an Enterprise
Tarih *Date*	24.12.2024
Makalenin türü (Araştırma makalesi, Derleme vb.) Manuscript Type (Research Article, Review etc.)	Araştırma Makalesi

Yazarların Listesi / *List of Authors*

Sıra No	**Adı-Soyadı** *Name - Surname*	**Katkı Oranı** *Author Contributions*	**Çıkar Çatışması** *Conflicts of Interest*	**Destek ve Teşekkür (Varsa)** *Support and Acknowledgment*
1	Meriç Esat BEBİTOĞLU	%100	-	-