International Journal of Strategic Property Management
ISSN: 1648-715X / eISSN: 1648-9179
2023 Volume 27 Issue 1: 64–75
https://doi.org/10.3846/ijspm.2023.18842

THE WAKEUP CALL OF COVID-19: PERCEPTIONS OF CRISIS IMPACTS IN THE REAL ESTATE MARKET

Saija TOIVONEN *, Henrik SINISALO, Eini UUSITALO

Department of Built Environment, Aalto University, Espoo, Finland

Received 02 December 2022; accepted 24 March 2023

Abstract. Participants in the real estate market are exposed to a variety of endogenous and exogenous crises. Because the real estate market environment is closely interconnected with the broader society and its diverse forces, the direct and indirect impacts of crises are experienced through changes in real estate market dynamics. In the future, the market environment is expected to be even more challenging, full of complexity, uncertainties, and ambiguities, which will require developing the skills, first, to learn from crises already experienced and then to foresee, prevent, or adapt to ones yet unseen. This article aims to deepen the understanding of how crisis impacts were perceived in the real estate market during the COVID-19 pandemic. The research applies a qualitative approach by interviewing 19 real estate market professionals in Finland to identify the factors influencing market dynamics, such as market sentiments, preferences, and procedures. The results will help market participants understand the diversity of crisis impacts, their interconnections, and how they are perceived. The findings contribute to the real estate literature by offering a qualitative perspective that supports individuals and organizations in developing risk and crisis management skills and contributes to building a more resilient real estate market to support communities.

Keywords: COVID-19, pandemic, risk management, crisis management, shocks, resilience, forecasting, market preferences.

Introduction

The turbulent recent years have brought several unexpected shocks, which is a characteristic situation in the so-called VUCA world, where rapid changes, complexity, volatility, ambiguity, and uncertainties are common (Bennett & Lemoine, 2014; Heinonen et al., 2017; Karjalainen et al., 2022). The real estate market environment is fundamentally connected to the various forces of change in society and the broader market environment (Toivonen & Viitanen, 2015) and exposed to the challenges of the VUCA world (Guo & Cheng, 2019; Worzala & Wyman, 2022). The diverse forces shape the values, preferences, aims, and actions of diverse market participants, including, for example, investors, space users, and developers as well as those in the public sector who steer the future development of the built environment. Both the demand and supply of real estate are exposed to the variety of forces and their impacts, whether positive, neutral, or negative. The fundamental task of real estate market participants is to acknowledge and analyze the forces of change to respond to the changing landscape of market dynamics. This is no easy task, as the forces differ in nature and form complex networks of causal relationships with direct and indirect impacts (Pelsmakers et al., 2021; Toivonen & Viitanen, 2016).

Moreover, scholars believe that the number of risks will increase in the future and become even more complex and challenging (Castaño-Rosa et al., 2022; Iloniemi & Limnéll, 2018; PwC, 2021). Real estate market participants have diverse motivations and capacities for identifying and analyzing the forces that create uncertainty (Toivonen, 2011, 2021; Toivonen et al., 2021; Wilkinson & Reed, 2008), some of which are well-recognized, significant, and highly probable megatrends, such as urbanization and globalization, while others appear suddenly and are not widely recognized in the market environment; these are typically called *black swans* (Taleb, 2007) or *wild cards* (Hiltunen, 2010). Interestingly, both megatrends and wild cards have the potential to yield radical future impacts (Kuusi & Kamppinen, 2002; Hiltunen, 2010) and thus the potential to change market dynamics dramatically, resulting in crises. This challenges our capacity to monitor the future real estate market environment and the broader society.

*Corresponding author. E-mail: *saija.toivonen@aalto.fi*

Copyright © 2023 The Author(s). Published by Vilnius Gediminas Technical University

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (https://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

In addition to the recent crises of COVID-19, the war in Ukraine, and the energy crisis, the real estate market and its actors have experienced a variety of other shocks over the past decades as discussed in detail in this article's literature review. Typically, real estate is considered a rather high-risk business, and the risk is usually connected to the potential for economic loss (Brueggeman & Fisher, 2011; Graaskamp, 1981). Risk is primarily characterized by the uncertainty it inspires regarding future outcomes (Crouhy et al., 2006; Hopkin, 2018; Kallunki et al., 2008). To cope with this uncertainty, diverse strategies, methods, and tools have been created to avoid, mitigate, transfer, or accept and prepare for risks (Berg, 2010).

In the field of real estate, there are several ways to categorize risk based on its origin and impacts, for example, systematic/market risks and idiosyncratic/property-specific risks (Wilkinson & Reed, 2008) as well as business, financial, liquidity, inflation, tenant, management, interest rate, legislative, economic, and environmental risks (Brueggeman & Fisher, 2011; Kaleva et al., 2017). Typically, real estate risk has been addressed and managed with methods such as due diligence, market and property analysis, insurance, agreements, and diversification (e.g. Brueggeman & Fisher, 2011; Kaleva et al., 2017). However, it is not always obvious how negative impacts are expected to actualize and how the forces of change are concretely linked to identified risks in the real estate field. Risks are often addressed by establishing a quantitative range for the variation of possible impacts (e.g., a range of variation for construction costs or inflation) but rarely by foreseeing and analyzing the nature of the forces associated with risk (e.g., identifying and analyzing the scope or magnitude) or the joint impacts of several forces. Furthermore, as shown in the literature review, there is a poor understanding of market sentiments, perceptions, and preferences when a crisis situation has been faced and the risks have been actualized. The limited understanding prevents actors from reaping the full benefit of proactive risk management methods and may prevent their fully learning the lessons of a crisis, which are crucial to inform the building of resilience (Allen & Holling, 2010; Jones Lang LaSalle, 2022).

Fortunately, the recent COVID-19 crisis has been eagerly investigated, and many studies provide valuable information on its impacts and their essence (e.g., Çamlibel et al., 2021; De Toro et al., 2021; Cooke et al., 2022; Duca et al., 2021; Hoesli & Malle, 2021; Ling et al., 2020; Liu & Su, 2021; Milcheva, 2021; Nanda et al., 2021; Tanrivermis, 2020; Rosenthal et al., 2022; Worzala, 2021; Xie & Milcheva, 2020). Many studies describe specific impacts, such as impacts on value development, vacancy, and demand by property type. These market indicators are undoubtedly important and provide evidence of actual market behavior, but they do not necessarily shed light on the underlying rationale of market actions or describe preferences that were not fulfilled. As already noted, the impacts of crises are not limited to direct ones, and they are not restricted to a specific sector; crises may have multiple indirect, cascading, or compounded impacts and may inspire further crises (Pelsmakers et al., 2021). Thus it is necessary to better understand the market sentiments and market actor perceptions and actions that drive the market environment during crises, adopting a qualitative approach to strengthen our holistic understanding of times of crisis and acknowledging positive discoveries. As noted above, the future is suffused with potential crises; the types of shock relevant to the real estate market may vary, but analyzing the impacts and lessons of a crisis can inform the development of a more resilient market environment.

Therefore, this study aims to deepen the understanding of how the impacts of crisis are perceived in the real estate market context, using COVID-19 as a relevant crisis in its empirical investigation. According to Naz et al. (2022) COVID-19 has been particularly challenging for the real estate sector which makes it therefore an ideal crisis to study. By interviewing 19 real estate market professionals in Finland, the research sought to identify the factors influencing market dynamics, such as market sentiments, preferences, and procedures. The results will help real estate market participants understand the variety of impacts and their interconnections with perceptions in a crisis situation. The findings can inform the development of individuals', organizations', and communities' risk and crisis management skills and, in general, the establishment of a more resilient real estate market.

The remainder of the paper is structured as follows. First, three types of major crisis and their impacts on the real estate market are described in the literature review. Next, the design of the empirical study is explained, followed by the results. The paper ends with a discussion and conclusions.

1. Literature review: various 20th-century crises and their impacts on the real estate market

The real estate market has faced diverse crises. Below, we shortly describe crises experienced in the past decades, focusing on three distinct types (with examples): (1) economic crises (the global financial crisis of 2007–2009), (2) safety crises (the September 11 terrorist attack), and (3) health crises (global epidemics, including SARS, and COVID-19). The impacts of crises such as the dot-com bubble resemble those of the global financial crisis (GFC), but we focus on the GFC, as it is viewed as the most devastating major financial crisis. Regarding safety crises, we similarly focus on 9/11 as one of the worst terrorist attacks in history. In discussing health crises, we focus on two epidemics because studies of the impacts of H1N1, MERS and Ebola on the real estate sector are nonexistent in the literature. The crises are briefly described at a general level, and their consequences related to the real estate market are discussed when such information is available.

1.1. Economic crisis: the global financial crisis

The GFC of 2007–2009 was one of the worst economic crises, and it has been widely discussed and studied (e.g., Edey, 2009; Hodson & Quaglia, 2009; Laeven et al., 2010; Mishkin, 2011). It started in the USA, but collapsed global trade flows and challenges in financial markets eventually led to a global recession (Claessens et al., 2010; Laeven et al., 2010), and the real estate field faced manifold difficulties. In the housing market, property values fell due to the dramatic increase in housing supply caused by mortgage defaults (Duca et al., 2010; Laeven et al., 2010). Investors and financial institutions faced a liquidity crisis when tenants could not pay rent or repay debt, and investors pulled assets from funds (Jokivuolle, 2010). Interest rates spiked significantly, increasing the price of debt (FRED, 2021), and a heavy reliance on leverage exposed investors, particularly, to financing risks (Jokivuolle, 2010).

The lessons learned from the GFC inspired new regulations, supervision systems, and risk management protocols and drew attention to the fatal combination of an overheated housing market and the extensive use of leverage (Hwang & Stewart, 2006), which led to the development of new procedures. For example, banks and other financial institutions placed stricter rules on levels of debt, and various risk management methods were implemented, including risk ratings and limitations on risk-taking (Marria, 2018; Jokivuolle, 2010; Lund et al., 2018). The European Commission created new supervisors to oversee new regulations and ensure that Europe's banking sector would be held accountable for its future actions (Marria, 2018). The important role of governments in financial crisis management was also noted (Karp, 2018).

1.2. Safety crisis: the September 11 terrorist attacks

On 11 September 2001, hijacked airplanes crashed into the World Trade Center (WTC) in New York as well as at locations in Washington, DC and Pennsylvania. This terrorist attack killed nearly 3,000 people (National September 11 Memorial & Museum, 2021), physically or mentally injured countless more (Farfel et al., 2008), and caused massive economic losses, with property damage playing a major role (Chernick, 2005; 9/11 and insurance…, 2009). Approximately 10% of the total Manhattan office stock was damaged (Fuerst, 2005).

According to Brounen and Jeroen (2010) terror attacks usually have a negative impact on international stock market returns, but the effects are short term and followed by a fast recovery. The 9/11 attack had both local and global impacts on stock markets (Brounen & Jeroen, 2010; Jackson, 2008; Mun, 2005). In the space market context, only local, short-term impacts were reported, which were limited to the Manhattan office rental market (Fuerst, 2005). Surprisingly, the event did not affect companies' willingness to work in high office towers. In fact, the New York office market recovered rather quickly as noted by Fuerst (2005) and Brounen and Jeroen (2010). After the attack, however, terrorism insurance gained significantly in popularity. Thus, 9/11 put human-made disasters under the umbrella of typically insured events (Risk Management Solutions, 2002) and according to Michel-Kerjan et al. (2015), as much as 78% of real estate industry companies had a separate terrorism insurance to cope with this new type of safety risk.

1.3. Heath crises: SARS and COVID-19

Severe acute respiratory syndrome (SARS) was first reported in China in 2003 and later spread to around 30 countries. The main impacts were experienced in Asian countries and Canada, but, despite an extremely high death rate (nearly 10% of infected people died), SARS infected only around 8,000 people during the epidemic (Centers for Disease Control and Prevention, 2016, 2017; Siu & Wong, 2004; World Health Organization, 2021). According to Keogh-Brown and Smith (2008), the worst economic impacts of SARS were seen in investments and in the retail, hotel, and restaurant sectors, while air travel and tourism also faced difficulties. However, the overall impact on the real estate market was milder than first expected; for example, housing prices fell less than 2% in Hong Kong (Wong, 2008). Despite its moderate impacts, SARS increased overall awareness of potential future health crises and their impacts. It was believed that the crisis enhanced the resiliency of the affected societies and business environments, preparing them for later health crises, such as the H1N1 and COVID-19 pandemics (Committee for the Future, 2020; Siu & Wong, 2004).

The first cases of COVID-19 were reported at the end of 2019 in Wuhan, China. As of the writing of this article, the pandemic had killed more than 6.5 million people around the world (World Health Organization, 2022), but strict countermeasures to avoid physical contact were eased after vaccines emerged. The hardest-hit sectors were retail and hospitality (Ling et al., 2020), as the restrictions influenced the fundamental drivers of demand due to falling numbers of tourists and business travelers, while online shopping grew at the expense of restricted in-store shopping (Hoesli & Malle, 2021; Ling et al., 2020; Nanda et al., 2021; Tanrivermis, 2020). Several scholars reported a negative impact of COVID-19 cases on commercial real estate returns and risks (Ling et al., 2020; Milcheva, 2021; Xie & Milcheva, 2020). Furthermore, office properties were negatively affected due to the rapid shift to working at home (Hoesli & Malle, 2021). The housing sector was generally less affected, but house prices declined in areas dependent on tourism (Duca et al., 2021; De Toro et al., 2021). Additionally, due to restrictions on in-person interactions, density lost value as a preferential factor related to location and proximity to transit stations and city centers (Liu & Su, 2021; Rosenthal et al., 2022). Construction companies experienced several challenges related to, supply chains and to the availability of labor force (Kaklauskas et al., 2021). The best performing real estate sectors were technology and logistics (Ling et al., 2020). In addition, the COVID-19 crisis and its impacts brought up the need to develop market procedures, for example concerning appraisal practices (Liu & Liu, 2022).

As the literature demonstrates, the GFC's impacts were broadly felt, whereas the consequences of the September 11 attacks were predominantly experienced locally and remained short-term. Regarding health crises, the impacts were primarily experienced in the affected areas, but the long duration of the phenomena and their global dissemination created wider secondary and long-term impacts. Notably, the first-level impacts of diverse crises were experienced primarily in specific real estate sectors. The GFC primarily affected the housing investment market, but secondary impacts emerged later; the 9/11 attack and the health crises mainly affected specific sectors of commercial real estate, such as the office, and hospitality sectors.

The lessons learned from these crises enhanced actors' ability to deal with future crises, for example, through tighter regulation or more cautious risk management methods, but this may be true only for the hardest-hit actors or sectors. According to Geijer (2019), those who survive a crisis with little or no harm typically do not develop their resilience; they are more likely to overlook future threats and overestimate their capacity to overcome them because of their previous, deceptively positive experiences. Therefore, it is crucial to obtain data on the impacts of crises to enable holistic resilience building.

2. Study design

A qualitative research approach was adopted to identify and analyze perceptions of the impacts of COVID-19 on the real estate market. To facilitate a holistic view of the variety of impacts on real estate market actors, their aims and actions, and the preconditions for market activities and market sentiment, semi-structured interviews were conducted with real estate market actors. The interviewees comprised 19 real estate market experts, such as CEOs, CIOs, CFOs, heads of research, and senior advisors (e.g., investment and asset management firms, advisory companies, and stock-listed real estate firms) (Table 1). Investors and asset management companies are among the biggest or middle-sized players in the market. The advisory and brokerage companies include both the most significant global players as well as smaller, domestic ones. Ten of the

Table 1. Descriptive information of the interviewees (source: company webpages)

Title	Company	Sector
Business director	Finnish real estate investment and asset management company	Retail, offices, and housing
CEO of investment management	Finnish real estate investment and asset management company	All property types in the Nordics
CEO	Finnish real estate investment company	Retail
Property analysis manager	Real estate investment company	Retail in the Nordics
CIO	Finnish real estate asset management company	All property type, domestic/global
CRO	Finnish real estate asset management company	Retail and community properties in Finland
Head of investment management	Nordic real estate advisory and asset management company	Variety of advisory services and asset management in the Nordics and Baltics
CFO	Nordic real estate investment and asset management company	Retail and logistics
CIO	Finnish real estate investment company	Housing
Chief analyst	Finnish real estate development and asset management company	Retail, housing, and care
Head of real estate	Nordic investment and asset management company	Logistics and housing
CEO	Global real estate advisory company	Variety of advisory services, no portfolio management in Finland
Head of valuation and advisory	Global real estate advisory company	Variety of advisory services, no portfolio management in Finland
Head of research	Global real estate advisory company	Advisory services, no portfolio management in Finland
Senior partner	Global real estate advisory companies	Variety of advisory services, no portfolio management in Finland
Senior advisor	Nordic real estate advisory and asset management company	Variety of advisory services and asset management in the Nordics and Baltics
Senior advisor	Finnish real estate brokerage company	Advisory services and asset management in the North Europe
Senior advisor	Finnish real estate brokerage and advisory company	All property types
CEO	Finnish real estate brokerage and advisory company	All property types

participants were authorized real estate valuers granted by the Finland Chamber of Commerce. When selecting the participants, the aim was to interview a variety of experts that were active in the market, interacted broadly with diverse market participants, and were consequently familiar with the market situation and sentiments. All together 33 experts were contacted of which 19 agreed to participate (response rate 58%). Contact information of the respondents was searched from the company and the Finland Chamber of Commerce webpages. Half of the respondents were interviewed in April 2020 (in the beginning of the first COVID-19 wave in Finland) and the other half in August and September 2021 (in the beginning of the second wave). The aim of the timing was to receive comprehensive views that included the first reactions as well as the more experienced ones. The first part of the interviewees included experts that were also authorized real estate valuers as they were expected to pay close attention to the first reactions of the market. The other market experts were expected to have a longer reaction period, and therefore they were included in the second round of the interviews.

Due to COVID-19 restrictions, the interviews were conducted remotely via Teams, Google Meet, or telephone and subsequently transcribed. The interviews lasted approximately 45 minutes to an hour, and the interviewees' anonymity was safeguarded to allow them to express their views freely. The main interview questions are presented in Table 2. As the interview was semi-structured, the interviewer in addition presented complementary questions based on the response. The results describe the professional real estate investment market.

The interview results were analyzed and categorized based on content analysis. First, 21 sublevel categories were formed which were then merged under three main themes: (1) market sentiment, (2) market preferences, and (3) market procedures (Table 3). The approach was qualitative and did not include e.g. calculation of repetitive words but was based on the narrative type of content of the interview responses. However, some quantifying marks are presented to complement the results and to provide a better view on the level of consensus among the interviewees.

3. Results

The real estate market experts' perceptions of the COVID-19 impacts fall under three distinct themes: (1) market sentiment, (2) market preferences, and (3) market procedures. Some differences of opinion were observed in the participants' estimations of specific events' significance, but they generally entertained similar views concerning the manifestations and impacts of the phenomena.

3.1. Market sentiment

According to approximately 70% of the interviewees, prudence was clearly the reigning sentiment among market actors during COVID-19. This was especially true at the beginning of the outbreak, but the market sentiment also seemed to closely follow the local cyclical nature (waves) of the pandemic itself. However, the experts pointed out that, even though the waves (describing the number of infections) occurred at different times in various countries, the periods of more positive sentiment were rather brief in countries that lagged in terms of the pandemic's development, because market actors monitored not only the local situation but also the global situation. In other words, local impacts spread and were indirectly felt in the global context. Many of the experts stated that market sentiment played an important role in the real estate field. One fifth of the respondents had observed market decisions that were not necessarily rational.

As a concrete result of market actors' prudence, many transactions were put on hold at the pandemic's start, as both sellers and buyers were reluctant to proceed and wanted to continue monitoring the situation's

Table 2. Structure of the main interview themes

Theme 1	What real estate trends have COVID-19 changed?
Theme 2	How has COVID-19 affected your company/operations/other market actors?
Theme 3	How has COVID-19 affected your company's risk management methods?

Table 3. Categorization of the interview content

1 Market sentiment	2 Market preferences	3 Market procedures
Prudence	Core investments	Physical interaction
Sentimentality and irrationality	Remote working and its impacts	Rental market procedures
Market freeze	E-commerce and its impacts	Real estate valuation procedures
Lack of equity	Flexibility	Transaction processes
Lack of market data	Preferred location	Construction site operations
Surprise	Cross-sectoral differences	Positive collaboration
Positiveness and new opportunities	Intra-sectoral differences	Future and risk orientation

development. This caution was also reflected in new rental agreements and in the launch of new development projects. According to the interviewees, transaction processes were prolonged, and both sides had to rethink their aims and abilities in order to reach a mutual understanding. Nearly half of the experts also highlighted the important role of the financing sector and observed that the sector's caution in providing funding prevented some transactions. Real estate valuers stated that demand for collateral valuation increased, as financers were paying close attention to value development. When financing was not available or its price was too high, those who possessed their own equity garnered significant market benefits and could continue their activities as usual.

The results show that the availability of market data played an essential role in the market environment and affected market sentiment. Five respondents described the situation as a market freeze. When transactions stalled, it was not possible to obtain market evidence on the actual, up-to-date impacts of the crisis, including the development of market indicators and transaction prices. Thus, the market actors could not themselves observe the concrete impacts of COVID-19. This was seen as a challenge, especially when real estate valuers were asked for valuations but had little or no data to support their analyses. It was also mentioned by three interviewees that such transactions as did take place were forced sales and, as such, did not reflect market values. Two interviewees mentioned another challenge related to market data: at the beginning of the crisis, the transaction statistics included transactions that were already negotiated before the COVID-19 outbreak, even though the deals were closed later. Thus, the participants observed that looking merely at the statistics could inspire a too-positive view of activity levels rather than providing an up-to-date understanding of the current market situation. One interviewee pointed out that a similar phenomenon had occurred at the beginning of the GFC.

Additionally, the lack of market evidence was seen to result in a vicious circle. Market participants were waiting for market data, as they wished to observe the impacts of COVID-19 before undertaking any transactions themselves, and this further slowed market activity, despite an underlying willingness to potentially conduct transactions. An especially interesting phenomenon according to one respondent was that, in the autumn of 2020, sellers were reluctant to "burn down" real estate that they hoped to sell. They feared that, if a property was offered on the public market and not sold, the failure would have a devastating impact on the would-be seller's reputation and the future possibility of achieving the desired transaction price. Reluctant to engage in public sales, sellers therefore preferred to contact a small number of potential buyers rather than a bigger audience to ensure that the property would be sold. As a result, potential buyers did not receive the information that the property was listed for sale unless they were included on the shortlist of privately contacted buyers.

None of the participants said that they had been expecting a COVID-19 type of crisis to take place. Eight respondents mentioned that this crisis had been an utter surprise for which actors in the real estate sector were poorly prepared. As one interviewee put it, "The first reaction was missing the gravity of the situation, then came fright followed by confusion and, at last, relief for those who were able to manage the situation." After the first shock in the early phases of COVID-19, real estate was still seen as an attractive investment and a "safe heaven" in a turbulent situation, as mentioned by approximately 25% of the interviewees. All in all, the interviewees observed that a great deal of equity was still seeking investment opportunities despite COVID-19, and new players were entering the market. Interestingly, eight participants noted that the heightened uncertainty and negative atmosphere were also reflected in sectors not directly affected by the pandemic or its countermeasures. At the same time, five respondents believed that the emerging situation could create new possibilities and business concepts.

3.2. Market preferences

According to the interviewees, the COVID-19 crisis to some extent influenced the preferences of market actors. Approximately 30% of the interviewees mentioned that professional investors were increasingly preferring core type of investment targets characterized by low cash-flow risks.

The interviewees said that the future role of office spaces became a hot topic during the COVID-19 crisis. They described the prevailing atmosphere by noting that office occupants were rather confused and did not know how to proceed regarding their use of space; it seemed that many companies pushed the pause button to see how things would evolve, postponing space-related decisions until employees returned to the office. However, the interviewees (approximately 70%) expressed a strong belief that remote working would persist even after the pandemic, not necessarily decreasing the use of office space but rather increasing the importance of quality and suitability in office spaces. They perceived that, in the future, offices will need to provide spaces for socialization and collaboration as well as closed office rooms to support online meetings; one interviewee saw this development as "the renaissance of individual office rooms." It was also suggested by two interviewees that employees will become more selective, choosing to work at home unless the office provides ideal conditions. Approximately 25% of the participants said that employers were willing to invest more in the quality of spaces, but their opinions diverged on the quantitative need for space. Some believed that the amount of space would increase due to the new space requirements, while others argued that less space would be needed, although spaces would need to be well suited to their purpose. The interviewees noted that these space requirements would eventually be reflected in investment preferences.

In addition to quality requirements, nearly half of the respondents brought up the flexibility of space. This was related to both technical and functional flexibility, for example, both the layout of a space and the flexibility to increase or decrease the amount of space as needed by implementing flexible lease agreements. In addition to space users, space owners paid attention to their spaces' ability to be adapted for different uses and different users. Furthermore, safety-related space requirements, including hygiene, ventilation and air quality, antibacterial materials, and room for physical distancing drew much more attention than before the pandemic, and approximately 20% of the interviewees foresaw that the increased awareness would persist even after the pandemic's acute phase. Five respondents noted that especially shared spaces had been problematic, and that the pandemic had at least temporarily made them less popular. Although digitalization, accelerated by pandemic countermeasures, was supposed to lessen the importance of location, this notion was not endorsed by the interviewees. On the contrary, approximately 20% speculated that location could be even more important in the future, as people might make fewer visits but have a greater variety of tasks to perform during each visit, a development that would increase the demand for availability and versatility of nearby services. However, two interviewees speculated that the preferred locations might not be limited to the CBD but could be in a subcenter with good traffic connections.

According to the interviewees, COVID-19 and its countermeasures affected diverse real estate sectors differently; as a result, segregation between sectors and properties increased and sector-specific risks were highlighted during the pandemic. For example, one investor said that they had totally stopped buying office properties due to the high risk. In general, as mentioned by approximately 30% of the interviewees, many investors would have preferred to invest in secure core type of properties, but the current owners of those properties were not eager to sell them in the uncertain market situation, so their availability was limited. Residential, logistics, and healthcare facilities were seen to present lower risks, while hotels and restaurants were believed to fare the worst. However, variation existed within sectors. Grocery, home improvement, and gardening performed well, while the fashion sector, for example, struggled. Nine respondents mentioned that COVID-19 had strengthened the role of e-commerce, but the interviewees disagreed on whether the growth in food-related e-commerce was only a short-term phenomenon related to the pandemic or would persist afterward in Finland. A sector-specific dichotomy was also seen in the hospitality sector, where, for example, hotels geared toward work and international travel performed poorly, while new opportunities emerged for real estate focused on domestic travel and accommodations for nature activities. This development required investors to develop a proper understanding of the target real estate, its suitability for distinct purposes, and its performance capability.

3.3. Market procedures

In addition to market sentiment and preferences, the COVID-19 crisis affected the practical arrangements and procedures of market activities. First, one third of the interviewees mentioned that physical visits to properties (e.g., as a part of a transaction processes) were limited or even impossible. Market actors had to adjust their procedures according to the restrictions, and banks were said to approve property valuations based only on virtual site visits. As Finland has a considerable number of international investors, international travel restrictions also significantly impacted market activities, putting an obstacle in the way of site visits by foreign market actors as part of transactions. According to the interviewees, this even hindered the completion of some planned transactions.

According to nearly 75% of the respondents, COVID-19 also influenced rental market procedures. As a result of the pandemic's uneven impact on various sectors, investors and asset managers said that they started to pay more attention than previously to their tenants' business viability, which took the form of implementing more systematic ways to evaluate tenants and their ability to pay rent, including close and frequent monitoring of KPIs, credit ratings, and solvency. They also engaged more actively with their tenants and showed greater interest in their future plans and coping mechanisms. In turn, many of the interviewees noted that tenants sought flexibility in their rental payments (e.g., free months and discounts), which was seen as a typical phenomenon in parts of the retail and hospitality sectors. The experts from investment and asset management companies had experienced that tenants also sought flexibility in the length of lease contracts and were keen to sign shorter leases, even with higher rents with the aim of transferring risk from tenants to owners. This notion was confirmed also by the real estate valuers. The interviewees observed that COVID-19 did not lower rents to great extent (mentioned by 5 respondents) but rather influenced other lease terms and prolonged leasing processes. Two participants also noted that procedures and legal guidelines differed between countries, so there was variation between countries. One argued that agreement policies in the real estate sector had not been designed for a COVID-19 type of shock and foresaw that, to increase resilience, future agreement policies might have clauses acknowledging possible future shocks. Some interviewees said that force majeure policies had already been implemented in rental agreements.

Real estate valuation procedures were also affected by the situation according to all of the authorized real estate valuers. In addition to the increasingly careful consideration of property sector type and the viability of the tenant, a novel clause in real estate valuation reports reflected the uncertain times. According to the interviewees, this clause informed clients and intended users of the uncertain nature of the prevailing market situation and its impact on value estimations. Approximately one third of the interviewees also pointed out that the situation created a challenge for real estate valuers, who also had to identify when the changed market situation became the "new normal" and to remove or modify the clause accordingly. In fact, they said, the clause was modified according to the pandemic's development and its impact on various asset types. However, only three investors mentioned about significant changes to their due diligence process, a risk management method related to transactions, due to COVID-19.

Despite the challenging situation, nearly 25% of the interviewees mentioned positive impacts related to market procedures, pointing out that some players had found new business opportunities and created novel business models that would not have emerged without the pandemic. Another positive outcome of COVID-19 was a new spirit of collaboration among market actors (e.g., real estate valuers, real estate owners, and tenants). In a challenging and uncertain market situation in which market data were scarce, market actors collaborated with their peers and stakeholders to analyze and discuss the market situation and the required countermeasures and to jointly forecast future development. Two of the respondents pointed out that this will increase the transparency and resiliency of the market environment.

Approximately 40% of the interviewees also noted that COVID-19 had shaken the market environment and its actors, waking everyone to the possibility of sudden, powerful shocks and highlighting the importance of risk management, a future-oriented perspective, and preparatory activities. Four participants noted that the tighter regulations and modified procedures established in response to the GFC had blunted the impact of the COVID-19 crisis and contributed to managing it, especially in its first phase. They also stated that, thanks to COVID-19, real estate market actors had developed a broader understanding of new potential risks relevant to the field and of the crucial need to monitor sector-specific risks, as crises do not necessarily emerge within the real estate field or affect its diverse sectors equally. From the risk management perspective, the pandemic taught real estate market actors to be more open-minded and to analyze not only primary but also secondary level risks, their interconnections, and their simultaneous effects. For example, as mentioned by four respondents, COVID-19 hampered construction site operations not only because of infections among workers but also because of shortages of construction materials due to global supply chain restrictions. Approximately 50% of interviewees mentioned that this new, more holistic approach to risk will broaden the variety of risks to be monitored. Therefore, the interviewees believed that the COVID-19 crisis would increase learning and enhance resilience to future risks.

Conclusions and discussion

This study interviewed 19 real estate experts to increase the understanding of how the impacts of COVID-19 were perceived in the real estate market environment. As shown in the literature review, the real estate market has faced a variety of crises. Some had limited impacts that were experienced on a local scale, while others spawned secondary impacts with global or cross-sectoral consequences. Because only sparse data describe those impacts holistically, it is difficult to form a clear picture of the experienced consequences. Regarding lessons learned, having an experience of crisis is believed to enhance actors' ability to handle future crises. However, even if this is true in the case of crises with similar impacts (e.g., previous pandemics "trained" market environments to face emerging pandemics), it does not necessarily contribute to building holistic resilience. As Taleb et al. (2009) put it, hindsight makes bad foresight. The future may conceal entirely new possibilities and risks, history does not necessarily repeat itself, and future market environments may not respond as previous ones did, even in response to the same type of crisis.

The empirical part of this paper presented real estate market experts' perceptions of the impacts of COVID-19 under three distinct themes: market sentiment, changed preferences, and market procedures. The interviewees were generally united in their views, which may reflect a somewhat stabile market situation in which actors have at least formed a tolerably clear picture of the status quo (including matters that remain cloudy) despite the ongoing crisis. This would probably not have been the case in a more chaotic situation, and the participants would have exhibited much more variation. Nevertheless, COVID-19 brought many challenging situations and consequences. Its impacts were not limited to direct consequences, as the interviewees identified several secondary impacts with complex causal relationships. A similar finding emerged in the work of Pelsmakers et al. (2021) and Toivonen and Viitanen (2016), who found that the forces of change in the real estate market are strongly interrelated and that one crisis can easily lead to another. This demands risk management that is not limited to detecting and preparing for direct impacts but views the market environment holistically.

According to the interviewees, some responses of market actors to the COVID-19 crisis seemed irrational and defied logical explanation, behavior that can be typical in relation to risk assessment (Kahneman & Tversky, 1979). Crisis situations can create a market atmosphere in which actors are highly sensitive and prone to overstatement. According to our results, a key contributor to this sensitivity and irrationality, which was reflected in market behavior, was a lack of market data on prevailing market attributes, especially at the beginning of the crisis. This paralyzed market activities or inspired highly uncertain market decisions in which the decision-makers compensated for absent official market information with, for example, hearsay or their own interpretations of the market atmosphere. According to Watkins and McMaster (2011), the significance given to feelings and intuitions increases in a market situation lacking information. Real estate markets can be susceptible to sentiment, and Hasu (2017) has highlighted this phenomenon in decision-making in the housing market context. Briefly, a crisis situation inspires an increased and crucial need for data, the lack of which can start a vicious circle that worsens negative impacts. Self-sufficiency seems to be a characteristic that enhances resilience. In the real estate market, this involves the availability of resources, such as data or possessing sufficient equity to take market actions independently of others, including outside financiers. The participants also described flexibility as a source of resilience, which was connected to matters such as multifunctionality, multilocality, and agile agreements. Also, a recent study by Cooke et al. (2022) noted that after COVID-19 the appreciation of both qualitative and quantitative flexibility of space has increased among space occupiers.

Other typical crisis behavior emerged in the analysis of market actions and preferences during COVID-19. According to the interviewees, market actors favored core investments, and Geijer (2019) notes that people in crisis situations are drawn to secure, familiar choices. Another typical reaction to an unclear situation is seeking the company of others for support and consensus building (Geijer, 2019), which also emerged in our data. The sudden crisis prompted real estate market actors to recognize more concretely that they are in a symbiotic relationship in which it is beneficial to interact and cooperate with stakeholders and even competitors to overcome mutual challenges. All in all, despite their many negative impacts, crises can bring benefits and inspire changes to traditional methods, thus promoting further development as noted in previous research that highlighted that learning is an integral part of resilience building (Walker et al., 2004).

Some limitations should be considered in interpreting our results. First, the sample size means that the results reflect the views and perceptions of a limited number of respondents. However, as noted earlier, we observed a clear consensus on the market impacts, indicating that the sample was adequate to yield a good understanding of perceptions. Second, although many of the companies involved in the study were global actors, the interviewed experts were based in Finland, and therefore their views focus on the Finnish situation and the local level experiences. Third, the findings describe the prevailing situation at the time of the interviews. As COVID-19 progressed in several waves, the situation at that specific time may have affected the respondents' views, so only limited conclusions regarding the whole duration of the COVID-19 crisis can be drawn from these results. Also, by including the same interviewees to both interview points (1st and 2nd wave), more information could have been received concerning the progressive nature of market perspectives. However, our findings describe both direct and indirect impacts, revealing causal development paths that relate not only to short-term events but also to longer timespans, which can inform future resilience building. In addition, it should be noted that the real estate market has experienced other crises than those mentioned in this study, including natural disasters (e.g., floods, wildfires, volcanic eruptions, and earthquakes), other types of terrorism (bombings, cyberattacks), political crises (revolutions, wars), and other human-made crises. Furthermore, several slowly developing phenomena not discussed in this article, such as market segregation and demographic changes, may pose significant risks for the real estate sector. These type of phenomena should be identified and managed to foster resilient crisis management in the future results.

The findings of this paper contribute to the real estate literature in several ways. First, we took a qualitative approach that focused on market actors' grassroots-level perceptions of various factors in the market environment, such as market sentiment and actor preferences. Such knowledge complements previous studies employing quantitative data, sheds light on the drivers of market metrics, and reveals the underlying forces that explain seemingly irrational market behavior. Our study also recognizes secondary and tertiary impacts rather than focusing solely on first-level impacts, enhancing the capacity to build more holistic resilience in the future. We also examined diverse real estate sectors simultaneously and included both internal and external causes of challenges. We hope that these findings will enable diverse real estate market actors, including investors, developers, tenants, advisors, and valuers, to deepen their understanding of the direct and indirect impacts of COVID-19, and how they were experienced and perceived in the market environment. Notably, although our empirical research focused on the COVID-19 crisis, we identified some general themes related to crises, such as the complexity of interrelated impacts and the vital need for information and data, self-sufficiency, flexibility, and collaborative measures to overcome challenges. Our results also show that a crisis exogenous to the real estate market can have significant, wide-reaching consequences on a variety of market actors and sectors. This serves as a wakeup call to inspire real estate market actors to monitor and foresee exogenous as well as endogenous crises.

This study identified some areas for further research. First, the impacts of many previously experienced crises in the real estate field are not well known, limiting actors' ability to prepare for similar events. To develop and achieve holistic resilience, future research must both consider past crises and actively look for potential yet unfamiliar ones. Furthermore, the causal relationships of crises and their impacts should be studied over various timespans and with novel research methods, looking beyond traditional approaches to address an ever-evolving future that will bring both new possibilities and crises of various magnitudes in the field of real estate.

Author contributions

Saija Toivonen is the corresponding author. Saija Toivonen, Henrik Sinisalo, and Eini Uusitalo were responsible for the literature review. Saija Toivonen and Henrik Sinisalo were responsible for the study design, data collection and analysis. Saija Toivonen wrote the first draft of the article and developed the discussion and conclusions.

Disclosure statement

The authors declare that they have no competing financial, professional, or personal interests from other parties.

References

9/11 and insurance: the eight year anniversary. (2009, September 11). *Insurance Journal*. https://www.insurancejournal.com/news/national/2009/09/11/103694.htm

Allen, C. R., & Holling, C. S. (2010). Novelty, adaptive capacity, and resilience. *Ecology and Society*, *15*(3), 24. https://doi.org/10.5751/ES-03720-150324

Bennett, N., & Lemoine, G. J. (2014). What a difference a word makes: understanding threats to performance in a VUCA world. *Business Horizons*, *57*(3), 311–317. https://doi.org/10.1016/j.bushor.2014.01.001

Berg, H. P. (2010). Risk management: procedures, methods and experiences. *Reliability: Theory & Applications*, *2*(17), 79–95.

Brounen, D., & Jeroen, D. (2010). The impact of terrorist attacks on international stock market. *European Financial Management*, *16*(4), 585–598. https://doi.org/10.1111/j.1468-036X.2009.00502.x

Brueggeman, W., & Fisher, J. (2011). *Real estate finance and investments* (14th ed.). McGraw-Hill.

Çamlibel, M. E., Sümer, L., & Hepşen, A. (2021). Risk-return performances of real estate investment funds in Turkey including the COVID-19 period. *International Journal of Strategic Property Management*, *25*(4), 267–277. https://doi.org/10.3846/ijspm.2021.14957

Castaño-Rosa, R., Pelsmakers, S., Järventausta, H., Poutanen, J., Tähtinen, L., Rashidfarokhi, A., & Toivonen, S. (2022). Resilience in the built environment: key characteristics for solutions to multiple crises. *Sustainable Cities and Society*, *87*, 104259. https://doi.org/10.1016/j.scs.2022.104259

Centers for Disease Control and Prevention. (2016). *SARS: 10 years after*. https://www.cdc.gov/dotw/sars/index.html

Centers for Disease Control and Prevention. (2017). *SARS: basics fact sheet.* https://www.cdc.gov/sars/about/fs-sars.html

Chernick, H. (2005). *Resilient city: the economic impact of 9/11*. Russell Sage Foundation.

Claessens, S., Kose, M. A., & Terrones, M. E. (2010). The global financial crisis: how similar? How different? How costly? *Journal of Asian Economics*, *21*(3), 247–264. https://doi.org/10.1016/j.asieco.2010.02.002

Committee for the Future. (2020). Koronapandemian hyvät ja huonot seuraukset lyhyellä ja pitkällä aikavälillä. In *Eduskunnan Tulevaisuusvaliokunnan julkaisu* (Vol. 1/2020), Tulevaisuusvaliokunta.

Cooke, H., Fiorentino, S., Harris, R., Livingstone, N., & McAllister, P. (2022). Corporate occupiers' attitude to flex space in the post-Covid environment. *Journal of Property Investment & Finance*, *40*(5), 493–507. https://doi.org/10.1108/JPIF-02-2022-0011

Crouhy, M., Galai, D., & Mark, R. (2006). *The essentials of risk management: the definitive guide for the non-risk professional.* McGraw Hill Professional.

De Toro, P., Nocca, F., & Buglione, F. (2021). Real estate market responses to the COVID-19 crisis: which prospects for the metropolitan area of Naples (Italy)? *Urban Science*, *5*(1), 23. https://doi.org/10.3390/urbansci5010023

Duca, J. V., Muellbauer, J., & Murphy, A. (2010). Housing markets and the financial crisis of 2007–2009: lessons for the future. *Journal of Financial Stability*, *6*(4), 203–217. https://doi.org/10.1016/j.jfs.2010.05.002

Duca, J. V., Hoesli, M., & Montezuma, J. (2021). The resilience and realignment of house prices in the era of Covid-19. *Journal of European Real Estate Research*, *14*(3), 421–431. https://doi.org/10.1108/JERER-11-2020-0055

Edey, M. (2009). The global financial crisis and its effects. *Economic Papers*, *28*(3), 186–195. https://doi.org/10.1111/j.1759-3441.2009.00032.x

Farfel, M., DiGrande, L., Brackbill, R., Prann, A., Cone, J., Friedman, S., Walker, D. J., Pezeshki, G., Thomas, P., Galea, S., Williamson, D., Frieden, T. R., & Thorpe, L. (2008). An overview of 9/11 experiences and respiratory and mental health conditions among World Trade Center Health Registry enrollees. *Journal of Urban Health*, *85*(6), 880–909. https://doi.org/10.1007/s11524-008-9317-4

FRED. (2021). *Federal funds effective rate*. https://fred.stlouisfed.org/series/FEDFUNDS

Fuerst, F. (2005). Exogenous shocks and real estate rental markets: an event study of the 9/11 attacks and their impact on the New York office market. *SSRN Electronic Journal.* https://doi.org/10.2139/ssrn.800006

Geijer, H. (2019). *Kriisit, katastrofit ja maailmanloput*. Art House.

Graaskamp, J. (1981). *Fundamentals of real estate development*. Urban Land Institute.

Guo, X., & Cheng, L. (2019). Challenges, core competence development and future prospects of appraisers in the VUCA era. In *Proceedings of the 2019 4th International Conference on Modern Management, Education Technology and Social Science* (pp. 555–561). Atlantis Press. https://doi.org/10.2991/mmetss-19.2019.112

Hasu, E. (2017). *Asumisen valinnat ja päätöksenteko paljastettuina* [Doctoral dissertation]. Aalto University.

Heinonen, S., Karjalainen, J., Ruotsalainen, J., & Steinmüller, K. (2017). Surprise as the new normal – implications for energy security. *European Journal of Futures Research*, *5*(12), 1–13. https://doi.org/10.1007/s40309-017-0117-5

Hiltunen, E. (2010). *Weak signals in organizational futures learning* [Dissertation]. Aalto University School of Economics.

Hodson, D., & Quaglia, L. (2009). European perspectives on the global financial crisis: introduction. *Journal of Common Market Studies*, *47*(5), 939–953. https://doi.org/10.1111/j.1468-5965.2009.02029.x

Hoesli, M., & Malle, R. (2021). Commercial real estate prices and Covid-19. *Journal of European Real Estate Research*, *15*(2), 295–306. https://doi.org/10.1108/JERER-04-2021-0024

Hopkin, P. (2018). *Fundamentals of risk management: understanding, evaluating and implementing effective risk management*. Kogan Page Publishers.

Hwang, H. S., & Stewart, C. (2006). Lessons from dot-com boom and bust. In D. B. A. Mehdi Khosrow-Pour (Ed.), *Encyclopedia of e-commerce, e-government, and mobile commerce* (pp. 698–702). IGI Global. https://doi.org/10.4018/978-1-59140-799-7.ch112

Iloniemi, J., & Limnéll, J. (2018). *Uhkakuvat*. Docendo.

Jackson, O. A. (2008). The impact of the 9/11 terrorist attacks on the US economy. *Journal of 9/11 Studies*, *20*(1), 1–27.

Jokivuolle, E. (2010). Finanssikriisi ja riskien hallintatutkimuksen näkökulma. *Kansantaloudellinen aikakauskirja*, *1*, 15–23.

Jones Lang LaSalle. (2022). Resilience in the built environment: how can organizations prepare for future disruption and thrive? In *Part 1: Decoding resilience in the built environment* (pp. 1–13). https://www.jll.co.uk/en/trends-and-insights/research/resilience-in-the-built-environment

Kahneman, D., & Tversky, A. (1979). Prospect theory: an analysis of decision under risk. *Econometrica*, *47*(2), 263–292. https://doi.org/10.2307/1914185

Kaklauskas, A., Zavadskas, E. K., Lepkova, N., Raslanas, S., Dauksys, K., Vetloviene, I., & Ubarte, I. (2021). Sustainable construction investment, real estate development, and COVID-19: a review of literature in the field. *Sustainability*, *13*, 7420. https://doi.org/10.3390/su13137420

Kaleva, H., Oikarinen, E., & Soutamo, M. (2017). *Kiinteistösijoittaminen*. KTI Kiinteistötieto Oy.

Kallunki, J., Martikainen, M., & Niemelä, J. (2008). *Ammattimainen sijoittaminen*. Talentum.

Karjalainen, J., Heinonen, S., & Taylor, A. (2022). Mysterious faces of hybridisation: an anticipatory approach for crisis literacy. *European Journal of Futures Research*, *10*, 21. https://doi.org/10.1186/s40309-022-00207-5

Karp, P. (2018). *The financial crisis 10 years later: lessons learned*. Harvard Law School Forum on Corporate Governance. https://corpgov.law.harvard.edu/2018/10/05/the-financial-crisis-10-years-later-lessons-learned/

Keogh-Brown, M. R., & Smith, R. D. (2008). The economic impact of SARS: how does the reality match the predictions? *Health Policy*, *88*(1), 110–120. https://doi.org/10.1016/j.healthpol.2008.03.003

Kuusi, O., & Kamppinen, M. (2002). Tulevaisuuden tekeminen. In M. Kamppinen, O. Kuusi, & S. Söderlund (Eds.), *Tulevaisuuden tutkimus, perusteet ja sovellukset* (pp. 117–170). Suomalaisen kirjallisuuden seura, Helsinki.

Laeven, M. L., Igan, M. D., Claessens, M. S., & Dell'Ariccia, M. G. (2010). *Lessons and policy implications from the global financial crisis*. International Monetary Fund. https://doi.org/10.2139/ssrn.1562412

Ling, D., Wang, C., & Zhou, T. (2020). A first look at the impact of COVID-19 on commercial real estate prices: asset-level evidence. *Review of Asset Pricing Studies*, *10(*4), 669–704. https://doi.org/10.1093/rapstu/raaa014

Liu, C.-H., & Liu, B. (2022). Exploring hotel appraisal determinants amid sales trend during COVID-19 pandemic using a DANP-mV model. *International Journal of Strategic Property Management*, *26*(4), 258–271. https://doi.org/10.3846/ijspm.2022.17168

Liu, S., & Su, Y. (2021). The impact of the COVID-19 pandemic on the demand for density: evidence from the U.S. housing market. *Economic Letters*, *207*, 110010. https://doi.org/10.1016/j.econlet.2021.110010

Lund, S., Mehta, A., Manyika, J., & Goldshtein, D. (2018). *A decade after the global financial crisis: what has (and hasn't) changed?* McKinsey Global Institute. https://www.mckinsey.com/industries/financial-services/our-insights/a-decade-after-the-global-financial-crisis-what-has-and-hasnt-changed#part3

Marria, V. (2018). *10 years since the 2008 financial crisis: how have the rules changed?* Forbes. https://www.forbes.com/sites/vishalmarria/2018/10/15/10-years-since-the-2008-financial-crisis-how-have-the-rules-changed/

Michel-Kerjan, E., Raschky, P., & Kunreuther, H. (2015). Corporate demand for insurance: new evidence from the US terrorism and property markets. *Journal of Risk and Insurance*, *82*(3), 505–530. https://doi.org/10.1111/jori.12031

Milcheva, S. (2021). Volatility and the cross-section of real estate equity returns during Covid-19. *Journal of Real Estate Finance and Economics*, *65*, 293–320. https://doi.org/10.1007/s11146-021-09840-6

Mishkin, F. (2011). Over the cliff: from the subprime to the global financial crisis. *Journal of Economic Perspectives*, *25*(1), 49–70. https://doi.org/10.1257/jep.25.1.49

Mun, K.-C. (2005). Contagion and impulse response of international stock markets around the 9-11 terrorist attacks. *Global Finance Journal*, *16*(1), 48–68. https://doi.org/10.1016/j.gfj.2005.05.002

Nanda, A., Xu, Y., & Zhang, F. (2021). How would the COVID-19 pandemic reshape retail real estate and high streets through acceleration of e-commerce and digitalization? *Journal of Urban Management*, *10*(2), 110–124. https://doi.org/10.1016/j.jum.2021.04.001

National September 11 Memorial & Museum. (2021). *What happened on the morning of September 11, 2001?* https://911memorial.org/

Naz, F., Kumar, A., Upadhyay, A., Chokshi H., Trinkunas, V., & Magda, R. (2022). Property management enabled by artificial intelligence post COVID-19: an exploratory review and future propositions. *International Journal of Strategic Property Management*, *26*(2), 156–171. https://doi.org/10.3846/ijspm.2022.16923

Pelsmakers, S., Poutanen, J., Saarimaa, S., Maununaho, K., & Toivonen, S. (2021). Kriisi ei tule yksin. *Arkkilehti*, *1/2021*.

PwC. (2021). *PwC's global crisis survey*. https://www.pwc.com/gx/en/issues/crisis-solutions/global-crisis-survey.html

Risk Management Solutions. (2002). *Managing risk in the aftermath of the WTC catastrophe*. https://forms2.rms.com/rs/729-DJX-565/images/terr_managing_risk_after_wtc.pdf

Rosenthal, S. S., Strange, W. C., & Urrego, J. A. (2022). JUE insight: are city centers losing their appeal? Commercial real estate, urban spatial structure, and COVID-19. *Journal of Urban Economics*, *127*, 103381. https://doi.org/10.1016/j.jue.2021.103381

Siu, A., & Wong, Y. C. R. (2004). The economic impact of SARS: the case of Hong Kong. *Asian Economic Papers*, *3*(1), 62–83. https://doi.org/10.1162/1535351041747996

Taleb, N. N. (2007). *The black swan: the impact of the highly improbable* (Vol. 2). Random House.

Taleb, N., Goldstein, D., & Spitznagel, M. (2009). The six mistakes executives make in risk management. *Harvard Business Review*, *87*, 123.

Tanrivermis, H. (2020). Possible impacts of COVID-19 outbreak on real estate sector and possible changes to adopt: a situation analysis and general assessment on Turkish perspective. *Journal of Urban Management*, *9*(3), 263–269. https://doi.org/10.1016/j.jum.2020.08.005

Toivonen, S. (2011). *The future commercial real estate market – The forces of change, influences and preferences in the Helsinki metropolitan area* [Dissertation]. Aalto University.

Toivonen, S., & Viitanen, K. (2015). Forces of change shaping the future commercial real estate market in the Helsinki metropolitan area in Finland. *Land Use Policy*, *42*, 471–478. https://doi.org/10.1016/j.landusepol.2014.09.004

Toivonen, S., & Viitanen, K. (2016). Environmental scanning and futures wheels as tools to analyze the possible future themes of the commercial real estate market. *Land Use Policy*, *52*, 51–61. https://doi.org/10.1016/j.landusepol.2015.12.011

Toivonen, S. (2021). Advancing futures thinking in the real estate field. *Journal of European Real Estate Research*, *14*(1), 150–166. https://doi.org/10.1108/JERER-01-2020-0003

Toivonen, S., Rashidfarokhi, A., & Kyrö, R. (2021). Empowering upcoming city developers with futures literacy. *Futures*, *129*, 102734. https://doi.org/10.1016/j.futures.2021.102734

Walker, B., Holling, C. S., Carpenter, S. R., & Kinzig, A. (2004). Resilience, adaptability and transformability in social–ecological systems. *Ecology and Society*, *9*(2), 5. https://doi.org/10.5751/ES-00650-090205

Watkins, C., & McMaster, R. (2011). The behavioural turn in housing economics: reflections on the theoretical and operational challenges. *Housing, Theory and Society*, *28*(3), 281–287. https://doi.org/10.1080/14036096.2011.599177

Wilkinson, S., & Reed, R. (2008). *Property development*. Routledge.

Wong, G. (2008). Has SARS infected the property market? Evidence from Hong Kong. *Journal of Urban Economics*, *63*(1), 74–95. https://doi.org/10.1016/j.jue.2006.12.007

World Health Organization. (2021). *Severe acute respiratory syndrome (SARS)*. https://www.who.int/health-topics/severe-acute-respiratory-syndrome#tab=tab_1

World Health Organization. (2022). *WHO coronavirus (COVID-19) dashboard*. https://covid19.who.int/

Worzala, E. (2021). COVID 19, real estate and uncertainty: examining this new "normal" through the quotes of Jim Graaskamp. *Journal of Property Investment & Finance*, *39*(1), 31–37. https://doi.org/10.1108/JPIF-06-2020-0068

Worzala, E., & Wyman, D. (2022). Real estate insights the human factor: the "unknown unknowns" in the real estate development process. *Journal of Property Investment & Finance*, *40*(3), 300–305. https://doi.org/10.1108/JPIF-11-2021-0099

Xie, L., & Milcheva, S. (2020). Proximity to COVID-19 cases and real estate stock returns. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3641268