

Why we (do not) share data in German real estate – a reasoned action approach

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Data in
German real
estate

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Received 6 June 2023
Revised 31 July 2023
Accepted 1 August 2023

Abstract

Purpose – German (corporate-) real estate management departments have been facing the challenge of poor data quality for years. This holds them back from generating efficiency potentials via the use of new methods from the field of digitalisation and from coping with the increasing requirements from the ESG context. The purpose of this paper is to explore why German (corporate-) real estate managements (do not) share data with their real estate service providers to address the data quality challenge and identify possible solutions.

Design/methodology/approach – To answer the research question, the reasoned action approach, an established theory from psychology for predicting human behaviour, is used. The relationships between the constructs are determined using linear regression. The study participants are almost exclusively from Germany.

Findings – The organisational milieu (perceived behavioural control) has a significant impact on the behaviour of sharing data with real estate service providers. Especially the change of contractual arrangements (data-driven contracts) seems to be crucial for the improvement of information logistics.

Originality/value – To the best of the author's knowledge, for the first time, the reasoned action approach is used within the German real estate industry to predict organisational behaviour in the context of digitalisation.

Keywords Corporate real estate management, Theory of planned behaviour, Data sharing, Digitalisation, Data-driven contracts, Real estate data

Paper type Research paper

Introduction

Value chains can be described via material and information flows (Christopher, 2011). The relevance of considering these flows for (corporate-) real estate management (C/REM) becomes clear with a look at the field of tension in which it usually finds itself (Figure 1) (Bernhold and Wiesweg, 2021).

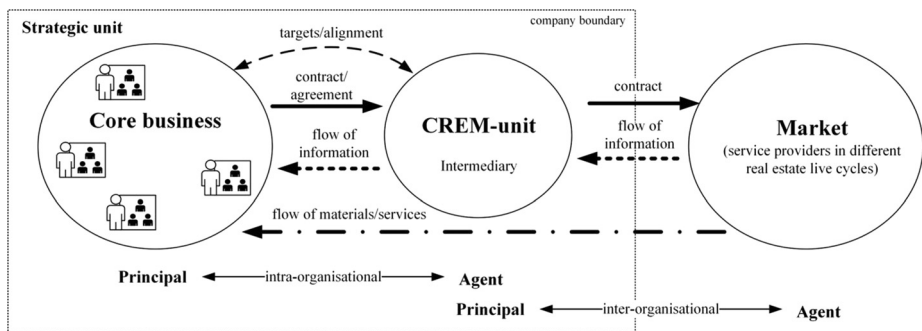
As an intermediary between the real estate-related requirements from the core business and the real estate service providers (RESPs) as suppliers, the C/REM sits in a multi-level principal–agent relationship with a changing role. Intra-organisationally, it is the supplier (agent) of support services for the core business (principal); inter-organisationally, it acts as the buyer (principal) of real estate-related services that are provided by RESPs (agents). In many cases, the flow of goods/services runs directly into the core business independently of this separation (if services are provided at the external factor; Bernhold, 2010). The information flow, on the other hand, runs asynchronously along the multi-level principal–agent relationship from the RESP via



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Journal of Corporate Real Estate
Vol. 25 No. 4, 2023
pp. 265–285
Emerald Publishing Limited
1463-001X
DOI 10.1108/JCRE-06-2023-0021

Figure 1.
Multi-level principal-agent relationship



Source: Taken and slightly adjusted from Bernhold and Wiesweg (2021)

the C/REM to the core business. Because of the asynchrony of the two flows, the active design of information logistics (i.e. the management of information flows) by the C/REM is of particular importance, at least on a theoretical level. In the context of digitalisation, the developments within the past few years promise significant increases in efficiency and an increasing integration of man and machine (e.g. Chat-GPT). However, this is only possible with sufficient availability and quality of data/information being inherent to digitalisation. The latter is also becoming increasingly important because of the advancing regulations within the sustainability discussion (ESG), for example, for the reduction of CO₂ footprints or the preparation of sustainability reports. Pfnür and Wagner (2018) concluded as early as 2018 that the German real estate sector was lagging behind in its digitisation development compared to other sectors. This continues to be the case in the digitisation studies for the real estate sector commissioned annually by the German Real Estate Committee (Zentraler Immobilien Ausschuss e.V.). Data quality is repeatedly identified as one of the greatest challenges (Hellmuth, 2022). The fact that the real estate industry has a fundamental challenge with data management has already been addressed in the past (Zeitner and Peyinghaus, 2013, 2015). What this means on a holistic level for the digital transformation of the industry is dealt with intensively by Pfnür *et al.* (2022). In view of the previously described area of conflict, the question arises as to why German C/REM departments continue to struggle with data quality challenges against the background of the developments and situation described. For this purpose, the supplier relationship (C/REM ↔ Market) in the context of information logistics will be examined more closely with the following research question:

- RQ1. What motivates the (corporate-) real estate management to conduct intensive information logistics within the supplier relationship with a real estate service provider, throughout the entire contract period?
- RQ2. To answer the question, the *theory of planned behaviour* is used and empirically answered within the framework of a quantitative cross-sectional study with a standardised questionnaire.

Literature review

Theoretical background

The framework originally developed in 1980 as the *theory of reasoned action* by Ajzen and Fishbein (1980) has been continuously developed by them over the past decades and found

its most recent stage of development in 2010 with the *reasoned action approach* or the *theory of planned behaviour* (Fishbein and Ajzen, 2010). The core element of the framework is the explanation and prediction of human social behaviour, which, according to Fishbein and Ajzen, is significantly promoted by a positive behavioural intention. Behavioural intention is determined by the three factors of attitude towards behaviour, subjective norm and perceived behavioural control[1] (Ajzen and Madden, 1986). In the last iteration, the three factors were supplemented by the so-called *beliefs*, as further explanatory elements[2]. Figure 2 shows the framework in its current iteration.

The framework is composed of two different model levels, with the second model level determining the effects of the first model level. Individuals have a certain attitude towards the positive or negative consequences of the personal execution of a behaviour. Ajzen and Fishbein now assume that attitudes result from individuals' inherent beliefs. Accordingly, these behavioural beliefs determine the positive or negative attitude towards the performance of the behaviour. This is analogous to the other two factors: Perceived norm can also be described as the perceived social pressure that people feel to engage in or refrain from a certain behaviour. This perceived social pressure is described by normative beliefs. The interviewed individual estimates for himself how the behaviour in question would be assessed by groups of people important to him and whether the corresponding groups of people would also perform or refrain from this behaviour. Perceived behavioural control is the effect of all external and personal factors that motivate the individual to behave or prevent him from doing so. Again, the underlying control beliefs influence the degree of perceived behavioural control (Ajzen, 2002; Fishbein and Ajzen, 2010; Francis, 2004). The beliefs are highly context-specific, and both Francis (2004) and Ajzen (2002) recommend identifying them in pre-studies with a small subgroup of the future sample. Within research, Ajzen and Fishbein's framework for clarifying behaviour has gained widespread recognition and application: For example, it has been successfully applied in the fields of business and management, environmental sciences and health sciences. (Bosnjak *et al.*,

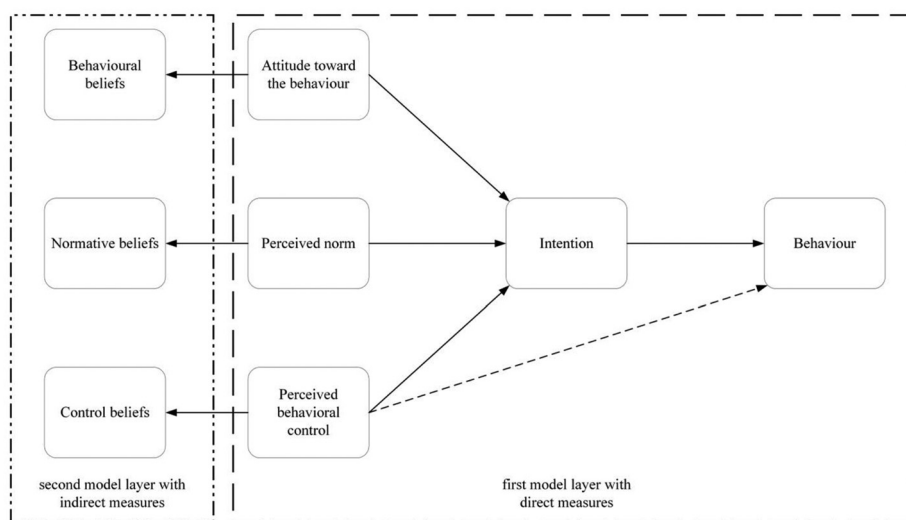


Figure 2.
Theory of planned
behavior (framework)

Source: Own presentation, based on Fishbein and Ajzen (2010)

2020). Consequently, it provides the ideal basis for answering the research question, which seeks to elicit the behaviour of CREMs in the context of information logistics.

Research design

The following study uses a standardised questionnaire, which the participants must answer in online format. This questionnaire is divided into the two model levels of direct and indirect measurement, analogous to the framework of Ajzen and Fishbein. The work of Ajzen (2002) and Francis (2004) was used to create the questionnaire. The questions surveying perceived norm and perceived behavioural control were adapted from Ajzen and Francis. For the perceived norm, however, a slight, context-specific adaptation was necessary, as the questions usually refer to individual groups of people and not to other companies. The pre-study questions, to elicit beliefs and attitudes, were based solely on Francis’ original questions. The pre-studies were conducted as workshops within the scope of a German Facility Management Association event from 22.11.22 to 23.11.22 with 15 participants from the C/REM departments of various companies. Table 1 shows both the tasks and the respective results.

Based on the workshop results, the final questions of the questionnaire were created. To check the questionnaire in terms of wording and comprehension, two pre-test rounds were then carried out in succession with a total of 35 participants. In the first round, the questionnaire was answered by 30 students of a master’s programme in Real Estate

Table 1.
Workshop results

<i>Attitude (An intensive exchange of data and information within the supplier relationship with service providers is ... please complete with adjectives)</i>	
• challenging • resource intensive • complex • legally secure • implementable	• cumbersome • sustainable • time-saving • advantageous • good
<i>Normative beliefs (interest groups that approve/disapprove)</i>	
• real estate department • RESP • associations of the real estate industry • academia • real estate owners	• colleagues from the real estate industry • core business • insurances • users/customers • platform operators
<i>Control beliefs (drivers and barriers)</i>	
• length of contract period • data exchange standards • RESP incentivitation • core business targets • contractual rules • data quality • data quantity	• data protection • Technical feasibility (interfaces, software, etc.) on the principal side • Technical feasibility (interfaces, software, etc.) on the agent side
<i>Behavioural beliefs (pros and cons)</i>	
• efficiency • compliance • data quality • complexity	• costs • partnership • IT competence • transparency
Source: Own presentation	

Management. After the suggestions for improvement had been implemented, the second round was carried out with five people working in C/REM. To ensure the expertise in the second round, it was ensured that the persons had a sufficiently long experience (+ 5 years) and suitable fields of activity (at least working in the management level, real estate and IT background). The final questionnaire for the first model level can be found in [Appendix 1](#) and for the second model level in [Appendix 2](#).

A seven-point Likert scale, also recommended and used by Ajzen and Francis, is used[3]. The study is addressed to German-speaking C/REM departments and their employees. To ensure a more precise description of the sample, demographic information is also collected at the end of the questionnaire.

Data collection and sample

A standardised questionnaire was used to collect the data. It was available to respondents via the Unipark online platform between 24 January 2023 and 31 March 2023. They were contacted via the career-oriented social platform LinkedIn as well as personally by telephone or mail. The analysis included only complete data sets. Because of the relatively small sample size, the total sample was not further divided into sub-samples, allowing for a total of 81 usable questionnaires. This meets the required sample size of 80 participants, according to [Francis \(2004\)](#). An overview of the sample can be found in [Table 2](#).

The majority (65%) of the sample is represented by the core target group of corporates. These are joined by eight participants from the institutional real estate investor sector. Because of the similarity of interest between corporates and investors (both are the procuring entity and represent the client), there is no reason why they should not be included in the overall sample. Furthermore, the questionnaire was answered by 20 RESPs. By including the RESPs in the overall sample, the overall picture of the study could possibly be slightly skewed, as the executing entity of the contractors shows a slightly different behaviour than the procuring entity of the clients ([Qian et al., 2023](#)). However, after a

<i>Role</i>	<i>Corporate</i>		<i>Investor</i>	<i>RESP</i>
Number	53		8	20
Ratio ^a	65%		10%	25%
<i>Country</i>	<i>Germany</i>		<i>Others^b</i>	
Number	79		2	
Ratio ^a	98%		2%	
<i>Position in the company</i>	<i>Staff</i>		<i>Management</i>	<i>C-level</i>
Number	25		44	12
Ratio ^a	31%		54%	15%
<i>Accounting</i>	<i>HGB</i>	<i>IFRS</i>	<i>US-GAAP</i>	<i>Others^c</i>
Number	38	34	2	7
Ratio ^a	47%	42%	2%	9%
<i>Sourcing⁵</i>	<i>Single</i>		<i>Modular</i>	<i>Integrated</i>
Number	32		27	22
Ratio ^a	40%		33%	27%

Notes: ^apercentage may not sum to 100% because of rounding; ^bCountries not within DACH-region, no precise information of origin available; ^cCollection basin for all non-listed accounting policies

Source: Own presentation

Table 2.
Overview of the
sample

descriptive review of the RESP's response behaviour in comparison to the rest of the sample, there are great similarities in this case, which is why the RESP can remain in the sample. Approximately half of the sample (49%) uses national accounting standards (47% according to the German Commercial Code and 2% according to United States Generally Accepted Accounting Principles [4]). On the other hand, about 40% prepare their accounts in accordance with International Financial Reporting Standards. The sample, thus, includes both nationally, that is, Germany-wide, and internationally active companies. Regarding the type of procurement of real estate-related services, most of the participants (60%) use bundled services by awarding contracts on a modular or integrated basis [5]. The other part of the sample uses the strategy of single sourcing [5].

Data analysis and results

Analytical approach

The evaluation of the first model level is carried out by creating composite variables via averaging and subsequent regression of the dependent (intention or behaviour) and independent variables (attitude, perceived norm, perceived behavioural control and/or intention and perceived behavioural control). However, Francis (2004) recommends first verifying the internal consistency of the items via Cronbach's alpha in a preliminary step to be able to adjust if necessary. For the evaluation of the second model level, composite variables are also formed, not by forming a mean value but by multiplying the weighting of the beliefs, which is to be collected beforehand, with the actual measurements of the beliefs (Ajzen, 2002; Francis, 2004). This is followed by a correlation analysis between the composite scores of attitude, perceived norm and perceived behavioural control as well as the weighted beliefs (behavioural beliefs, normative beliefs and control beliefs) (Fishbein and Ajzen, 2010).

First model layer

In a first step, the items attitude, perceived norm and perceived behavioural control of the first model level were analysed for internal consistency using Cronbach's alpha. Nunnally and Bernstein (1994) recommend a threshold value of at least 0.7. The first calculation showed an inverse scaling of the items x3–x7 of the attitude factor, so that a corresponding inversion was made [6]. A new reliability analysis of attitude with all seven items showed an α value of 0.690 ($\alpha < 0.7$). The elimination of item x2 led to a significant improvement ($\alpha = 0.768$; $\alpha > 0.7$), so that the recommended threshold value was reached. Perceived norm ($\alpha = 0.812$) and perceived behavioural control ($\alpha = 0.780$) met the threshold without adjustments. The results and a descriptive evaluation can be found in Table 3.

Subsequently, the composite scores for the three factors attitude, perceived norm and perceived behavioural control were calculated using the respective arithmetic mean. Table 4 contains the correlations among the resulting factors. The final evaluation of the statistical model is done in two steps [7]:

- (1) running a multiple linear regression using the three composite scores of attitude, perceived norm and perceived behavioural control as independent variables and the direct measures of intention as the dependent variable; and
- (2) running a multiple linear regression using the composite score of perceived behavioural control and the direct measures of intention as independent variables and the direct measures of behaviour as the dependent variable [8].

					Data in German real estate	
Factor	Item	Mean	SD	α (≥ 0.7) ^a		
Attitude	x1	3.67	1.84	0.768	271	
	x3	3.43	1.77			
	x4	3.00	1.66			
	x5	2.17	1.42			
	x6	2.38	1.70			
	x7	2.09	1.38			
	x8	4.11	1.86			
Perceived norm	x9	3.77	1.73	0.812		
	x10	3.99	1.87			
	x11	4.43	1.90			
Perceived behavioural control	x12	3.85	1.74	0.780		
	x13	4.47	2.02			
	x14	3.15	1.71			
	y1	5.02	1.78			
Intention						
Behaviour	y2	3.75	2.14			

Note: ^aNunnally and Bernstein (1994)

Source: Own presentation

Table 3.

Statistical results

Table 3.
Statistical results

^a	Attitude	Perceived norm	Perceived behavioural control
Attitude		<i><0.001</i>	<i><0.001</i>
Perceived norm	0.523		<i><0.001</i>
Perceived behavioural control	0.438	0.573	

Notes: ^aLower triangle contains Pearson coefficients with composite scores, upper triangle contains two-sided *p*-values in italics
Source: Own presentation

Table 4.
Factor correlations

The results of the two regression models can be found in Table 5 and the corresponding coefficients in Table 6. The predictors used in the first regression model predict statistically significant the intention to intensively and automatically share data [$F(3,77) = 11.04$ and $p < 0.001$]. Both attitude towards behaviour and perceived norm have a statistically significant influence on intention ($\beta_{att} = 0.324$ and $p < 0.01$; $\beta_{pn} = 0.399$ and $p < 0.01$). Only perceived behavioural control appears to have no influence. The second regression model, with the predictors of perceived behavioural control and intention, also statistically significant predicts the behaviour to intensively and automatically share data [$F(2,78) = 29.39$ and $p <$

Dependent variable(s)	Independent variable	R^2	Adjusted R^2	F	<i>p</i> -value
(1) Attitude, perceived norm and perceived behavioural control	Intention	0.301	0.273	(3,77) 11.04	< 0.001
(2) Perceived behavioural control and intention	Behaviour	0.430	0.415	(2,78) 29.39	< 0.001

Source: Own presentation

Table 5.
Results of regression
models

Table 6.
Overview of
regression
coefficients

0.001]. In contrast to the first regression model, however, perceived behavioural control has a statistically significant influence on behaviour ($\beta_{\text{pbc}} = 0.560$ and $p < 0.001$), so that no mediation effect can be assumed via intention. Intention also influences behaviour, although to a significantly lesser extent ($\beta_{\text{int}} = 0.249$ and $p < 0.01$). Figure 3 shows the regression results of the first model level in the framework.

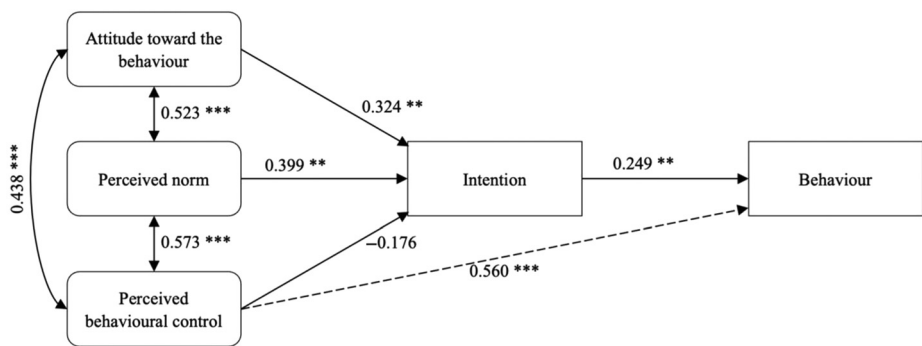
Second model layer

For the evaluation of the second model level, the individual assessments regarding the importance of the listed beliefs (e.g. z1.1–z1.8) were multiplied with the individual implementation/orientation (e.g. z2–z9) to a weighted result per answer (BbX, NbX and CbX). The weighted responses obtained in this way were then correlated with the composite scores of the predictors of the first model level. To check the correct scaling (i.e. unipolar scale vs bipolar scale), the composite score was calculated with both scales. The scale would have to be changed to the bipolar scale whenever it showed higher correlation results in direct comparison with the unipolar scale (see also footnote 12 and Appendix 3 in Francis, 2004). The review showed that the change of scaling was not necessary in any case. The descriptive evaluation already addressed in the first model level showed that the beliefs seem to follow the findings of Qian *et al.* (2023), at least in certain areas. Within the correlation analysis, therefore, only data sets of the real estate owners (= corporates and

Model		Beta ^a	p-value	Sig ^b
(1) Intention	Attitude (att)	0.324	0.006	**
	Perceived norm (pn)	0.399	0.002	**
	Perceived behavioural control (pbc)	−0.176	0.143	
(2) Behaviour	Perceived behavioural control	0.560	< 0.001	***
	Intention (int)	0.249	0.005	**

Notes: ^astandardised coefficients are shown; ^b p -value < 0.001 = ***; p -value < 0.01 = **, and p -value < 0.05 = *

Source: Own presentation



p -value < 0.001 = ***; p -value < 0.01 = **; p -value < 0.05 = *. Standardised coefficients are shown.

Figure 3.
Results first model
layer

Source: Own presentation, based on Fishbein and Ajzen (2010)

investors; $n = 61$) were considered, and the RESPs ($n = 20$) were excluded. The results of the correlation analysis can be found in [Table 7](#) and [Appendixes 3, 4 and 5](#).

Discussion

Theoretical implications

Basically, it can be stated that the reasoned action approach or the theory of planned behaviour is also suitable for predicting individual behaviour within the German real estate industry. Both regression models predict statistically significant the intention and the behaviour towards an intensive and automated data exchange with RESP.

At the first model level, it can be stated that the intention to exchange data intensively and automatically with RESP is influenced by a positive attitude. The core drivers [9] for this attitude, coming from the second model level, are the improvement of compliance ($r = 0.612$ and $p < 0.001$) and partnership ($r = 0.518$ and $p < 0.001$). The latter result is in line with the findings already obtained in this area and confirms previous research by [Wiesweg et al. \(2022\)](#) and cross-sectoral research by [Chang et al. \(2015\)](#) and [Frazier and Summers \(1986\)](#), for example. A look at the results from [Appendix 3](#) reinforces the impression of the

Category	Belief	r_{att}^a	r_{pn}^a	r_{pbc}^a	sig^b
Behavioural beliefs	Bb1 Efficiency	0.438			***
	Bb2 Data quality	0.390			**
	Bb3 Complexity ^c	0.324			*
	Bb4 Costs ^c				
	Bb5 Transparency	0.447			***
	Bb6 Compliance	0.612			***
	Bb7 Partnership	0.518			***
	Bb8 IT competence ^c				
Normative beliefs	Nb1 Real estate colleagues		0.334		**
	Nb2 RESP		0.306		*
	Nb3 Real estate associations		0.290		*
	Nb4 Scientific community		0.300		*
	Nb5 Real estate owners		0.328		**
	Nb6 Controlling department				
	Nb7 Purchasing department				
	Nb8 Compliance department		0.359		**
	Nb9 Management		0.377		**
	Nb10 Insurance companies		0.328		**
	Nb11 Real estate users		0.408		***
	Nb12 Platform operators		0.442		***
Control beliefs	Cb1 Long contract terms				
	Cb2 Data exchange standards				
	Cb3 Incentives for RESP			0.381	**
	Cb4 Company-specific targets			0.366	**
	Cb5 Contractual regulations				
	Cb6 Real estate-related data quality			0.353	**
	Cb7 Data protection and IT security				
	Cb8 Technical feasibility (client)			0.279	*
	Cb9 Technical feasibility (RESP)				

Notes: ^aPearson coefficients, only significant correlations are shown. ^b p -value $< 0.001 = ***$; p -value $< 0.01 = **$; p -value $< 0.05 = *$; two-sided; ^cinverse coded for easier interpretation

Source: Own presentation

Table 7.
Correlation analysis
beliefs

core drivers: improving compliance goes hand in hand with improving partnership ($r = 0.707$ and $p < 0.001$). Other drivers include improving transparency ($r = 0.447$ and $p < 0.001$) and efficiency ($r = 0.438$ and $p < 0.001$). Both correlate with each other at a high level ($r = 0.610$ and $p < 0.001$) and at the same time are also closely related to the two core drivers (transparency: $r_{\text{partnership}} = 0.692$ and $p < 0.001$; $r_{\text{compliance}} = 0.626$ and $p < 0.001$ /efficiency: $r_{\text{partnership}} = 0.728$ and $p < 0.001$; $r_{\text{compliance}} = 0.521$ and $p < 0.001$). Contrary to the expectation that intensive and automated data exchange significantly improves data quality, the correlation result with attitude is surprisingly low in its strength ($r = 0.390$ and $p = 0.002$). A closer look at the correlation matrix in [Appendix 3](#) shows that both efficiency and partnership correlate highly with the improvement of data quality ($r_{\text{efficiency}} = 0.762$ and $p < 0.001$; $r_{\text{partnership}} = 0.709$ and $p < 0.001$). This again illustrates the relevance of the partnership for data exchange. The necessity of having a high level of IT competence appears to be completely irrelevant: There are no correlations either regarding the attitude or between the individual beliefs. Complexity is a slightly inhibiting factor [10] ($r = 0.324$ and $p\text{-value} = 0.011$). It correlates exclusively with costs at the medium level ($r = 0.593$ and $p\text{-value} < 0.001$; [Appendix 3](#)). In a direct comparison of the correlation strengths between barriers and core drivers, however, the former is significantly less intense. From an attitudinal perspective, it can then be concluded that German C/REM departments would engage in such an exchange precisely because of their own positive conviction that intensive and automated data exchange offers advantages.

The second finding at the first model level lies in the influence of the perceived norm on the intention: The perceived norm basically results from the group behaviour of other stakeholders within the real estate industry, which in turn influence one's own intention to behave. A look at the second model level shows that the more influential stakeholders ($r > 0.3$) include not only the groups of real estate users, the management and the compliance department but also the colleagues within the real estate sector, the real estate owners and insurance companies. In this case, platform operators play a special role ($r = 0.442$ and $p\text{-value} < 0.001$): Platforms, as a new organisational form, increasingly control the flow of information in both the B2C and B2B sectors ([Kenney and Zysman, 2016, 2019, 2020](#)). As a central data repository, the platform, in the case considered here, is placed in the inter-organisational context between the C/REM and the market. It adds another, data-oriented layer to the multi-level principal-agent relationship. As a key stakeholder, platforms seem to act as a catalyst for intensive and automated data exchange between C/REM and RESP. On a higher level, there is also a moderately strong, reciprocal relationship ($r = 0.523$ and $p\text{-value} < 0.001$; [Table 4](#)) between the attitude and the perceived norm. From the perspective of the perceived norm, it can then be concluded that German C/REM departments are oriented towards other stakeholders regarding their intention to engage in intensive and automated data exchange. The perceived norm even influences the intention to a greater extent than the attitude does ($\beta_{\text{att}} = 0.324$ and $p = 0.006$; $\beta_{\text{pn}} = 0.399$ and $p = 0.002$; [Table 6](#)).

As a final finding, the first level of the model shows that intention is not influenced by perceived behavioural control, but that the latter has a direct effect on behaviour. Here, the pooled effects of attitude and perceived norm over intention on behaviour are significantly smaller than the influence of perceived behavioural intention on behaviour. The main driver for intensive and automated data exchange is, therefore, not the intention to do so but is rather described by the external circumstances. The control beliefs collected at the second model level can be described as the organisational milieu in which intensive and automated data exchange with RESP becomes significantly more likely. Key elements include ($r > 0.3$):

- incentivisation;
- company-specific targets (e.g. from the ESG context); and
- sufficiently good data quality.

The element of incentivisation is also, based on theoretical knowledge, a successful measure for influencing the behaviour of a contractual partner: within the inter-organisational relationship (between C/REM and market), principal-agent theory identifies this measure as a central element for reducing information asymmetries between contractual partners (Eisenhardt, 1989). It is precisely the addition of the inter-organisational perspective in the discussion that lends weight to the second element (company-specific targets). However, the intra-organisational relevance must first be considered: The discussion of the transfer of company-specific objectives to the C/REM and the best possible fulfilment and communication of these has already given rise to many scientific works in the past, under the concept of added value of C/REM. (Bernhold *et al.*, 2019; Heywood and Kenley, 2008; Jensen, 2010; Jensen *et al.*, 2013; Lindholm, 2008; Lindholm and Leväinen, 2006). The intra-organisational design of the information flow between the core business and the C/REM department (Figure 1) can, thus, be seen as a conditional prerequisite for the development of the inter-organisational flow of information: The inter-organisational flow of information can participate through an understanding of the core business and the corresponding aggregation of the C/REM-specific key figures, which are fed, among other things, by the inter-organisational flow of information. From an inter-organisational perspective, the company-specific targets, thus, lead to a corresponding alignment between C/REM and RESP. This is also confirmed by a relatively strong correlation between the company-specific targets and the contractual regulations ($r = 0.599$ and $p\text{-value} < 0.001$; Appendix 5). Not only is the alignment of goals and interests represented within principal-agent theory (Picot, 2008) but also the effect on data sharing has already been confirmed empirically (Wiesweg *et al.*, 2022). Interestingly, the length of the contract term, which is often derived from principal-agent theory to reduce information asymmetries, only just misses the threshold of significance in the present sample ($p\text{-value} = 0.054$). On a higher level, there is also a moderately strong, reciprocal relationship ($r = 0.573$ and $p\text{-value} < 0.001$; Table 4) between the perceived norm and the perceived behavioural control. Also present, although somewhat weaker, is the relationship with attitude ($r = 0.438$ and $p\text{-value} < 0.001$; Table 4). From the perspective of perceived behavioural control, it can then be concluded that German C/REM departments engage in intensive and automated data exchange primarily because of the organisational milieu in which they find themselves and less because of their own intention ($\beta_{\text{int}} = 0.249$ and $p = 0.005$; $\beta_{\text{pbc}} = 0.560$ and $p < 0.001$; Table 6).

Implications for practice

The theoretical implications elaborated as well as the statistical results of the correlation analysis, especially for perceived behavioural control, have far-reaching implications for practice:

Contrary to the industry-specific developments of recent years in Germany, which increasingly led to initiatives for data exchange standards (gif Gesellschaft für Immobilienwirtschaftliche Forschung e.V., 2021; Schüppler, 2020 or International Organization for Standardization, 2018), no statistically significant correlation between corresponding standards and the perceived behavioural control directly affecting behaviour can be proven ($r = 0.234$ and $p\text{-value} > 0.05$). Furthermore, data exchange standards on the

C/REM side do not seem to have any influence on the ease of technical feasibility ($r = 0.235$ and p -value > 0.05 ; [Appendix 5](#)). This contrasts with the significantly higher correlation for feasibility on the RESP side in a direct comparison ($r = 0.438$ and p -value < 0.001 ; [Appendix 5](#)). As RESPs work for many clients, this seems perfectly understandable. However, the application of standards by RESP will also inevitably require an information technology change on C/REM (this is also shown by the strong correlation between feasibility on the principal side and the agent side; $r = 0.577$ and p -value < 0.001 ; [Appendix 5](#)). Nevertheless, aspects of incentivisation (regardless of their characteristics) as well as a stronger alignment between C/REM and RESP appear to be much more promising in practice to be able to solve challenges of insufficient data quality ([Hellmuth, 2022](#)). At this point, the technical relevance of the topic is not to be negated, but rather the discussion is intended to show that, in addition to technological changes, changes are also necessary at the organisational level: Data quality is comparatively strongly related to company-specific targets ($r = 0.539$ and p -value < 0.001 ; [Appendix 5](#)) and contractual regulations ($r = 0.495$ and p -value < 0.001 ; [Appendix 5](#)). The strong correlation between the two elements ($r = 0.599$ and p -value < 0.001 ; [Appendix 5](#)) shows that company-specific targets must find their way into contractual regulations with the RESP. By simultaneously adapting the organisational milieu (described by the elements of incentivisation and goal setting/alignment) as well as the technical component, current as well as future challenges of information logistics become shapeable. In this context, platform operators or platform economic developments seem to be a suitable vehicle, both as an instrument of alignment and to intensify and control their own information flows. Descriptions and concrete requirements for the flow of information should be part of the contractual arrangements between C/REM and RESP in the future. The C/REM should not only work data-driven on a technological level but also anchor this institutionally in the form of data-driven contracts.

An attempt to generalise the results

The statements made above can only be valid for the German region under study. Nevertheless, an attempt at generalisation will be made.

There is international agreement on the fundamental core tasks of CREMs. It is, therefore, highly likely that a large part of the future challenges in the context of digitalisation will be similar at the international level. The challenge of designing CREM-specific inter-organisational information logistics is, therefore, relevant, regardless of the regional location. What makes CREM organisations and their value chain different internationally is, among other things, their cultural embedding. Contracts, their negotiations and the way in which these contracts are practiced are, for cultural reasons, not socially uniform ([Brett, 2000](#)). The effect of these cultural characteristics is reflected, in the context of the theory of planned behaviour, both in the beliefs (second model layer) and in the decision-making patterns (first model layer). For example, the selection of relevant stakeholders (perceived norm) will not differ much across cultures because of organisational factors, but their relevance for CREM and for data and information sharing will. Analogous results are obtained for the factors attitude and perceived behavioural control. The model and the statements made based on the model results should, therefore, continue to be valid in principle, regardless of the demographics of the sample, but should have a different priority depending on the cultural characteristics. For example, hierarchical cultures would show significantly stronger effects in social norm and less in attitude. To improve information logistics, the measures presented here from the area of social norms should therefore be focused more strongly on improving information logistics.

Limitations and future research

However, the extent to which the statements can be transferred to other countries in terms of their validity would have to be investigated separately within the framework of further studies. Although the sample limit of 80 participants was met, a new survey with a larger sample size would possibly lead to further findings. Peculiarities of the respective sectors of the core business, regarding company sizes and degrees of internationalisation, could be investigated and considered separately. An analogous implementation of the study with a focus on RESP would also be informative. For this, however, both the convictions and the characteristics of the attitude should be renewed in advance through preliminary studies, as they are currently exclusively C/REM-based because of the workshop participants.

Conclusion

The *theory of planned behaviour* or the *reasoned action approach* was used to predict the behaviour, in terms of intensive and automated data exchange with RESP, of German C/REMs. The analysis of the regression results showed that the behaviour is influenced by the intention to perform this behaviour. However, it is significantly determined by the perceived behavioural control, which exerts a direct influence on the behaviour. This behavioural control could be described more precisely through the correlation analysis of underlying beliefs: As an organisational milieu, characterised by incentives, contractual regulations and the quality of the data, it positively influences the behaviour of an intensive and automated data exchange with RESP. The intention to behave is positively influenced by the attitude towards the behaviour (characterised by improvements in transparency, efficiency and compliance) and slightly inhibited by the factors of complexity and costs. Also present is the positive influence of the perceived norm on intention. Significant stakeholders shaping this influence are the developments in the context of the platform economy, represented by platform operators, the property users and the management as well as the compliance department. In the future, descriptions and concrete requirements for information flows should be part of the contractual regulations between C/REM and RESP. The developments of digitalisation should be reflected not only at the technological level but also at the institutional level, in the form of data-driven contracts, so that they can unfold in potential inter-organisationally.

Notes

1. Together with intention and behaviour, referred to as the “first model level” in the rest of the paper.
2. Referred to as “second model level” in the following.
3. Scale labelling, unless stated otherwise via footnote, does not apply at all ↔ fully applies.
4. These are not the two participants from a non-DACH region, but participants from Germany.
5. Single sourcing describes the contracting of individual services (e.g. cleaning, maintenance of the heating system, security service, etc.) to many RESP. Module-based sourcing bundles the facility-related individual services (cleaning and maintenance of individual technical facilities) into packages (then labeled as hard- and soft-services), which are outsourced to a smaller number of RESPs. The integrated sourcing builds upon the module-based sourcing and bundles the modules into an overall package to further reduce the number of RESPs (Bernhold, 2010).
6. A larger value corresponded to a more negative answer. This scale was reversed by the inversion: larger value $\hat{=}$ more positive answer.
7. All calculations for the model evaluation were carried out with SPSS v27. The procedure corresponds to that already explained above by Ajzen (2002), Fishbein and Ajzen (2010), Fishbein and Ajzen (2010) and Francis (2004).

8. The inclusion of the composite score of perceived behavioural control serves to test the mediation effect between intention and perceived behavioural control. Further information on this can be found in [Ajzen \(2002\)](#) and [Francis \(2004\)](#).
9. All conclusions regarding the strength of correlations are made according to [Dancey and Reidy \(2017\)](#).
10. This conclusion results from the inverse scaling of both items that was subsequently carried out: a positive value corresponds to a negative effect.

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Table A1.
Questionnaire (first
model layer)

Appendix 1		
Factors	Indicators	
Attitude	Extensively exchanging data and information with real estate service providers in an automated way is ... ^a	
	x1	resource intensive ↔ not resource intensive
	x2	complex ↔ not complex
	x3	legally compliant ↔ not legally compliant
	x4	realizable ↔ not realizable
	x5	sustainable ↔ non-sustainable
	x6	time saving ↔ not time saving
Perceived norm	x7	beneficial ↔ not beneficial
	Extensive and automated exchange of data and information with real estate service providers is ...	
	x8	... practiced by companies to which we orient ourselves (benchmarking, target image, etc.)
	x9	... practiced by companies that are important to us (e.g. business partners, shareholders, etc.)
Perceived behavioural control	x10	... expected from our company
	Extensive and automated exchange of data and information with real estate service providers is ...	
	x11	... practicable by us if we wanted to
	x12	... fully configurable by us according to our ideas
	x13	... our free decision
Intention	x14	... easy for us
	y1	We would extensively exchange data and information with real estate service providers in an automated way, assuming a supplier relationship that is ideal for us
Behaviour	y2	Last year, we exchanged data and information with real estate service providers on an extensive automated basis
Note: ^a Items reflect scale expression (min/max)		

Factors	Indicators				
Behavioural beliefs	z1 Extensive data and information exchange with real estate service providers in an automated way... 1.1 [...] increases efficiency 1.2 [...] increases data quality 1.3 [...] increases complexity 1.4 [...] increases costs 1.5 [...] increases transparency 1.6 [...] improves compliance 1.7 [...] improves partnership 1.8 [...] requires a high level of in-house IT competence z2 Increasing efficiency is for us[...] ^a z3 Increasing data quality is for us...0.11 z4 The increase in complexity is for us[...] ^b z5 The increase in costs is for us...0.12 z6 Increasing transparency is for us...0.11 z7 Improving compliance for us is...0.11 z8 The improvement of the partnership is for us...0.11 z9 Requiring our own high level of IT competence is for us...0.12 <td>Normative beliefs</td> <td> z10 The extensive and automated exchange of data and information with real estate service providers is supported by[...] z11 How closely do you align the supplier relationship with[...]^c 1.1^d [...] colleagues from the real estate industry 1.2 [...] real estate service providers 1.3 [...] associations of the real estate industry 1.4 [...] the scientific community 1.5 [...] real estate owners 1.6 [...] the controlling department 1.7 [...] the purchasing department 1.8 [...] the compliance department 1.9 [...] the management 1.10 [...] insurance companies 1.11 [...] real estate users 1.12 [...] platform operators <td>Control beliefs</td><td> z12 The extensive and automated exchange of data with real estate service providers becomes much easier ↔ more complicated because of...^e 1.1 [...] long contract terms 1.2 [...] data exchange standards 1.3 [...] incentives for the real estate service provider 1.4 [...] company-specific targets (e.g. ESG) 1.5 [...] contractual regulations 1.6 [...] good real estate-related data quality 1.7 [...] good data protection and high IT security 1.8 [...] a simple technical feasibility (interfaces, software, etc.) on the client side 1.9 [...] a simple technical feasibility (interfaces, software, etc.) on the real estate service provider side </td></td>	Normative beliefs	z10 The extensive and automated exchange of data and information with real estate service providers is supported by[...] z11 How closely do you align the supplier relationship with[...] ^c 1.1 ^d [...] colleagues from the real estate industry 1.2 [...] real estate service providers 1.3 [...] associations of the real estate industry 1.4 [...] the scientific community 1.5 [...] real estate owners 1.6 [...] the controlling department 1.7 [...] the purchasing department 1.8 [...] the compliance department 1.9 [...] the management 1.10 [...] insurance companies 1.11 [...] real estate users 1.12 [...] platform operators <td>Control beliefs</td> <td> z12 The extensive and automated exchange of data with real estate service providers becomes much easier ↔ more complicated because of...^e 1.1 [...] long contract terms 1.2 [...] data exchange standards 1.3 [...] incentives for the real estate service provider 1.4 [...] company-specific targets (e.g. ESG) 1.5 [...] contractual regulations 1.6 [...] good real estate-related data quality 1.7 [...] good data protection and high IT security 1.8 [...] a simple technical feasibility (interfaces, software, etc.) on the client side 1.9 [...] a simple technical feasibility (interfaces, software, etc.) on the real estate service provider side </td>	Control beliefs	z12 The extensive and automated exchange of data with real estate service providers becomes much easier ↔ more complicated because of... ^e 1.1 [...] long contract terms 1.2 [...] data exchange standards 1.3 [...] incentives for the real estate service provider 1.4 [...] company-specific targets (e.g. ESG) 1.5 [...] contractual regulations 1.6 [...] good real estate-related data quality 1.7 [...] good data protection and high IT security 1.8 [...] a simple technical feasibility (interfaces, software, etc.) on the client side 1.9 [...] a simple technical feasibility (interfaces, software, etc.) on the real estate service provider side

Table A2.
Questionnaire

(continued) (second model layer)

Table A2.

Factors	Indicators
	z13 We have long contract terms (>4 years) for our real estate-related contracts
	z14 We use data exchange standards
	z15 We use incentive mechanisms to control the behaviour of the real estate service provider
	z16 We have to be guided by company-specific targets (e.g. ESG) in the design of contracts
	z17 We use contractual provisions to manage the real estate service provider
	z18 We have good real estate-related data quality
	z19 We have good data protection and IT security for our real estate data
	z20 Our IT landscape offers a central data repository that can be shared
	z21 The IT landscape on the real estate service provider side offers the technical connection to a central data repository that can be shared
Notes: ^a Scale: very important ↔ very unimportant; ^b Scale: very bad ↔ very good; ^c Scale: very weak ↔ very strong; ^d Following lines apply to z10 and z11; ^e Respondents should rate the items based on the scaling much easier ↔ more complicated	
Source: Own presentation	

Appendix 3

Data in
German real
estate

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^a	Bb1	Bb2	Bb3 ^b	Bb4 ^b	Bb5	Bb6	Bb7	Bb8 ^b
Bb1	–	<i><0.001</i>			<i><0.001</i>	<i><0.001</i>	<i><0.001</i>	
Bb2	0.762	–			<i><0.001</i>	<i><0.001</i>	<i><0.001</i>	
Bb3 ^b			–	<i><0.001</i>				
Bb4 ^b			0.592	–				
Bb5	0.610	0.515			–	<i><0.001</i>	<i><0.001</i>	
Bb6	0.521	0.513			0.626	–	<i><0.001</i>	
Bb7	0.728	0.709			0.692	0.707	–	
Bb8m								–

Notes: ^aLower triangle contains Pearson coefficients, upper triangle contains two-sided *p*-values in italics. Only significant correlations are shown; ^bInverse coded for easier interpretation

Source: Own presentation

Table A3.
Correlation matrix
behavioural beliefs

Table A4.
Correlation matrix
normative beliefs

^a	Nb1	Nb2	Nb3	Nb4	Nb5	Nb6	Nb7	Nb8	Nb9	Nb10	Nb11	Nb12
Nb1	–	<0.001	<0.001	0.004	0.002			0.001	<0.001	0.04		0.001
Nb2	0.521	–	0.002	0.009	<0.001	0.04	0.024	0.002	<0.001	0.003	<0.001	0.046
Nb3	0.493	0.385	–	<0.001	<0.001			0.006	<0.001	0.028		
Nb4	0.362	0.331	0.468	–	<0.001	0.008			0.002	<0.001	0.001	<0.001
Nb5	0.391	0.503	0.457	0.516	–	0.041	0.015	<0.001	<0.001	0.011	<0.001	0.004
Nb6		0.264		0.334	0.262	–	<0.001	<0.001	0.001	<0.001	0.012	0.045
Nb7		0.288			0.309	0.520	–	<0.001	<0.001	<0.001	0.001	0.024
Nb8	0.431	0.389		0.348		0.532	0.540	–	<0.001	<0.001	0.001	0.004
Nb9	0.548	0.467	0.477	0.395	0.596	0.413	0.444	0.531	–	0.002	0.004	0.006
Nb10	0.263	0.374	0.281	0.512	0.322	0.448	0.437	0.554	0.384	–	<0.001	<0.001
Nb11		0.504		0.441	0.501	0.322	0.425	0.411	0.362	0.456	–	<0.001
Nb12	0.426	0.256		0.522	0.362	0.257	0.289	0.360	0.346	0.433	0.447	

Note: ^aLower triangle contains Pearson coefficients, upper triangle contains two-sided p-values in italics. Only significant correlations are shown
Source: Own presentation

Appendix 5

Data in
German real
estate

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^a	Cb1	Cb2	Cb3	Cb4	Cb5	Cb6	Cb7	Cb8	Cb9
Cb1	–	<i><0.001</i>		<i>0.031</i>		<i>0.014</i>			
Cb2	0.440	–	<i><0.001</i>	<i>0.01</i>		<i>0.001</i>	<i>0.008</i>		<i><0.001</i>
Cb3		0.442	–	<i><0.001</i>	<i>0.018</i>	<i>0.001</i>	<i>0.012</i>		
Cb4	0.276	0.326	0.438	–	<i><0.001</i>	<i><0.001</i>	<i><0.001</i>		
Cb5			0.302	0.599	–	<i><0.001</i>	<i><0.001</i>	<i>0.002</i>	
Cb6	0.312	0.429	0.425	0.539	0.495	–	<i>0.001</i>		
Cb7		0.335	0.319	0.449	0.444	0.401	–	<i>0.005</i>	<i>0.004</i>
Cb8					0.393		0.356	–	<i><0.001</i>
Cb9		0.438					0.363	0.577	–

Note: ^aLower triangle contains Pearson coefficients, upper triangle contains two-sided *p*-values in italics. Only significant correlations are shown

Source: Own presentation

Table A5.
Correlation matrix
control beliefs

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