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Heuristics and Biases Uncovered During the Digitalisation Decision-Making Process in the Property Sector

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ABSTRACT

The property industry is lagging other industries in the drive towards digitalisation. This study hypothesised that biases and heuristics encountered during the digitisation decision-making process contributed to this delay. Biases could increase the property industry practitioners' reluctance or resistance to make the digitisation decision and could further add to the complexity of the decision-making process. Most of the previous research in this field had been conducted quantitatively, utilising surveys and experiments to detect the presence of specific pre-selected biases, but only expected biases could be measured in this way. The present study followed a qualitative approach in which unstructured in-depth interviews with a purposively selected sample of property industry decision-makers allowed the detection of many biases. The sample covered a broad spectrum of the industry including decision-makers from the listed property sector, private sector commercial property developers, commercial property financiers, and residential real estate agencies. The study detected 37 biases that influenced the digitisation decision.

Keywords: Heuristics, Biases, Decision-making, Digitisation, Digitalisation, Investment decision

INTRODUCTION

Considering the plethora of available programmes and digital applications available in the era of digital transformation it is peculiar that the real estate industry, and the construction sector component thereof in particular, is said to be slow to digitalise. When comparing 22 industries, McKinsey Global Institute Industry Digitisation Index places construction in the second last position, outperforming only hunting and agriculture. Real estate is classified as a digital leader within the relatively un-digitised construction sector and, due to its methods of market-making, transactions, and digital spending on workers, it achieves a twelfth position (Agarwa, et al., 2016).

When surveying the global level of maturity in the real estate industry related to technology and data functionality, JLL states that "… limited data and technology maturity is currently slowing the pace of change". Amongst the top five barriers to adding strategic value in real estate organisations "the lack of access to effective data and analytics" was confirmed (JLL Global Research, 2022, p. 26).

Numerous other authors provide examples of property sector related digital applications and inform that the property industry should improve its processes by embracing digitalisation (Dossick & Messner, 2020; Donner, et al., 2018; El Saddik, 2018; Faggella, 2019; Koponena, et al., 2019; Starr et al., 2021; Sindhu & Sangwan, 2017; Solid Green, 2019; Xu *et al.,* 2018).

The purpose of this study was to investigate the obstacles to effective decision-making regarding digitalisation in the property sector. These obstacles may include the use of heuristics (mental "rule of thumb" techniques applied during decision making) and cognitive biases (obstacles to effective decision making that often cloud the decision), delayed the decision to digitalise. As pointed out by Dabara *et al.* (2014) "Decision theory is very much relevant in real estate development decisions because by assessing the risks, complexities, and uncertainties associated with real estate development, the decision maker is better placed to make a more informed and "better" decision" (p. 1861).

These biases can "short circuit" the process of rational decision-making and stem from the reliance on heuristics. Individuals and groups rely on heuristic principles as this process reduces complex tasks of probability assessment and prediction to simplify judgmental processes. While, generally speaking, heuristics save time, reduce complex cognitive tasks, and are thus useful, they may lead to severe and systematic errors (Tversky & Kahneman, 1974) - errors that should be avoided by the decision makers during digitisation decisions in retail real estate.

Volberda *et al.* (2021) investigated the cognitive barriers that managers face in trying to understand the innovative new digital world and the difficulties experienced when attempting to envision new business models based on digitalisation and concludes that: "Most managers are aware of digital needs and opportunities, but translating awareness into the correct actions often requires cognitive hurdles to be overcome before any action can be taken" (p. 11).

Although biases would most often negatively affect decision making, especially during times of uncertainty brought on by rapid change in the real estate environment and when decisions need to be made fast, heuristics on the other hand could have a positive impact on decision making. When biases change from subconscious intuitive processes in system 1 (fast) thinking to being detected and recognised by decision makers during the objective analysis of system 2 (slow) thinking, they becoming conscious biases (Kahneman, 2011). Decision makers can practice recognising them and with practice develop resilience to the extent that the decision maker can move back to system 1 (fast) thinking. The system 2 process that requires considerable effort becomes an effortless mental rule-of-thumb as confirmed by a Harvard Business Review study on decision making during times of rapid transformation. The study found that the development of new heuristics improved and expedited decision making, especially when important decisions had to be made rapidly (Suarez & Montes, 2020).

METHODOLOGY

In-depth interviews were ideally suited to reveal biases and heuristics as this methodology allowed cognitive and emotional biases to emerge spontaneously in a completely unstructured conversation (similar to the first conversation between a psychologist and their client in the diagnostic process). Biases could then be detected during qualitative data analysis. Thematic content analysis was done using a code book (created manually) and the NVivo software package to code the data. Prioritisation of the themes was done quantitatively. Two groups of industry experts were interviewed.

The first group comprised the digitisation decision makers of five leading property sector organisations in the South African real estate industry (although all of these organisations also invest elsewhere in Africa and/or internationally). Organisations included were two of the top five South African REITs (Real Estate Investment Trusts), the foremost commercial property financier (bank), the leading property development organisation, and the largest real estate agency franchisor.

The executives interviewed (referred to collectively as Application purchasers) had made the digitalisation decision by purchasing or subscribing to one or more of five digital applications, or had customised these applications to address their particular needs. The five digital applications considered represent some of leading real estate digital applications in the industry in their respective categories namely (i) Procore: A SaaS ecosystem for property development and construction, (ii) MRI Real Estate Software: A SaaS property management ecosystem, (iii) Lightstone: A market intelligence and automated valuations platform, (iv) Admyt: A parking management application, and (v) PeppaComm Community: A property sector B2B and B2C community communications platform.

The second group interviewed consisted of the five providers/developers/sellers of these digital applications (referred to collectively as Application developers) who had sold them to the Application purchasers.

The data collected from these two groups were cross-referenced to gain a complete account of the digitalisation decision from both sides of the decision-making process. The results were triangulated against the literature (through substantiation) which improved the validity and reliability of the results.

FINDINGS

All the participating real estate organisations, represented by the decision makers, as well as the Application developers confirmed that the industry was lagging other industries. Decision making was done by a group or team in each organisation and the participants interviewed led these teams.

In all but one organisation the original digitalisation decision (to digitalise or not) had been made by their predecessors and in all these cases the onset of digitalisation had been delayed as their predecessors were resistant towards change in general and digitalisation in particular. A total of 37 biases and heuristics were detected pertaining to several factors (discussed below). The 30 most prominent biases and heuristics are presented after these factors.

Uncertainty about the future success of these applications, especially their financial viability, coupled with their considerable cost, prohibited the uptake of new applications or delayed the digitalisation decision as confirmed by both groups interviewed. All the Application purchasers, but to a lesser extent the Bank (where digitalisation had begun many years ago) were very uncertain about the future success of digital applications that they investigated as they did not require standard off-the-shelf products or services in most cases but needed customised or bespoke digital products/services. When standard applications came close enough to satisfy a particular need, customisation or complete integration into existing platforms was usually not possible or simply too expensive. Four of the five Application developers confirmed this by indicating that personalisation of their digital platforms or ecosystems was possible but customisation was usually not and where this was possible the incremental costs of customisation and system updates was prohibitive. The firth Application developer's communication platform was intended for customisation yet complex system integration was still costly.

It was also difficult and time-consuming for all the Application purchasers to establish if the desired outcome would be met sufficiently given the cost.

The uncertainty in deciding whether the costs of digital applications could be justified related to the following eight complexities that influenced the Application purchasers' decisions by delaying the decision-making process.

(i) Conducting a cost-benefit analysis when the potential benefits were not clearly measurable or quantifiable in financial terms (e.g. improvement in customer experience/satisfaction).

(ii) Determining if the cost of the digital application and related subscription or license fees should be viewed as a capital or operational expense related to a particular property. Application purchasers that viewed the cost as an enterprise expense related to all properties and projects, could expedite their decision-making process once this realisation had occurred, especially when the cost of the application was structured in line with the usage thereof. All Application developers confirmed that their applications should be viewed as an enterprise expense as the cost of the application would not be financially viable for a single property or development, yet when implemented across all properties it became feasible.

(iii) The uncertainty about what the cost of the application should be compared to. Some Application purchasers compared the costs to that of the manual process that the application would replace or reduce. Others compared it to the application's income generation potential, the savings it should bring about, or to similar or alternative applications.

(vi) The uncertainty related to the exponential cost increase for customisation, developing a bespoke application, and the integration of the application into existing systems/platforms. Both groups confirmed these costs to be exponential in most cases. Subscription or licence fees complicated this consideration for Application purchasers as these also increased exponentially in the case of some customised or bespoke digital products provided by large SaaS enterprise platforms/ecosystems. These Application developers confirmed that, due to the complexity of bespoke system development and updates, the costs were exponential.

(v) Provision for unforeseen costs such as hardware improvement to accommodate the application and (vi) the reality that the costs could not necessarily be recovered from tenants/clients even though the applications benefited them, complicated the Application purchasers' decision.

(vii) The possibility provided by some Application developers to commoditise the usage of their products in order to receive non-GLA income expedited the Application purchasers' decision. All participants confirmed that the true value of the applications was understood only after implementation when the results they achieved became evident.

(viii) The risk associated with delayed digitalisation was a general concern of property industry practitioners. Delaying the considerable expense was perceived to potentially result in the deterioration or failure of their businesses. This was often related to regulatory compliance requirements and the risk that human error posed which was greatly reduced by automated applications.

Biases That Occurred Related to Uncertainty and Resulting Reluctance

Thirteen biases were found related to uncertainty and reluctance (as described above) including:

a) *The Ambiguity effect/bias* that occurred in conjunction with the *familiarity bias* and *confirmation bias*: Application purchasers preferred to consider, recall, and select familiar unambiguous options (such as solar installations or a BMS) where they could measure the probability of a favourable outcome, rather than a digital application where the probability of a favourable outcome was difficult to measure. The ambiguous or uncertain outcome did not support their prior methods and views (e.g. the cost benefit analysis) and thus they often avoided the unknown, difficult to measure digital outcomes as a plausible alternative.

b) *Sunk cost fallacy*: Some Application purchasers were reluctant to incur the cost of digital applications to improve their processes by either upgrading or abandoning their prior, less effective methods (older un-integrated computer programs or hardware up-grades) as these had come at a cost.

c) *Anchoring and adjustment bias*: Some Application purchasers fixated on, or anchored to the cost of digital applications while failing to adjust their price perception by comparing the cost of the digital application to the costs of their previous (non-digital/non-integrated/free-standing) processes including the cost related to additional time these older/manual processes consumed. Application developers confirmed that this occurred frequently.

d) *System justification bias*: Some decision makers justified the decision to remain using their existing manual methods (or less efficient free-standing computer programs) since these were familiar and did not require capital expenditure.

e) *Law of the instrument bias or 'Maslow's hammer'* (loosely translated to 'when one has only a hammer, everything looks like a nail'): Application purchasers and developers testified to some industry practitioners' reliance on an available tool that resulted in foregoing the need to change.

f) C*ongruency bias*: This occurred when the Application purchasers' decision makers knew that alternative digital methods (or hypotheses) were present, yet preferred to continue testing their previous, often manual methods (initial hypothesis) trusting that these methods would repeat their initial results. These decisions occurred when the alternative digital methods could have disproved their assumption.

g) *Overestimation of the learning/experience curve*: Some Application purchaser decision makers overestimated the relationship between their experience, (e.g. to decrease the cost of their properties or to remain using siloed systems of software) and the related efficiency of the properties. They believed that remaining true to their experience or expertise would result in increased success rather than earnestly investigating alternatives (e.g. integrated SaaS solutions).

h) *The inverse Dunning-Kruger effect*: Some Application purchaser decision makers who had the required experience/knowledge, underestimated their own knowledge/experience, including their ability to make the right decision. Application developers indicated that their sales cycle varied between 1 month to more than a year due to the significant reluctance brought about by this effect and Application purchasers confirmed that the decision would remain on their agendas for an extended time as they kept on revisiting their decisions.

i) *Curse of knowledge bias*: Application developers were sometimes oblivious to the fact that the terminology they used, and their in-depth understanding of digitalisation in all its complexity, was not common knowledge to those outside their field in the real estate industry.

j) *The illusion of transparency*: This occurred when managers (both Application purchasers and developers) overestimated the extent to which they knew the mental state of their employees, and conversely how well employees were able to interpret the manager's mental state. Mental state includes not only the information conveyed but also beliefs, perceptions, emotions, and intentions. Tor example, one CEO was hopeful and believed that adopting the new application would truly benefit the organisation and employees, but that hope and belief had not been transparent, leaving employees sceptical about the application.

k) *The mere exposure effect/bias*: This bias related to Information Technology executives or Chief Information Officers as part of the Application purchasers' decision-making team. Often these individuals and their staff members preferred applications with uncomplicated back-end integration, or hosted in the same way as their current systems, merely because they were familiar with their own systems and preferred them over the unfamiliar. Both groups reported that these representatives often had inadequate knowledge and understanding of the property industry organisation's business processes and desired business outcomes. Most of the Application purchasers' firms interviewed had subsequently excluded them from the decision-making teams and presented integration to them as a necessary challenge.

l) *The anchoring and adjustment bias*: This bias also occurred when some Application purchasers' users of data generated by Automated Valuation Models (AVMs) anchored to the value/price provided by the AVM without

adjusting it in line with the particular property compared to the other properties on which the AVM valuation was based. This happened although the Application developer of this product provided training and cautioned against this possibility.

m) *Availability heuristics*: This heuristic occurred where the value provided by the AVM came to mind first as it was immediately available to the Application purchasers' staff and the potential purchasers or sellers of property. It could result in selling a property under its market value or paying more than market value when purchasing a property.

Biases Affecting Decision Makers With Mindsets Opposed to Change

The following sixteen biases and heuristics negatively impacted Application purchasers' decision makers who were set in their ways with mindsets opposed to change (to exploring new or alternative methods, processes, and systems) and increased their reluctance to digitalise or to adopt and adapt to newly introduced digital applications:

a) *Risk aversion*: Some Application purchasers' decision makers had been exceedingly hesitant to consider digitalisation due to the fear that it posed excessive risk. Application developers testified to this aversion that occurred even though their digital applications had proven track records in other real estate firms or when the risk was remarkably low.

b) *Status quo bias*: The conviction/belief of some Application purchasers' decision makers was that, based on past success, the firm's future success could best be achieved by remaining with trusted methods, procedures, routines, and systems rather than investigating digitalisation or more advanced SaaS integrated ecosystems.

c) *Belief bias*: This is defined as "the tendency in syllogistic reasoning to rely on prior beliefs rather than to fully obey logical principles" (Ding, *et al*., 2020, p. 1). Both prior beliefs and logical principles that apply to some, but not all cases were used by an Application purchaser's firm that had developed their own AI assisted big data analysis application. They encountered this bias when they started suspecting that human biases had been built into the AI. When human assumptions were biased, (e.g. the assumption that a particular property type or lease agreement attracted less risk which was true in some cases but not necessarily in all cases) the belief bias occurred. The AI could be corrected when the realisation occurred.

d) *Semmelweis reflex or effect*: When the success of digital initiatives in other industries became frequently visible in the media, some individuals priorly at the head of these Application purchasers' organisations completely rejected the notion that digitalisation could benefit their firms, displaying this heuristic as defined as "The knee-jerk reaction to reject new evidence because it contradicts established beliefs" (Semmelweis Foundation, 2022).

e) *Inertia* (Moradi et al., 2021): In firms where decision makers did succumb to the Semmelweis effect, the suggestions or recommendations to digitalise made by their employees, and the marketing attempts of Application developers were met with disapproval and firm rejection. Application

developers provided examples of how these Application purchasers belligerently rejected their applications.

f) *Illusion of invulnerability*: This occurred when previous group members of the Application purchasers' executive were excessively optimistic that the paradigm shift brought about by digitalisation would not affect them and thus took substantial risk by deciding not to digitalise.

g) *Dunning-Kruger effect*: Some property sector decision makers subsequently replaced by new executive members possessed vast knowledge and experience of the property industry, but very little knowledge and experience in the field of digitalisation and the potential benefits and advantages thereof. By rejecting digitalisation as a new 'fad' not beneficial to the property industry nor their organisations, they displayed this effect by overestimating their ability and knowledge.

h) *The omitted variable bias*: This bias described by Samadi (2018) contributed to the initial tendency of underestimating the impact of the rising tide of digitalisation in general, and in their industry in particular when some decision makers refused to consider digitalisation in spite of this fast-growing trend.

i) *Omission bias*: Some members of Application purchasers' decision-making teams succumbed to this bias when their attempts to provide input regarding digitalisation was not welcomed or met with defiance by other team members. This instilled the fear of being singled out. Thus, taking no further action (omission) was preferred over acting (commission). The fear was that, should the digital initiatives fail, their actions would be to blame. In these cases, Application developers lost the business opportunity as no one was willing to drive digitisation.

j) *Group attribution error/bias*: The bias arose when the attitudes, beliefs, or behaviour of an individual Application purchaser decision maker differed remarkably from that of the other members in the decision-making team and resulted in a unilateral decision. The other members assumed that the unilateral decision reflected the group's decision although their own decisions were different.

k) *Authority bias* and (l) *bandwagon effect*: By setting an example, decision makers at the head of their firms, who had proven themselves as authorities in the real estate industry, yet who were not interested in digitalisation had (occasionally unknowingly) introduced these biases. Their employees adopted their beliefs, attitudes, and behaviours, regardless of their own, and followed the leader's behavioural example and declarations.

m) *The ostrich effect*: This effect was confirmed when Application purchasers' decision makers experienced emotional discomfort and preferred to not notice or to forget the digitalisation process or the application that caused frustration, fear, or anxiety by simply ignoring it.

n) *Reactance* and (o) *the backfire effect*: Reactance occurred when a few employees of an Application purchaser felt that attempts were being made by their managers to persuade them to act against their personal beliefs (e.g. that the old system was the best solution), and that their freedom of choice was threatened when the new system was announced to become the only system. This happened despite change management, through training, motivation,

small gifts, and a prolonged period allowed for migrating to the new system. These employees simply refused to use the new system that their colleagues regarded as a substantial upgrade. They displayed a strong negative reaction by doing the opposite of what the employer tried to achieve. The backfire effect was encountered in a similar way namely that they believed their management had attempted to persuade them in trying to change their beliefs or convictions about the old system and they reacted by strengthening their beliefs, thus refusing to migrate.

p) *The Pseudocertainty effect*: This was encountered where perceptions influenced decision-making when an outcome might be perceived as certain, yet in multi-staged decision making the outcome is actually uncertain. People tend to disregard the evaluation of certainty of the first stage of decisions when they make their second or subsequent choice. The same employees that refused to migrate to the new system displayed a directional shift of preference between their first and second decisions. They first selected the risk-averse choice (remain using the old system) and then shifted their preference to the risk-seeking choice (refuse to use the new digital system that had become the only system). It is proposed that this result confirmed the predictions of Tversky and Kahneman (1981) as it observed a directional shift of preference between the two problems.

CONCLUSION

This study identified a number of biases that occurred during the real estate digitalisation decision process by using a mixed, but mostly qualitative method of data collection (through unstructured in-depth interviews) and analysis (code book developed manually and using the NVivo software package for coding). The purpose was not to measure the biases that hampered decision-making, but to provide sufficient evidence that the biases existed. Biases thus identified could in future be subjected to rigorous quantitative measurement through surveys and experiments to confirm the exact extent of occurrence and the extent to which they contributed in prolonging the reluctance or resistance to making decisions in the complexity surrounding these decisions.

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