Understanding factors affecting the managers' perception of AI applications in information processing

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Abstract: Artificial Intelligence (AI) bears great potential in supporting and/or replacing managers' information processing activities, but the benefits of AI can only be realized if the organisational managers are willing to use AI for information processing. The academic literature contains very limited theoretical and empirical research focusing on understanding the acceptance and applications of AI in manager's personal information processing. To address this knowledge gap, this work-in-progress paper aims to develop a conceptual framework on factors affecting the managers' perceived roles of AI in their information processing and their intention to use AI. Underpinned by the relevant theories of information processing, the research framework can be used to examine if and to what extent the situational, personal, and performative factors of information systems (IS) influence the managers' perception of AI-based applications in terms of preferred human-AI collaboration modes and levels of AI input in information processing activities. The proposed framework offers a theoretical understanding and development of AI-based applications in the context of information processing from an end user's perspective.

Key words: Artificial intelligence, information processing, AI-human collaboration, big data.

1. Introduction

With the increasing amount of data and information available in large volume, high velocity, and complex variety (big data), information processing, which includes acquiring, synthesizing, and making sense of information, forms an important and critical part of managers' organisational routine work. However, to effectively harness the value of big data, managers are constantly struggling to cope with the challenges associated with information processing. Artificial Intelligence (AI) bears great potential in supporting and/or replacing managers' information processing activities. Examples of AI implementation in information processing could include providing personal intelligent agents to automate information searching and filtering, providing alert of incoming important messages, analysing and synthesizing incoming information, or taking actions on the manager's behalf without human intervention (Duan, Ong, Xu, & Mathews, 2012). However, it is argued that information processing behaviour is inherently individual (Bawden & Robinson, 2013; Ong, Duan, & Xu, 2020), therefore the benefits of AI can only be realized if the organisational managers are willing to accept the benefit of human-AI collaboration and use AI for information processing, even allow AI to replace them, but the academic literature contains very limited theoretical and empirical research focusing on understanding the role and applications of AI in individual manager's information processing activities.

To address this knowledge gap, the paper reports a work-in-progress study that aims to develop and test a conceptual framework on factors affecting the managers' perception and intention to use AI. Underpinned by the relevant theories, the research framework attempts to examine if and to what extent the situational, personal, and performative factors of information systems (IS) influence the managers' perception of AI-based applications in terms of preferred human-AI collaboration modes and levels of AI input in information processing activities and their intention to use AI. In the proposed framework, the situational factors include the managers' level of responsibilities, perceived information processing challenges in their daily work, organizations' data driven culture, and IS facilitating conditions. The personal factors relate to managers' trust in AI and decision-making styles. The performative factor represents the perceived performativity of current information systems.

The proposed conceptual framework offers a theoretical understanding of AI-based applications in the context of information processing from an end user's perspective.

2. Literature review

The advancement of emerging information and communication technologies (ICTs) has enabled organisations to use various digital devices (e.g. Internet of Things) and communication channels (e.g. social media) to collect data in the form of big data. However, Managers in organisations are struggling to make sense and effectively utilise big data. For example, information overload has been recognised as a major challenge in information processing (Bawden & Robinson, 2009; Duan et al., 2012; Edmunds & Morris, 2000). Mintzberg (1973) studies managerial behavior and suggested information behavior is an essential part of managerial activities. Base on the relevant literature (e.g. Duan et al., 2012; Simon, 1960; Wilson, 1997), information processing is considered from a process perspective and defined in more details as below:

- Information acquisition includes information seeking which is solicited searching, or unsolicited receiving from information feeding and automated alerts. It includes receiving information from either pulling information, or being pushed information.
- Information synthesis and analysis includes data integration, data filtering, data manipulation and analysis of data from simple comparison, to statistics and comprehensive analytics.
- Making sense of information includes understanding and interpreting information often leading to action taking e.g. decision making or enhancing individual or collective organization learning.

Based on Cao, Duan, Edwards, and Dwivedi (2021), AI for this research is defined as the use of machines or systems to do things that would require intelligence if done by humans. AI has become revitalised due to Big Data, advanced algorithms, and improved computing power and storage (Duan, Edwards, & Dwivedi, 2019) and AI systems are becoming an embedded element of almost all digital systems. AI is undertaking more complex tasks that require cognitive capabilities which previously seemed impossible (Mahroof, 2019) and believed to be able to help employees to reach better decisions, to boost our analytic and decision-making abilities and heighten creativity (Wilson & Daugherty, 2018). Miller (2018) calls for the rethink of "how humans and machines need to work symbiotically to augment and enhance each other's capabilities." (page 2). However, only 10% of companies obtain significant financial benefits with AI (Ransbotham, Khodabandeh et al. 2020). It is argued that "The Key to Success With AI Is Human-Machine Collaboration" and companies that emphasize collaboration between AI and human workers are best positioned for success"(Ryder, 2021).

According to Ransbotham et al. (2020), there are five modes of Human- AI collaboration ranging from human leads to AI leads:

1. AI generates insights, human uses them in a decision process
2. Human generates, AI evaluates
3. AI recommends, human decides
4. AI decides, human implements
5. AI decides and implements

Based on the literature review regarding information processing challenges in the era of big data and the potential of AI in information processing through human-AI collaboration, the following section proposes a framework to investigate the organisational managers perceived AI roles in information processing, their intention to use AI, and the factors affecting their perception and intention.

3. Framework development

AI has great potential to deal with the information processing challenges in the era of big data and support human information processing processes. However, would organisational managers accept and use AI in their information processing? More importantly, what are the factors affecting their perception and intention to use AI? What are their perceived roles of AI in their information processing? To addresses questions, this study first develops a conceptual framework, and it will then test it using empirical evidence.

Over the last few decades, various theories and models have been developed and improved to explain and predict the acceptance and use of the new technologies (Cao et al., 2021). One of the most widely used models is unified theory of acceptance and use of technology (UTAUT) (Venkatesh & Davis, 2000). However, due to AI's

unique feature, which is its ability to completely replace human and automate their work, the existing adoption model has its limitation when applying them to understand the human user's intention to accept AI. In searching relevant work on understanding factors affecting AI adoption, this study finds a relevant work on understanding the failure of decision support systems that increasingly take advantages of big data by Aversa, Cabantous, and Haefliger (2018). Their research integrates the decision maker as well as the organizational and material context and identifies three interrelated sources of strategic failure that are worth investigation for decision-makers using decision support systems and big data: these include: (1) the situated nature and affordances of decision-making; (2) the distributed nature of cognition in decision-making; and (3) the performativity of the DSS. Inspired by Aversa et al. (2018)'s work on decision support systems, this study develops a conceptual framework for using AI in information processing from situational, personal and performative perspectives. This proposed framework adapts the three dimensional views by Aversa et al. (2018) and includes the relevant constructs from UTAUT model. As shown in figure 1, the framework include: Situational factor, e.g. information processing challenges, facilitating conditions, organizational culture, Level of managerial responsibility; Personal factors, e.g. decision making style and trust of AI; and Performative factor, e.g. Perceived Performativity of the current information processing systems. The proposed framework can be used as a theoretical base for the empirical investigation using quantitative and/or qualitative method.

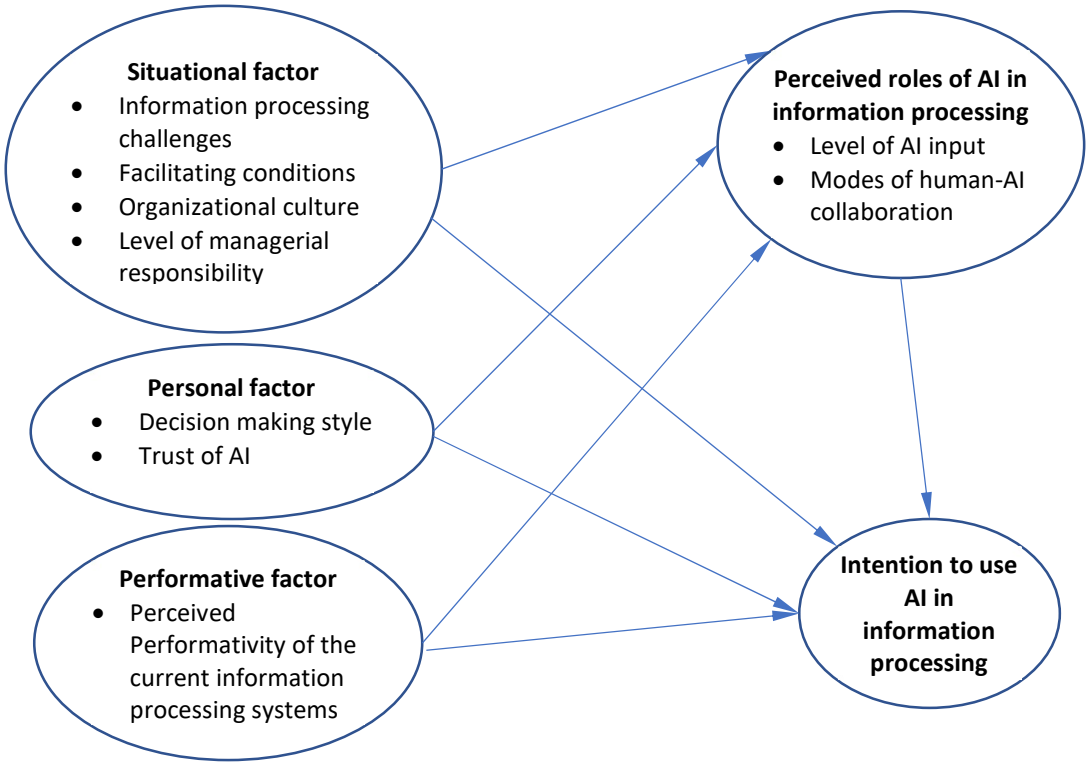

Figure 1. Research framework

4. Work in progress and expected contributions

This is an ongoing research. A quantitative research method using questionnaire survey is employed to test the framework. A survey questionnaire is developed and used to collect data from a sample of UK organisational managers. A total of 153 valid responses are collected. The study is currently processing and analysing empirical data to test research hypotheses and validate and revise the research framework. Findings will be published in the future. At the end of this research, it is expected to reduce the knowledge gaps regarding AI applications in addressing information processing challenges in organisations by making the following contributions:

- A clarification on the concept of AI-Human collaboration in information process in the era of big data.
- A conceptual framework to examine if and to what extent the situational, personal, and performative factors of information systems (IS) influence the managers' perception of AI-based applications in

terms of preferred human-AI collaboration modes and levels of AI input in information processing activities.

- New constructs and measures for information processing challenges and perceived roles of AI in terms of the level of AI inputs and the modes of human-AI collaboration in information processing.
- New empirical evidence and insights on managers perceived information processing challenges, trust of AI and AI roles and human-AI collaboration modes.

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