A Conceptual Exploration of Digital Trust

Developmental Paper

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Abstract

The current developmental paper aims to explore the concept of digital trust and identify related themes that will help to contribute to richer insights about trust within the digital era. Existing literature is reviewed using the semi-systematic review approach; this led to the identification of three themes linking digital trust to the sharing economy, industry 4.0, and the digitalised workplace. These contribute to the conceptual exploration of digital trust and implications for further research.

Keywords: Digital Trust, Industry 4.0, Digitalised Workplace, Literature Review, Conceptual Analysis

Introduction

There is no doubt that digitalisation has been an embedded part of both work and social aspects of our life. At the same time, with the increased acceleration of digital transformation across a range of sectors, there is a greater need to develop a better understanding of trust in the digital setting or *digital trust*. Researchers have already posited that digital trust "…is an inescapable topic in the digital society" (Guo, 2022, pp. 1), and that without this "… no business transactions take place [and] no new technology is adopted (Casare *et al.,* 2021, pp. 108). Nevertheless, despite this recognition on the relevance and significance of digital trust in a highly digitalised society, there is lack of a clear or united definition of what digital trust is and the contexts in which it unfolds. As Shin (2019, pp. 1) demonstrates: "while it is obvious that trust matters in digital contexts, there has been a lack of clarity about what trust is [and] how it develops."

Past research has shown that "the relationship between technology and trust is not a simple one and warrants investigation" (Nandhakumar *et al.,* 2004, pp. 20). With an increased reliance on digital technologies that influence individual, organisational and societal experiences, behaviours, and practices, we argue for the need to study digital trust, which we broadly define as trust which is related to digital phenomena. Yet, there is no single and accepted definition of digital trust, despite the increasing number of publications written on the subject (Pietrzak and Takala, 2021). Within this exploratory, developmental paper we explore research that has so far been conducted on the subject of digital trust, arguing for the need for an expansive and comprehensive conceptualisation. We contribute a more extensive, cross-disciplinary, and contemporary literature review than those that have been previously published (e.g.

Pietrzak and Takala, 2021; Guo, 2022). We seek to do this in order to better understand what digital trust is, how it develops, and how it has been previously defined. The aim of this work is to provide the conceptual groundwork for establishing a more encompassing and usable definition of digital trust. This will then underpin a future empirical study in which we will test the suitability and applicability of digital trust by taking account of different dimensions and different scenarios and settings.

In what follows we present the method adopted in exploring the literature on this topic, and then we proceed by discussing the key findings of this review in terms of the core emerging categories. We conclude with our own conceptualisation of digital trust and areas for future research.

Methodology

Our review was influenced by the state of the art, semi-systematic literature review approach (Grant and Booth, 2009) which offers *"the ability to map a field of research, synthesise the state of knowledge, and create an agenda for further research"* (Snyder, 2019, p. 335); and *"new perspectives on an issue"* (Grant and Booth, 2009, p. 105), making it appropriate for exploratory studies (e.g. Chamakiotis, Panteli and Davison, 2022). In contrast to the Systematic Literature Review (SLR) method which requires strict rules and specific inclusion/exclusion criteria which are needed to define the review process, our research was guided by the following criteria: a cross-disciplinary *field of study* (i.e., information systems, information security and human-computer interaction); *source* (i.e., peer-reviewed journal articles; conference papers; industry reports); and *topic* (i.e., digital trust, trust in digital era, trust and digitalisation). A total

of 22 academic papers (see Table 1 in Appendix) and several non-academic sources (e.g. industry report and policy brief) were reviewed.

Three core themes were identified from our review of existing literature on digital trust. These are in relation to the sharing economy, industry 4.0 and the digitalised workplace. We present these below.

Digital Trust in the Sharing economy

Some of the most cited work that is written about digital trust concerns platforms in the digital sharing economy; these are platforms that allow users to share resources, such as ride-share or rent spare rooms (AirBnB, Uber etc.). Much of this research considers how the platforms disrupt the previous understandings of trust and allow for its development in new ways. Mazella *et al.* (2016) do not directly define digital trust but explore how trust is generated and expanded within the context of the ridesharing platforms and the wider digital economy. The authors draw on empirical data to come up with a framework which they call DREAMS (Declared, Rated, Engaged, Moderated, Social) for how trust is generated within such sharing platforms. Möhlmann (2016) similarly explores how trust is developed within the platform AirBnB. They investigate trust management measures that such platforms use to build consumer trust both in the platform and between peers on the platform. According to Mazella et al. (2016), trust is hierarchical in this environment with trust first needing to be built with the platform but demonstrate that platform trust has a positive impact on peer-to-peer trust. Wang and Jeong (2018) furthered this work whilst also utilising the example of AirBnB. These researchers use the term e-trust as opposed to digital trust; according to them "e-trust means general beliefs in online service providers that result in behavioural intentions" (Wang and Jeong, 2018, pp. 163). They examine trust as a wider investigation on the

AirBnB experience and hypothesise that the trust people have in the platform positively impacts their attitudes towards the website, and therefore their overall experience. Sundararajan (2019) sought to understand where consumer trust originates from within digital services. Their work alludes to digital trust as trust that originates in digital settings: "A typical digital trust system provided by a platform may include peer feedback through a reputation system that allows customers and providers to learn from one another's experiences" (pp.34). Ko *et al.* (2022) builds on this, arguing that digital trust the extent that customers perceive the organisation and the platform to be reliable and credible within relevant validating institutions. Each of these definitions explores digital trust, but only in the limited context of online sharing platforms.

Digital trust and Industry 4.0

Industry 4.0 is an umbrella term for the technologies that have "…accelerated the pace of technological transformation and internationalization of businesses" (Mubarak and Petraite, 2020). It includes technology such as artificial intelligence, blockchain, and Internet of Things. Within this context, digital trust has been discussed in several, largely technical, papers with reference to these emerging technologies. Shin (2019) designs a conceptual framework for digital trust utilising blockchain technology as the example, ultimately arguing that digital trust is governed by contextual, individual factors, alongside the technology involved in the exchange. Comparatively, Mubarak and Petraite (2020) saw industry 4.0 technologies as enabling digital trust, impacting trust relationships by providing a reliable and trustworthy environment for business stakeholders to interact. They define digital trust "…as stakeholders' trust in the ability of actors, technologies, and processes to build a reliable and secure business network (Guo, 2022). Elsewhere, Kozhevnikov and Korolev (2018) argue that digital trust

comes from the interpretations made about their data footprint and what an autonomous agent reviewing potential customers can understand about that person's trustworthiness. Thus, digital trust exists between the person and the autonomous agent and is successfully established when the agent can sufficiently predict and meet their needs by committing transactions on their behalf. From a computational perspective, Akram and Ko (2014) simply explain that digital trust is "trust established using technological means."

Digital Trust and the Digitalised Workplace

Digital technologies enable organisations to redesign not just their workplaces, but also how and where their employees work. Though digitally dependent and enabled, the digitalised workplace is not just a technological phenomenon, but rather an organisational (Panteli et al., 2022), with trust being a critical factors for its effectiveness. Within this context, researchers have examined not just the development of trust, but also its preservation. For example, Panteli et al. (2022), in their study of trust in the enforced remote work context following Covid-19, found that trust preservation encompassed a shared understanding of the situation that both employees and managers were in, the disruption to their normal work environment and even the need for new monitoring practices.

Marcial and Launer (2019; 2021) have written a series of papers on how to quantify digital trust in the workplace, including with other co-authors (Çetin and Launer, 2021; Çetin *et al.,* 2022; Marcial *et al.,* 2022; Launer *et al.,* 2022). The authors do not directly define digital trust, but utilise a definition made within a 2018 PWC global trust survey: "…the level of confidence in people, process, and technology to build a secure digital

world" (Joyce, 2018, npp., quoted in Çetin *et al.,* 2022). Although they do not directly define digital trust, the input-output model they present in their 2019 paper provides insight into the factors they feel impact its development, and the impacts it has on an organisation. in the central part of the model are the three components they identify as the drivers for confidence in digital technology within the workplace: people, technology, and process. The authors measure a variety of subcomponents of these three drivers could collectively provide a measurement of digital trust within the workplace. In later papers on the subject, Çetin et al., (2022, pp. 229) argue that the empirical study of digital trust has so far remained limited, claiming that the definition and management of digital trust "still need to be developed and researched especially when taking into consideration different countries."

Existing understandings of Digital Trust

Our literature review identified three papers in which researchers attempted to define or explore the meaning of digital trust. Perhaps the most comprehensive of these is by Guo (2022, pp. 2) whose study demonstrates that "digital trust is a new trust relationship among governments, individuals, enterprises, and society in the Internet Age. It is the reconstruction of the social trust model in the digital economy." Further, Rowley and Johnson (2013) referred to digital trust as being people's trust decisions when it comes to information from digital sources. Finally, in a paper by Pink *et al.* (2018), though a clear definition is not provided, researchers refer to what this it is not. In particular, their view is that digital trust is in opposition to or the remediation for digital anxiety, which may be caused by the lack of certainty and control that users have in digital environments.

Research exists that though has a focus on digital trust, it does not always directly define the term and what the authors mean by it. This is the case with Levine (2019) who theorises how trust is established and governs the exchanges that take place between digital businesses. There is a heightened need for trust in these settings as there is an increased risk within the interactions. Businesses must therefore act in a trustworthy manner in order to be trusted so they can take part in exchanges, which, in turn, produce trust and cooperation. Leonard (2018) also does not define digital trust, but studies how digital trust can be built or eroded in different settings and gives examples of where this may occur. Finally, Dwyer *et al.* (2013) argues about the importance of distrust in conceptualisations of digital trust, by which they mean trust decisions made in a digital environment or involving technology.

Where authors of conceptual papers do define digital trust, there is yet again, no united definition. Chon et al. (2019) describes it as "an umbrella term we use to describe the behavioural guidelines and cultural principles that include data privacy, security, protection, and stewardship." Comparatively, Ting *et al.* (2021) contends that digital trust utilises "evidence and implicit knowledge about the digital environment for reasoning and decision-making, like social trust, digital trust uses inductive knowledge and faith." They define it, borrowing partly from others, as a quantifiable belief or confidence that is based on past experience and an expectation for the future.

Re-conceptualisation of Digital Trust and Implications for Further Research

The review of existing literature has shown that there is no uniformity of approach or definition of digital trust. Similarly, there appears not to be an appreciation of what

makes trust different in digital settings or when trust is also required to be put in digital technology, or what kinds of technological tools or processes may help to build trust. Overall, a more comprehensive definition of digital trust is needed that can bring together these definitions and bring some uniformity and clarity about what it means.

In this study, we draw on these definitions to define *Digital Trust* as the degree of confidence that one has in a) interacting with others on digital platforms and other technology-mediated environments, b) in using specific digital technologies and those that design them, and c) in being part of digital settings such as workplaces, organisations and society. Our position is that this definition is more comprehensive than existing ones as it includes the different contents identified in our semi-systematic literature review; the definition therefore contributes to the integration and unification of different understandings rather than their dismissal and therefore more likely to be widely adopted in future studies in this area.

Our next steps are to continue this literature review and include papers that explore trust within digital settings but may not define this specifically as 'digital trust'. We will also provide a more detailed examination of the papers identified within our initial literature search. Finally, we will seek to identify some key dimensions that shape people's perceptions of digital trust, and test these within a cross-country comparative empirical study.

References

Akram R.N. and Ko, R.K.L. Digital Trust - Trusted Computing and Beyond: A Position Paper, *2014 IEEE 13th International Conference on Trust, Security and Privacy in Computing and Communications*, 884-892.

Chon, A., Sims, R. R. Daultrey, S., Buff, A. & Fealey, A. (2019) How digital trust drives culture change." *MIT Sloan Management Review,* 60(3) (2019).

Çetin, F., Paliszkiewicz, J., & Launer, M. (2022). Digital Trust in the Workplace: Testing on the Chinese, German, and US Samples. *Trust and Digital Business: Theory and Practice*, 229-244.

Chamakiotis, P., Panteli, N., & Davison, R. M. (2021). Reimagining e-leadership for reconfigured virtual teams due to Covid-19. *International Journal of Information Management*, *60*, 102381.

Davenport, T.H. & Prusak, L., (1998). Working Knowledge: How Organisations Manage What They Know. Cambridge, MA: Harvard Business School Press.

Dodgson, M., (1993). Learning, Trust And Technological Collaboration. Human Relations. 46(1), 77-95.

Dwyer, Basu, A., & Marsh, S. (2013). Reflections on Measuring the Trust Empowerment Potential of a Digital Environment. *Trust Management VII,* 127–135.

Grant, M. J., & Booth, A. (2009). A typology of reviews: An analysis of 14 review types and associated methodologies. *Health Information & Libraries Journal*, *26*(2), 91–108. https://doi.org/10.1111/j.1471-1842.2009.00848.x

Guo, Y. (2022) Digital Trust and the Reconstruction of Trust in the Digital Society: An Integrated Model Based on Trust Theory and Expectation Confirmation Theory. *Digital Government: Research and Practice.*

Joyce, S. (2018) Introducing Digital Trust Insights Fall 2018, *Digital Trust Insights,* Quoted in, Çetin, F., Paliszkiewicz, J., & Launer, M. (2022). Digital Trust in the Workplace: Testing on the Chinese, German, and US Samples. *Trust and Digital Business: Theory and Practice*, 229-244.

Kanter, R.M., (1994). Collaborative advantage: successful partnerships manage the relationships, not just the deal. Harvard Business Review. July-August, 98-108.

Ko, G., Amankwah-Amoah, J., Appiah, G., & Larimo, J. (2022). Non-market strategies and building digital trust in sharing economy platforms. *Journal of International Management*, *28*(1), 1-15.

Kozhevnikov, D. E., & Korolev, A. S. (2018). Digital trust as a basis for the digital transformation of the enterprise and economy. In *2018 Eleventh International Conference Management of large-scale system development,* 1-3.

Launer, M. A., & Cetin, F. (2021). Exploring Digital Trust in Hotel Supply Chain: A Primary Research From the Hotel, Restaurant & Tourism Industry. *Co-Editors*, 207.

Launer, M., Çetin, F., & Paliszkiewicz, J. (2022). Digital trust in the workplace: Testing a new instrument on a multicultural sample. In *Forum Scientiae Oeconomia*, Vol. 10(1), 30-47.

Leonard, P. G. (2018). Social licence and digital trust in data-driven applications and AI: a problem statement and possible solutions. *Available at SSRN 3261228,* 1-12.

Levine, L. (2019). Digital trust and cooperation with an integrative digital social contract. *Journal of Business Ethics*, *160*(2), 393-407.

Luhmann, N. (1979). Trust and Power. London: John Wiley and Sons

Marcial, D. E., & Launer, M. A. (2019). Towards the measurement of digital trust in the workplace: A proposed framework. *International Journal of Scientific Engineering and Science*, *3*(12), 1-7.

Marcial, D. E., Palama, J. C., Maypa, A. L., & Launer, M. A. (2022). Responsible Digital Citizenship: A Measurement Of Trust In The World Wide Web. *Webology*, *19*(2), 1-17.

Marcial, D., & Launer, M. (2021). Test-retest Reliability and Internal Consistency of the Survey Questionnaire on Digital Trust in the Workplace. *Solid State Technology*, 64(2), 4369-4381.

Nandhakumar, J., Panteli, N., Powell, P., & Vidgen, R. (2004). Trust in the digital era. In *Social and economic transformation in the digital era* (pp. 77-94). IGI Global.

Mayer, R.C., Davis, J.H. & Schorman, F.D., (1995). An Integrative Model of Organizational Trust. Academy of Management Journal. 20(3), 709-734.

Mazzella, F., Sundararajan, A., d'Espous, V. B., & Möhlmann, M. (2016). How digital trust powers the sharing economy. *IESE Business Review*, *26*(5), 24-31.
Möhlmann, M. (2016). Digital trust and peer-to-peer collaborative consumption platforms: A mediation analysis. *Available at SSRN 2813367*, 1-38.

Mubarak, & Petraite, M. (2020). Industry 4.0 technologies, digital trust and technological orientation: What matters in open innovation? *Technological Forecasting & Social Change*, *161*, 1-11.

Panteli, N., Giæver, F., & Engesmo, J. (2022). Guest editorial: Emotions in the digitalised workplace. *Information Technology & People*, *35*(6), 1677-1692.

Panteli, N., Nurse, J. R., Collins, E., & Williams, N. (2022). Trust disruption and preservation in the Covid-19 work from home context. *Journal of Workplace Learning*, (ahead-of-print).

Pink, Lanzeni, D., & Horst, H. (2018). Data anxieties: Finding trust in everyday digital mess. *Big Data & Society*, *5*(1), 1-14.

Rowley, & Johnson, F. (2013). Understanding trust formation in digital information sources: The case of Wikipedia. *Journal of Information Science*, *39*(4), 494–508.

Shin. (2019). Blockchain: The emerging technology of digital trust. *Telematics and Informatics*, *45*, 1-11.

Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research*, *104*, 333–339. https://doi.org/10.1016/j.jbusres.2019.07.039

Sundararajan. (2019). Commentary: The Twilight of Brand and Consumerism? Digital Trust, Cultural Meaning, and the Quest for Connection in the Sharing Economy. *Journal of Marketing*, 83(5), 32–35.

Ting, Kang, X., Li, T., Wang, H., & Chu, C.-K. (2021). On the Trust and Trust Modeling for the Future Fully-Connected Digital World: A Comprehensive Study. *IEEE Access*, 9, 106743–106783.

Wang, & Jeong, M. (2018). What makes you choose Airbnb again? An examination of users' perceptions toward the website and their stay. International Journal of Hospitality, 74, 162-170.

Appendix:

Table 1: Academic Sources used in Semi-Systematic Literature Review

	Authors	Type of Paper	Journal	Reference to Digital Trust
1	Levine, 2019.	Conceptual	Journal of Business Ethics	Does not directly define trust but theorises how trust is established and governs the exchanges that take place between digital businesses. There is a heightened need for trust in these settings as there is an increased risk within the interactions. Businesses act trustworthy in order to be trusted (so they can take part in exchanges) which produces trust and cooperation.
2	Leonard, 2018.	Conceptual, social.	SSRN	Not directly defined. Explores how digital trust can be built and eroded in different settings e.g., governments, technology companies, etc. and how things like poor privacies practices erode trust between the two parties. Paper largely discusses uses of personal data.
3	Chon *et al.,* 2019.	Conceptual.	MIT Sloan Management Review	"An umbrella term we use to describe the behavioural guidelines and cultural principles that include data privacy, security, protection, and stewardship."

4	Dwyer et al., 2013.	Conceptual, social.	Trust Management	Not specifically defined but argue that distrust is as equally important for conceptualisation of digital trust in preventing people from making harmful decisions. Again, relating digital trust to trust decisions made in digital environments or involving technology. "…outlining the challenges when evaluating digital applications that assist users to negotiate on the user's own terms with other people and organisations."
5	Ting et al., 2021.	Conceptual, technical.	IEEE Access	"Digital trust uses evidence and implicit knowledge about the digital environment for reasoning and decision-making, like social trust, digital trust uses inductive knowledge and faith." They define it, borrowing partly from others, as a quantifiable belief or confidence that is based on past experience and an expectation for the future.
6	Ko *et al.,* 2022.	Conceptual.	Journal of International Management	How digital sharing platforms can build trust and borrows Sundararajan's (2019) definition.
7	Pink *et al.,* 2018.	Empirical, qualitative, social, cross-location ethnography	Big Data & Society	Not defined but relates to trust in a digital world and the technology we engage with. Social conceptualisation of digital trust. Conceptualised in opposition to, or remediation for digital anxiety (lack of certainty and control in digital environments where the digital element adds risk)
8	Guo, 2022.	Empirical, quantitative, survey (n=531).	Digital Government: Research and Practice.	"Digital trust is a new trust relationship among governments, individuals, enterprises, and society in the Internet Age. It is the reconstruction of the social trust model in the digital economy." "…digital trust affects the development of political, economic, cultural, and social activities in the digital society…people need to build trust in digital governments and transfer trust to the digital world through the intermediary of technology."
9	Rowley & Johnson, 2013.	Empirical, social, survey, deductive experiment (n=50).	Journal of Information Science	Define digital trust as relating to people's trust decisions when it comes to information from digital sources.

10	Çetin *et al.*, 2022.	Empirical, quantitative, survey.	Book: Trust and Digital Business: Theory and Practice	"Digital trust appears in environments where physical and direct contacts do not occur, and digital devices mediate interactions."
11	Launer *et al.*, 2021	Empirical, quantitative	Co-Editors	As above.
12	Launer *et al.*, 2022	Empirical, quantitative	Oeceonomia	As above.
13	Marcial & Launer, 2021	Conceptual, quantitative	Solid State Technology	Not directly defined but seems to relate to employee trust in the digital technologies and processes within the workplace, as in their paper above.
14	Marcial & Launer, 2019.	Conceptual, quantitative	International Journal of Scientific Engineering and Science	Do not define digital trust but allude to it using three industry definitions. Produce an input-output model framework for quantifying digital trust in the workplace by measuring three components: people, technology, and process, and six interrelated variables, which they argue, are the three drivers of confidence in digital technology among employees.
15	Marcial *et al.*, 2022	Conceptual, quantitative	Webology	As above.
16	Shin, 2019.	Empirical, quantitative, survey (presurvey n=20, pretest n=43, survey n=391).	Telematics and Informatics	Designed a conceptual framework for what constitutes digital trust and why it matters, using blockchain technologies as example. Argues that digital trust sits within and is governed by contextual factors, individual factors, and the technology involved and these collectively "determine the quality of interactions between two parties using a blockchain medium."
17	Mubarak & Petraite, 2020.	Empirical, quantitative, survey (n=324)	Technological Forecasting & Social Change	"…as stakeholders' trust in the ability of actors, technologies, and processes to build a reliable and secure business network. They found that digital trust significantly improves open innovation." (Guo, 2022). Saw new technologies such as blockchain and AI (Industry 4.0) will have an impact on trust relationships.
18	Kozhevnikov & Korolev, 2018.	Conceptual, technical.	International Conference on Management of Large-Scale System Development (MLSD)	Arguing that the digital economy which is now based on collecting information about individuals and their purchasing habits, reviews left etc., creates a digital twin and this can be used to make

				automated decisions about whether that person can be trusted, and to anticipate both the buyer's and seller's needs. Digital trust exists between the person and the autonomous agent. Trust is built between the person and the agent when the agent can sufficiently predict and meet their needs by committing transactions on their behalf.
19	Akram & Ko, 2014.	Conceptual, technical	International Conference on Trust, Security and Privacy in Computing and Communications	"trust established using technological means."
20	Mazella *et al.*, 2016.	Empirical, quantitative, survey.	IESE Business Review	Not directly defined but the authors suggest that platforms are how trust is generated and expanded within the digital sharing economy, suggesting that there are new sources of trust available within it. Also demonstrate that users within Digital Sharing Economy became more trusting in their wider life from their DSE participation.
21	Sundararajan, 2019.	Conceptual, qualitative	Journal of Marketing	"…the extent to which customers perceive the platform provider business to be reliable and the digital platform to hold credible standing among relevant validating organizations." (Ko, 2022, pp. 2).
22	Möhlmann, 2016.	Empirical, social, quantitative 3 studies: Trustpilot data analysis, Survey n=232, survey n=462)	SSRN	Not directly defined by discusses how trust is developed in the sharing economy and how platforms build trust between peers, and with peers and the platform.