From Adoption to Endurance: Exploring the Dynamics of General-Purpose AI Adoption Across Time and Contexts

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Abstract

This research project aims to explore the dynamics of AI adoption within organizational contexts, focusing on the interplay of context and time in shaping users' attitudes and behaviors towards general-purpose (GP) AI technologies. Through a comprehensive investigation involving empirical studies and an extensive review of existing literature, our objective is to formulate a GPAI Endurance Theory capturing sustained interactions with GPAI across various contexts and extended timeframes, transcending the limitations of conventional adoption theories' static nature. By delving into the recursive impact of previous AI usage on subsequent adoption, analyzing contextual factors, and considering temporal variations, we seek to provide organizations with valuable insights to facilitate the successful integration and long-term acceptance of GPAI-based components within their information systems (IS). This understanding will ultimately contribute to a deeper understanding of human-AI interactions in organizational settings and inform the future design and development of GPAI-based IS.

Keywords

General-Purpose Artificial Intelligence, Artificial General Intelligence, Adoption, Usage Context, Dynamic Adoption, GPAI Endurance

1. Context & Motivation

Artificial intelligence (AI) is increasingly integrated into various components of information systems (IS), serving analytical, predictive, or recommendation purposes [1]. This trend is driven by the growing accessibility of AI technologies, resulting in a technological shift that requires an increasing day-to-day collaboration between IT specialists and intelligent software. Users within organizations are now encountering a multitude of AI-based technologies in the systems they use, ranging from recommendation chatbots to automatic components of assembly lines. This shift requires a coexistence with AI technologies in the day-to-day work life of organization's workers.

Currently, researchers and practitioners are increasingly considering the adoption of a novel type of AI technology in the workplace, known as General-Purpose AI (GPAI). These technologies possess unique characteristics, such as self-learning and improvement capabilities, and notably, the ability to operate in contexts beyond their initial training. Generative Artificial Intelligence (GenAI) is a primary example of GPAI, capable of generating new data

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(text, images, audio) based on its training data and user interactions [2]. With its generative capabilities, GenAI significantly impacts how individuals work and engage with AI systems. It transcends traditional discriminant tasks, enabling engagement in more creative endeavors, thereby evolving from a mere tool to an actual entity within socio-technical systems [2]. Understanding user reactions, interactions, and adoption of GenAI (and GPAI more broadly) is paramount for ensuring successful implementation, as emphasized in previous studies [3, 2]. Understanding the factors influencing the ultimate decision of IS users to utilize GPAI-based IS is paramount for informed future system design and engineering. This understanding aims to boost adoption rates and ensure sustained usage over time and across diverse contexts of innovative GPAI-driven IS.

The exploration of individual technology acceptance is not a new endeavor; researchers have already delved into this, producing well established models like the Technology Acceptance Model (TAM) [4], the Unified Theory of Acceptance and Use of Technology (UTAUT) [5], and their declinations such as UTAUT-2 [6] and TAM-3 [7], to mention just a few. These models helped understanding and predicting technology adoption, considering various socio-technical factors such as perceived ease of use, age, or facilitating conditions for example. Nevertheless, intelligent technologies introduce a new set of factors, such as prediction quality and system form, which have not yet been thoroughly discussed within existing models [8]. These new factors, specific to AI, have a notable impact on users' attitude towards AI that traditional acceptance models fail to accurately capture, reducing their precision in measuring AI acceptance and their applicability to modern corporate settings. As a response, alternative acceptance models building upon TAM or UTAUT have been proposed, specifically tailored to gain knowledge on AI adoption [8, 9]. These models address a portion of the prior research gap by quantifying the acceptance of AI within distinct contexts and analyzing context-specific variables that influence the adoption of AI. For instance, Gursoy et al. delve into the factors influencing AI adoption within the customer service context in [8], whereas Cao et al. in [9] examine AI adoption within the framework of managerial decision-making contexts. Yet, in focusing solely on AI adoption within specific contexts, these models are constrained to identical scenarios, lacking the capability to assess an overall level of AI acceptance across different settings of an organization. This stands in stark contrast to emerging GPAI technologies, particularly GenAI technologies such as Large Language Models (LLMs), which are inherently "generalist" by design, intended for use across various contexts, e.g., ChatGPT which is applicable in diverse contexts, accommodating a wide array of tasks and business settings.

The underlying principles of GPAI technologies, such as GenAI, indeed revolve around their capacity to address a wide range of tasks across various contexts. As inherently versatile systems, they can be applied repeatedly to tackle different challenges. This characteristic necessitates a nuanced approach to studying the adoption and usage of such technologies, taking into account the dimensions of **context** and **time**. The adoption and usage behavior of GPAI technologies may exhibit significant variability across different contexts and over time through factors such as fatigue effects or fluctuations in learning curves, to cite only them.

Put together, these new dimensions suggest much more than an increment on existing adoption models and will bring us to the formalization of a new paradigm for intelligent technology adoption. Instead of adoption, we plan to investigate the introduction of a novel, more suited, concept called "AI endurance", which will refer to the ability of human users to

interact with and utilize general-purpose intelligent technologies over extended periods and across various contexts effectively. It will encompass traditional aspects of technology adoption such as user satisfaction, engagement, and usability over time but would also consider how users' experiences and interactions with GPAI technologies evolve over prolonged usage, including factors such as user fatigue, cognitive load, learning curve, and adaptation to evolving GPAI capabilities or interfaces. In essence, it will reflect the sustainability of users' engagement and satisfaction with AI systems throughout their usage journey. In addition to achieving a clear understanding of workers' usage behaviors, acceptance, and adoption of GPAI technologies, this research is also aimed at informing the design of GPAI-supported IS. It will achieve this by delineating a set of requirements for the design and engineering of GPAI-supported IS, grounded on knowledge about users' behavior and attitude, sustaining their usability across various contexts and over time. These requirements will subsequently undergo a validation phase to ensure their efficacy and relevance.

2. State of the Art

Numerous studies have investigated technology acceptance and adoption models, with the Technology Acceptance Model (TAM) serving as a foundational precursor in this domain. The TAM posits that actual system usage hinges on behavioral intention, influenced by perceived usefulness and ease of use [4]. Building upon TAM, the Unified Theory of Acceptance and Use of Technology (UTAUT) incorporates personal factors like gender, age, experience, and voluntariness of use to mediate the impact of expected performance and effort, social influence, and facilitating conditions on behavioral intention [5]. TAM and UTAUT have then been extended to fit different contexts of use with for example UTAUT 2 [6] and TAM-3 [7], which consider additional variable impacting the final behavioral intention to use and an additional set of moderating variables. While these models laid the groundwork for technology adoption modeling, they primarily focused on non-intelligent technology, reducing their applicability to assessing user attitudes towards AI technologies. AI technologies indeed possess specific characteristics unaccounted for in traditional acceptance models, such as prediction quality, anthropomorphism in conversation, and empathy, all influencing final user adoption [8].

In response to these limitations, AI-specific models were developed, grounded in their predecessors [8, 9, 10]. However, these models were designed to capture AI adoption and resistance within specific contexts, such as service delivery [8], managerial decision-making [9], or operation management [10]. While these models enhance AI attitude comprehension by considering aspects like anthropomorphism or model quality, none has proposed a cross-contextual measure of AI adoption at a higher-level. Moreover, we noticed a notable gap in research concerning the prolonged adoption of AI technologies. Particularly, within the realm of versatile technologies like contemporary GPAI, the notion of adoption may exhibit fluctuations over an extended timeframe. Individuals might initially embrace the technology, but as time progresses, they could experience fatigue or a shift towards resistance. Additionally, the effects of an individual's AI experience in one context may influence the adoption of the same AI technology in another context. Gaining knowledge on these phenomena can aid in designing and developing GPAI-based IS that transcend one-time usage, enabling their reusability and effectiveness across

various contexts, which would, in turn, enhance the long-term success and usability of such AI-driven systems. Our approach therefore stands out by introducing an endurance theory, recognizing the central influence of the usage context on AI adoption, and acknowledging the dynamic and recursive effect of AI usage on further AI adoption. In addition to the technology adoption models mentioned earlier, we intend to delve into the existing literature on technology "fatigue" or decline of interest to augment our comprehension of AI adoption and utilization within organizational contexts. We will also extend our inquiry beyond technology-centered models, considering theories less focused on technology, such as the Innovation Resistance Theory and the Social Cognitive Theory, to cite only two. These theories explore factors impeding innovation adoption and the interplay of personal factors, behavior, and environment in shaping human behavior, respectively [11, 12]. These theories from social sciences, once combined with theories from the IS communities, will lay the foundations for our innovative AI endurance theory, as they offer insights into human reactions and behaviors regarding different stimuli, such as innovation and social impact but also to more technical factors such as ease-of-use and technology fit.

3. Research Questions

As highlighted, AI technologies are unique – differentiating from conventional technologies by their intelligent capabilities. It is consequently inadequate to treat the acceptance of AI technologies with the same frameworks applied to traditional technologies. To address this, researchers have endeavored to develop AI-specific adoption, acceptance, and aversion models and theories, often building upon existing frameworks such as TAM or UTAUT. However, a common trait among these models is their context specificity, tailored to measure AI acceptance within particular contexts. Yet, as AI technologies continue to evolve into more generalist forms, capable of application across diverse contexts such as GenAI, the challenge arises in assessing acceptance and usage within varied environments. This highlights the inherent dependency of GPAI acceptance on usage context, with acceptance and adoption within one context potentially influencing adoption in another, thus shaping the overall adoption landscape of GPAI technologies.

Another noteworthy observation emerges from our preliminary investigations: as AI tends to be more generalist and used within various contexts, it is reasonable to assume that the adoption of a GPAI system may exhibit a recursive behavior. This phenomenon suggests that adoption and usage at time t may influence further adoption at time $t + 1$, potentially explaining many decisions regarding the utilization of GPAI technology. Specifically, technology adoption, including AI technologies, is expected to display temporal variations characterized by phenomena such as fatigue, learning curves, and the potential influence of past negative experiences with one technology on the adoption of others. These aspects are applicable to GPAI systems as well. However, a distinctive characteristic is that GPAI technologies imply the prolonged use of the same system to address a variety of tasks across diverse contexts. This raises fundamental questions: what is the duration of these effects? How long do negative experiences with GPAI technologies persist in impacting current adoption? Moreover, how do factors like fatigue and learning curves influence users' willingness to engage with or attitudes

toward GPAI technologies? In essence, our inquiry seeks to understand the overarching impact of time on GPAI adoption dynamics.

By integrating considerations related to context and time, our objective is to elevate the measurement of AI adoption and acceptance to a higher level than previously achievable. This entails moving beyond the limitations of context-specific assessments and accounting for past experiences with AI technologies. Consequently, we aim to develop a novel adoption theory, rooted in existing technology acceptance and aversion frameworks, capable of assessing overall GPAI adoption and use across varying contexts and over time. Termed the "GPAI Endurance Theory", this framework represents a significant advancement in understanding the sustained engagement with and acceptance of AI technologies.

To summarize, this thesis project aims to address three key research questions concerning the adoption of AI technology incorporated within information systems:

- ***RQ1:*** What is the role played by the **usage context** in defining a user's overall GPAI-technology adoption?
- ***RQ2:*** How do overall GPAI-technology adoption **evolve through time**?
- ***RQ3:*** How to measure an overall GPAI-technology adoption – called "**GPAI Endurance**" – considering the impact of context and time?

4. Contributions & Expected Artifacts

The primary contribution anticipated from this whole research endeavor is the development of a GPAI Endurance Theory, which aims to elucidate how users respond to prolonged usage of GPAI technologies across different contexts. This theory will be instrumental in understanding the dynamics of user engagement with GPAI systems over time, considering contextual, temporal, and other socio-technical factors.

However, to realize this overarching goal, several intermediary contributions are envisioned. These contributions are essential steps in the progression towards the formulation of the GPAI Endurance Theory.

Our research will initially delve into the impact of context in shaping technology adoption, with a specific focus on GPAI technology adoption. A critical observation arising from this exploration is the absence of a formal theorization regarding the usage context for AI technology in existing literature. This gap hinders our ability to accurately gauge the influence of context on technology adoption. Therefore, our first research objective is to clearly and formally define what "usage context" means and its constituting factors in the context of GPAI technology adoption. We aim to create a precise definition to help evaluate how this concept influences users' overall behavior in adopting and using GPAI technology. Achieving this will allow us to empirically investigate the research question ***RQ1***: What impact does context have on GPAI adoption and use? Defining "usage context" and understanding its impact on GPAI adoption and usage is our first key contribution.

The second intermediate contribution of this research involves investigating the influence of time on GPAI technology adoption and usage patterns, that is, answering ***RQ2***. Our plan is to delve into the long-term coexistence between workers and GPAI-based system components

to comprehend how time impacts GPAI adoption. This investigation will entail analyzing the behavior of various workers across different organizations who will be asked to use a GPAI-system over an extended period. The anticipated outcome of this research is to discern any shifts in attitude towards the usage of GPAI systems, pinpoint the reasons behind these shifts, and determine the duration of their impact on GPAI adoption. This endeavor aims to provide a comprehensive understanding of how time affects GPAI adoption, including an analysis of the duration of adverse experiences with the GPAI systems and their implications for future adoption of the same system. Additionally, we aim to explore whether behavioral phenomena such as fatigue or cognitive overload also influence GPAI system adoption and to what extent.

The outcomes of these preliminary investigations will lead to a deeper understanding of the underlying dynamics of GPAI experiences and future GPAI adoption, as well as the enduring effects of GPAI system usage on adoption and use over time. These foundational insights are crucial for the development of the third and most significant contribution – the GPAI Endurance Theory. This theory represents the apex of the project, aiming to establish a new paradigm for AI usage within organizations' IS. Drawing upon answers to ***RQ1*** and ***RQ2***, the GPAI Endurance Theory seeks to offer a comprehensive and innovative perspective on human-AI interactions within organizational contexts. By synthesizing insights from existing technology adoption models and empirical observations, the GPAI Endurance theory aims to provide a holistic understanding of the enduring dynamics of AI adoption.

The major contribution of this theory will be a model capable of assessing the level of GPAI endurance of a person or a group of people within an organization, based on captured contextual factors, knowledge on enduring effects, and other socio-technical factors shown to be relevant by existing acceptance models. This theory and its model will answer ***RQ3***.

Another anticipated contribution pertains to design science. By addressing ***RQ1–3***, we will gather valuable insights into user reactions towards various characteristics of GPAI systems or components. This will enable us to compile a list of potential requirements for a successful and widely adopted GPAI-based IS. Following the completion of this requirements list, a validation phase will ensue. During this phase, professional developers will assess the feasibility of the requirements, while business users will evaluate their relevance, completeness, and adequacy. This constitutes the "engineering" aspect of the thesis, aimed at guiding the further development of future successful GPAI-based IS.

As demonstrated, these contributions are primarily aimed at assisting organizations in developing informed and sustainable GPAI-based IS components by gaining a better understanding of the attitudes of their workforce. By identifying potential levers to increase the endurance of GPAI adoption and usage, organizations can ensure long-term success for their innovations and foster a successful coexistence between their workforce and GPAI-based components.

5. Research Methodologies

To ensure the success of this research project, we intend to employ a mixed-methods approach for data collection, analysis, and knowledge-building, encompassing both empirical and theoretical data.

For each contribution, we will start with a thorough literature review aimed at examining

existing research and establishing the groundwork for our studies. This literature review phase will primarily involve an in-depth exploration of existing literature on acceptance and aversion theories, including TAM [4], UTAUT [5], as well as AI-centered acceptance theories such as those presented in [10] and [8]. Additionally, we will explore models addressing user intention and behavioral reactions, such as the Social Cognitive Theory [11] and the Innovation Resistance Theory [12]. The objective of this review phase is to identify socio-technical factors already discussed in the literature that may influence the sustained usage or adoption of GPAI technologies.

Following the literature review, we will conduct several empirical studies to investigate the phenomena of interest.

First, we aim to identify and formalize the components of a comprehensive usage context that may influence GPAI adoption and understand how these factors impact the adoption and usage behavior of GPAI-technologies by workers. To achieve this, a methodological triangulation approach will be utilized, as outlined by [13]. This will involve three key steps:

- **Observational Data Collection:** The objective of this first approach is to gain preliminary insights into how and why individuals accept and interact with GPAI systems in their work environments. To achieve this, we will provide workers from various organizational levels with access to a GPAI technology (if not already integrated into their workflow) and instruct them on its usage and capabilities. Subsequently, we will encourage these workers to utilize the GPAI technology whenever they encounter a relevant task, assessing their initial adoption of the technology. By observing their usage throughout the workday, we aim to capture a snapshot of their behavior across different contextual settings, including the tasks performed, tools utilized, and workspace dynamics. In the end, this initial phase will also allow us to formulate initial hypotheses regarding the contextual factors influencing usage and adoption.
- **Qualitative Surveys**: The next step will involve conducting focus groups and semi-structured interviews. The objective is to directly gather insights from users regarding factors impacting their adoption of GPAI technologies, validating observational findings and uncovering additional contextual nuances in their usage behavior and adoption.
- **Quantitative Surveys**: We will finally undertake quantitative surveys to systematically validate hypotheses regarding contextual factors influencing GPAI adoption, developing a framework for defining a context of use and identifying impactful contextual variables and how these influence the adoption and usage behavior of GPAI-technologies by workers.

The second phase of the research project will focus on understanding the dynamic effect of time on generalist AI technology adoption. A longitudinal study spanning two years will be conducted, following the methodology proposed by [14]. This will involve collecting quantitative survey data and qualitative interview data at multiple time points to capture changes in attitude and behavior towards GPAI technologies over time, formalizing the impact of time and past experiences on adoption and attitude.

Finally, the GPAI Endurance Theory will be modeled based on the findings from the initial studies and existing theories using Structural Equation Modeling (SEM), with a specific focus on Confirmatory Factor Analysis (CFA). SEM is chosen for its ability to measure and model the

impact of latent constructs such as time and context, as it allows for the integration of multiple variables and their relationships [15]. CFA, within the SEM framework, is particularly suited for this research as it enables the validation of theoretical constructs and measurement models, providing insights into the underlying structure of the GPAI Endurance Theory.

As previously mentioned, an additional anticipated contribution involves compiling a list of requirements for future GPAI-based IS. These requirements will be derived from the interviews and focus groups conducted across various phases of the research. Eventually, we intend to present the list of requirements to both business experts and IS developers to evaluate their representativeness, validity, and feasibility, representing a validation of these requirements which may in turn lead, in future research perspectives, to the development of a protoype of GPAI-based IS.

In conclusion, the research project will employ a combination of observational, qualitative, and quantitative methodologies to gather insights and develop the GPAI Endurance Theory, providing a comprehensive understanding of the factors influencing generalist AI adoption across usage contexts and over time and a list of requirements for desirable and successful GPAI-based IS.

6. Conclusion

In conclusion, this study aims to explore the behavior of information systems users in adopting GPAI technologies. We will investigate the impact of two key variables on the use of these technologies: context (the conditions under which the technology is used) and time.

Our research project will first delve into the role of context in adopting GPAI technology. We plan to conduct a study to clearly define the concept of "context" in the context of AI technology usage. This will involve employing a triangulation methodology to gather and analyze observational, qualitative, and quantitative data from interviews and surveys.

Subsequently, we will examine the role of time in the adoption and usage of GPAI technologies. This longitudinal study will span over two years, aiming to capture potential fatigue effects, the impact of the learning curve, and the influence of past negative or positive experiences – among others – on the decision to use, adopt, and reuse GPAI technologies.

These investigations will pave the way for the third phase of this research project: deriving a GPAI Endurance Theory. This theory seeks to formalize the impact of context and time on the adoption and usage of GPAI technologies, drawing on insights from the earlier studies and existing literature. The ultimate goal is to develop a GPAI Endurance Model using Structural Equation Modeling, particularly Confirmatory Factor Analysis.

We will finalize this research by compiling and validating a list of requirements extracted from the preceding studies. These requirements will be critical in guiding the informed design and engineering of GPAI-based IS.

Overall, the aim of this research project is to comprehensively capture and formalize the influence of contextual and temporal factors, along with other socio-technical factors, to elucidate the adoption and sustained use of GPAI-based technologies across information systems by an organization's workers. This understanding will enable organizations to undertake consistent and successful GPAI-based projects with due consideration for their workforce.

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