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RESEARCH ARTICLE



# Expanding the scope of Technology Assessment (TA): a critical narration from the Iranian digital technologies case

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## ABSTRACT

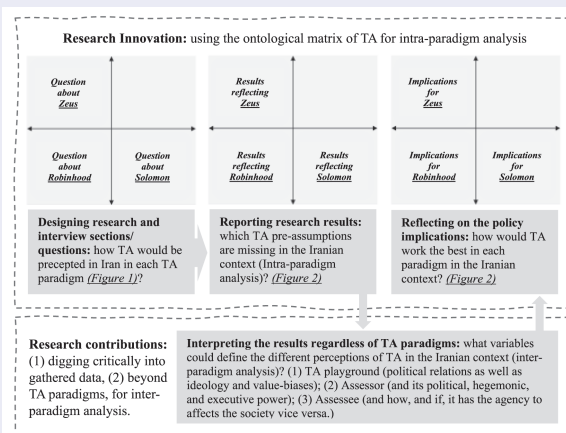
Technology Assessment (TA) theories and methods have taken the global North as their predominant context; however, they are being adapted increasingly in the South. Against this backdrop, elaborating on the theoretical potential of TA, this research tries to critically reflect on the shortcomings of Southern voices in the mainstream TA literature. Gathered through extensive expert interviews and mapped into the novel ontological matrix of TA, our data is interpreted to answer the research question: why and how is TA perceived differently in the Iranian context than in the mainstream TA literature? Candidate variables to answer this question are power relations and ideological governance of the *TA playground*; political, hegemonic, and executive power of the *assessor*; and the agency of the *assessee* and the society in counter-defining each other. Acknowledging these variables could lead to realizing TA's potential, expanding its perceptions' scope, and facilitating its implementations in non-mainstream contexts, like Iran.

## ARTICLE HISTORY

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## KEYWORDS

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## Introduction

Technology Assessment (TA) does not have a clear-cut definition covering every TA effort. Rather, it is a well-established concept that, in the most general wording, investigates non-technical aspects of technological development. To give a more tangible definition, TA is classically defined as ‘attempts to anticipate future development of technologies and projects and their possible impacts, and feedback the assessments to relevant decision arenas’ such as private firms, government agencies, and society in general (Rip 2001). Accordingly, TA is widely used to equip societies with challenges, such as the ever-growing diffusion of technology in citizens’ lives, inevitable conflict of interest facing new technologies, technocratic decision-making among governing systems, and pursuing sustainability in its extensive discourse, among others (Grunwald 2019).

This orientation implies the bilateral essence of TA, commuting between the process and purpose, which truthfully reflects the chronological tale of TA. In its early days, TA represented a modern institute committed to objective scientific reasoning, seeking the truth as a singular entity. TA, in this stage, relied generally on the experts as its source of knowledge (Bauer and Kastenhofer 2019). While evolving, TA embraced participation to *generate dialogues* instead of *speaking truth to the power*. The latter is the spirit of the very early practices of TA in the Office of Technology Assessment (OTA) (Klüver et al. 2000). An additional evolvement of TA, keeping up with the scientific trends of its time, such as phenomenology and constructivism (Bijker, Hughes, and Pinch 1987), TA turned to seek subjective reasoning, where not just objective alternative policy options but somewhat subjective parallel narrations, are expected for a single question. In this stage, as a postmodern scientific field, TA would also value the participatory or interactive processes instead of providing an issue with tangible policy *options* (Klüver et al. 2000). According to these transitions, TA’s source of knowledge also expanded from merely expert-oriented knowledge to the world-lives of the stakeholders and users of the technology, which is, in turn, responsible for reflecting the values of different social groups (Grunwald 2019). So, regardless of the methods and modes that TA has employed, it has an extensive ontological (who does it?) and epistemological (based on what knowledge?) position, which makes TA too broad to be easily defined.

Nevertheless, having this chronological path of TA evolution in mind, TA has some less or more shared attributes among its heretofore practiced modes: *TA is a process executed by various institutions and relies on the collective sources of knowledge, which pursues safeguarding the value of as many social groups as possible while investigating, either prescriptively or descriptively, social and societal impacts of technological development*. This conceptualization, we assume, is broad enough to elaborate on the potentials of TA, expand in terms of its scope, and provide Southern settings with a theorizing basis for their TA-related needs. Nevertheless, these potentials are overlooked in the TA’s evolving path, as will be discussed in this paper.

Initially practiced in the American parliamentary decision-making system (Coates 2016), TA owes its origin to practice. Soon and expanded enough, TA theories were developed to support those practices, leading to more well-rooted and far-reaching TA efforts. Accordingly, raised from and nurtured in the Northern context, conventional TA theories and practices can barely reflect more diversified global values and realities

from the South. It could be one plausible justification for the short-sightedness of TA to include contexts, institutions, and value systems of the global South (Moscona et al. 2022; Sand 2019; Srinivas and van Est 2023). The importance of reflecting the Southern values and cultures in the TA literature has more than one reasoning approach. First comes the increasing material, scientific papers, and policy reports, which reflect the employment of TA in the Southern or international setting including the South (Hahn and Ladikas 2019; Hennen et al. 2023; UNCTAD 2022). Second, engaging Southern narrations in conventional TA debates is vital to make the TA discourse broader and more inclusive, as its missions and potentials imply. Third, as an extreme positioning, comes the criticism of Western scientific hegemony, which, according to Edward Saeed's Orientalism theory back in 1987, seeks to intervene in the East as a superior parent (Moxon 2019). Less driven by the latter justification and more responsive to the former, this paper stays committed to the conventional TA fundamentals. It seeks to critically uncover how the TA and its potential could provide Iran, as a Southern setting, with a more practical, theoretical and methodological basis.

This positioning aligns with the missions of global TA (Hennen et al. 2023; Ladikas and Hahn 2019). As a consistent scientific term that brings these debates to light, global TA steps ahead of national borders and takes global concerns as its primary affair. Global TA, in other words, is expanding the scope of TA to include the cross-national setting by seeking the '*deep structural differences between developed and developing countries*' (Ladikas et al. 2023, 230) and raising its dependence on the national contexts (Hennen and Nierling 2015; Hennen et al. 2023). While various studies examine and affirm the practicality of TA in a more expanded international setting, including the South, questioning the intra-national setting has been under-represented in the TA literature. To critically reflect on these under-represented contexts, our paper, while committed to TA's potential and promises, questions the maneuverability of TA in a Southern setting, Iran. So, pursuing the realization of TA potential and its expandable scope, this paper is trying to investigate how it is perceived differently in the Iranian context vs. in conventional literature. So, our research question would be, '*What are the context-related considerations of expanding TA research into Southern countries, such as Iran, toward making TA's scope more global?*'

To answer this question, our paper continues with an extensive review of the TA literature and its practice cases in the South to critically address its overlooked potential in reflecting the realities of the South (Section 2). Then, to depict an authentic setting of TA in a Southern context, some attributes of the Iranian case, as the domain of this study, are presented (Section 3). The realities selected to report in this section could be considered complementary content to the theoretical analysis and make the proposition of this paper more concrete. This section is followed by scoping and methodology (Section 4), which includes justifying the Iranian digital technologies sphere as our case, selecting the interview as our primary data-gathering method, and appointing the interviewees. This section also includes introducing an ontologically comprehensive framework of TA as the broadest possible starting point for our cross-branch analysis. This framework assures us of minimizing the risk of excluding some attributes of TA while trying to realize its overlooked potential. Additionally, it assists us in articulating our research questions and reporting our results (Section 5). This section includes some *intra-paradigmatic* discussions to address how the contextual and institutional differences of the

Iranian context distort the conventional TA in each TA paradigm. The *inter-paradigmatic* analysis, the outcome of the thick interpretation of results, constitutes our discussion (Section 6), where three variables to distinguish Iranian perception of TA, regardless of TA paradigms, are introduced. The research question is answered by introducing our three candidate variables, which explain how TA is perceived differently in the Iranian context, and some clues to expand the scope of TA are delivered. Finally, we present some implications to reflect how TA practices in the Iranian context can benefit from this outcome, along with our research limitations and further potential research (Section 7).

## A critical overview of the literature

### *Rise of criticisms*

While chronologically evolving from an objective scientific field to more subjective attributes, TA was tremendously affected by the constructivist movement. This movement also fueled the momentum for Science and Technology Studies (STS), where the Social Constructivism of Technology (SCoT) theory was born. According to SCoT, various interpretations of the same technology inevitably occur among social groups (Bijker, Hughes, and Pinch 1987). The reflection of this theory, and the constructivism movement in general, in TA, broadened both the ontological and epistemological extent of TA. This new branch, Constructive TA (CTA), made TA a more potent field to engage under-represented social groups in the TA practices, including Southerners. Nevertheless, for Southern citizens, as technology end users who are miles away from where technology is being born and are getting mature, there is no venue to make themselves heard by the technology developers. In other words, assuming that Southerners are consuming Northern technologies, SCoT seems insufficient in theorizing Southerners' voice in constructing technology, if not irrelevant.

Accordingly, even in a highly inclusive perspective for TA, i.e. CTA, Southerners' values are left aside when designing technologies. Applying Actor-Network Theory (ANT), another highly influential supporting theory of TA, has also been shown to be challenging when it comes to developing countries. A Sri Lankan case study casts doubt on the general operability of this theory in understanding technological change in development. It suggests that ANT should be combined with other theoretical bases in developing countries. As Heeks and Stanforth offer, the analysis of the innovation process and systems theory (Heeks and Stanforth 2015) are candidate theories that can be coupled with ANT to make it more potent in explanatory work in developing countries.

Similarly, the heterogeneous national context is also discussed for Responsible Research and Innovation (RRI) efforts and how they might *transduct* (instead of *translate*) while traveling across borders (Doezema et al. 2019). This resolution could, semantically, be associated with Hennen and Nierling's *TA habitat*, which elaborates on specific national, cultural, and history-related settings wherein TA functioning could be analyzed (Hennen and Nierling 2015). Nonetheless, one might doubt whether Southern contexts could offer a hospitable habitat to conventional TA practices or if TA needs to realize its overlooked potential to theorize some expansions (or transductions) to be more habitable for them.

One general, while clarifying, justification for this standpoint would be the notion of technological innovation in developed countries (*Science, Technology, and Innovation: STI Mode*) vs. in developing countries (*Doing, Using, Interacting: DUI Mode*) (Johnson, Lorenz, and Lundvall 2007; UNCTAD 2021). In a most minimal approach, as stated in the New Manifesto of Technology Assessment (Ely, Van Zwanenberg, and Stirling 2011), the governance system of countries plays an intrinsic role in the impact of technology assessment. According to this manifesto, TA fails to meet some of its vital promises in the South, mainly due to its failure to consider the determinant variable of power relations. Similarly, as ‘inappropriate’ technology explains, developers consider their local conditions as the basis for their effort insofar as incorporating these technologies in other habitats is severely inhibited (Moscona et al. 2022). In the developed context, in the most simplified linear perspective, technology is born as the outcome of scientific progress and pushes technological innovation, whereas, in developing countries, innovation and technological progress mainly originate from interacting with imported technical products. Hence, as brought up to elaborate on the shortcomings of SCoT in including Southern citizens, the origin of technology is a determinant variable in justifying why TA should broaden its theoretical basis to be more influential in Southern settings.

This notion of the dominance of mainstream TA debates in the developing world has also been criticized in the Vision Assessment literature, where Sand discusses the absence of Southerners in setting technological visions. According to him, visioneering is held by ‘a small group of highly educated, male, well-off people from the Northern Hemisphere’ (Sand 2019, 99) who take the front seat of the technological path, leaving others, including citizens from the developing world, in the backseat. Likewise, Mostana and Sastry attach technology adaptation to ‘high-income, research-intensive countries’ (Moscona et al. 2022). As Lösch et al. discuss, drawing these visions is a socio-epistemic practice that later forms or invents responsibilities expected from technologies (Lösch, Heil, and Schneider 2017). In other words, the epistemological absence of the Southern values reflected in vision assessment, which indicates responsibility, would remain under the shadow of doubt.

On the significance of visioning in the socio-technical futures and its dependence on the cultural context, Roßmann argues that two realms generate the social imagination. He claims that semantic structures (the social realm), next to the material realm, are incorporated to construct technology and shape socio-cultural visions (Roßmann 2021). While the absence of the material realm means nullification for technology, the absence of the social realm, or downplaying it, brings out the abstract question of how and even if the material realm would proceed. Likewise, he discusses that technology discourse is shaped by history and the culturally embedded practices in society. So, the historical conditions of a given region reflect on the technology discourse. Accordingly, values, ethics, and moralities are embedded in this discourse, too (Stemerding et al. 2015). One down-to-earth, widely-debated case is digital privacy, which, as Arora discusses, has a different connotation in the global South (Arora 2022).

These debates may question the formidability of current debates on TA theories and methods in the global South. This short-sightedness of the conventional TA debates makes their employability in Southern countries disputable. Nevertheless, considerable pieces of literature have brought them to light.

## **Response to criticisms**

Due to realizing these shortcomings, including Southern countries in current TA debates, and broadening the responsibilities and burdens of TA, some efforts have been made. The applicability of TA for a developing country was first raised in the OTA era in 1984. Different priorities of the developing countries, which, in turn, lead to diverse concerns for TA; associating TA more with ‘appropriate technology’ and ‘choice of technology’ than inquiring about ‘pervasive effects of technology on society’; and challenges like lack of data and expertise, which question the operability of TA in developing countries; are among key issues raised in this report (Wad and Radnor 1984). While these arguments could still apply to the case of the Southern countries, this report is diminishing the problem by taking just the Parliamentary TA (PTA), the only dominant paradigm of TA of that time, as its point of analysis. It is also the case in some of the more recent works, such as those that tailor TA methods for developing countries (UNCTAD 2022) and how they are taking one of the TA paradigms as the subject of their studies.

Likewise, scientific works that examine the influence of new technologies (Kebede and Mulder 2008; Van Egmond-Dewilde De Ligny and Erkelens 2008) and their adaptation and implementation (Heeks and Stanforth 2015) in developing countries do not fulfill the shortcomings of the conventional TA literature. These contributions, we argue, are looking at the global South as a passive subject of TA without reflecting the agency of the South in their studies. More proactive contributions in this trait suggest validating missions and promises offered by TA to broader sets of communities, including citizens of developing countries in global Participatory TA (pTA) projects (Ely, Van Zwanenberg, and Stirling 2011).

Another response to this topic is global TA, which initially seeks to go beyond national systems and reflect the international challenges raised by technology. While this approach undeniably demonstrates the agency of Southern citizens, it applies no alterations to the conventional scientific standpoint of TA and treats the South as an extension of the North. The same standpoint could be traced in other TA-related activities in the South, such as need assessment, responsible innovation efforts, and including the access, equity, and inclusion (AEI) in responsible innovation (Srinivas and van Est 2023); or evaluating their TA efforts by conventional TA criteria (UNCTAD 2021); or digesting and comparing TA and TA-like efforts in different national settings, including some Southern settings (Hahn and Ladikas 2019). Our counterargument to this standpoint is to doubt the reliability of employing conventional TA methods and the applicability of mainstream TA practices in the Southern context. Sticking to the Northern perception of TA, these studies fail to uncover institutional, axiological, legal, and ideological assumptions of TA in the Southern context.

Over and above, more first-handed Southern narrations imply some traces of the hegemony of mainstream TA. While some Southern cases try to institutionalize the established TA methods and theories in their national or regional settings, others acknowledge the context differences, based on their historical and institutional differences from the TA’s genuine habitat, and try to articulate challenges for TA to be institutionalized (Mugabe and Musango 2024; Sinozic-Martinez, Udrea, and Nentwich 2024). However, they barely discuss how TA should step ahead of its established

methods and theories and expand itself to overcome these challenges while staying committed to its missions and definitions. Against this backdrop, we recognize the agency of the Southern context in the TA practices and go beyond presenting a manual to employ TA in the South.

To conclude, while TA habitat raises the importance of national context and its status quo in implementing TA, we would investigate how a Southern context, in our case Iran, is a hospitable habitat for conventional TA. So, critically acknowledging some context-specific traits of a Southern setting (Iran) and discovering their reflection in conventional TA practices is a main contribution of our research. By critical, we mean digging into the narrations to investigate hidden power relations instead of elaborating on the different status quo of TA as an institution in our Southern case, Iran. Our additional contribution is to deliver an inter-paradigmatic analysis of how TA is perceived in the Iranian context instead of limiting the analysis to a single TA paradigm.

### **Some practical criticisms raised from the Iranian context**

This section depicts the Iranian economy, development status, and policy/political sphere. Next to the theoretical gap presented in the previous section, this part uses some practical realities to reflect how Iran, as a Southern context, cannot fully deploy the conventional TA theories and methods.

Iranian GDP, as measured in 2022 by the World Bank, is 413.49 billion (Current US\$) with an annual growth rate of 3.8%. Iran's economy is ranked 40th globally (World Bank 2024). The official inflation rate of 43.5% in 2022 and the ever-weakening official<sup>1</sup> currency rate since 1992 are the other significant figures of the country's economy (World Bank 2024). This unstable economic status could pose a variety of goals for the TA studies (such as environmental soundness, socio-culturally appropriateness of design to address context-specific needs and utilizing local raw material, consistency with other activities in a systematic sense, among others) (Wad and Radnor 1984, 55) which do not have priority, at least anymore, in the Northern context with a robust economy.

Iranian economy leans heavily on natural resources such as oil, gas, and minerals (UNCTAD 2016). In the last decades, however, there has been an active debate on shifting from selling raw materials toward a knowledge-based economy. This shifting policy, nonetheless, has not yet led to a tangible outcome on the economic scale (Sadreghazi 2021; UNCTAD 2016). Alongside the high dependency of the economy on natural resources, the Iranian economy is isolated from the world due to the US sanctions. With limited, if not impossible, bank transactions with other countries, the public and private sectors cannot cooperate with leading global peers (World Bank 2021).

Additionally, due to the fragmented political and decision-making systems, along with the involvement of a variety of councils, organizations, and actors in each policy issue (Ghazinoory and Ghazinoori 2006), one can see little coherence between development policies and technology policies (UNCTAD 2016). Nonetheless, significant advances have been made in the fields of science and technology (Goodarzi and Ghazinoori 2013), and the National Innovation System (NIS) has evolved significantly (Sadreghazi 2021). These two trends, growing STI institutions while overlapping with



(and sometimes contradictory to) policy-making bodies, make the Iranian tech-policy sphere a challenging context for TA practices.

Along with the political isolation of the country and weak tech-policy endeavors comes ideological governance in all policy realms (Bertelsmann Stiftung 2024), public policy and technology policy among them. Decision-making in the Iranian policy sphere is highly centralized, although various legally defined institutions and organizations are engaged. Executive, legislative, and regulatory systems in Iran are three power systems that, despite the system of checks and balances stated in the constitution, are dynamically interrelated (Bertelsmann Stiftung 2024, 11). To interpret these statements into practice, one would raise the role of Supreme Councils assembled to allegedly make deliberative decisions by engaging various ministries and representatives of three power systems. Yet, these institutions (Supreme Councils) have a hegemonic power over all the power systems, and their decisions are, ironically, more centralized. This paradox, one might argue, sabotages the autonomy of power systems, which complicates socio-technical decisions. Limiting access to the internet for Iranian citizens is a solid example, which is authorized by the Iranian Supreme Council of Cyberspace and limits other entities from arguing against its decisions. This example indicates the weak deliberative institutions in Iran, a Southern country, which might discourage TA practitioners. These trends, among others, suggest that innovation and technology development have barely played a critical role in the Iranian economy.<sup>2</sup> As compensation for the lack of deliberative institutions, TA's expert- and stakeholder-driven modes could benefit from the geographically scattered, massive, and collective knowledge of the numerous Iranian experts who live abroad, whether by choice or exiled.

Another practical trace that shows the lack of autonomy for enterprises and institutions is the concept of the public-private sector, which is the outcome of privatization policies in the last two decades. According to the recent economic policies followed by this *privatization* law, eligible public institutions are sold to the private sector while still dependent on the national ideology and governing system (Sadreghazi 2021). So, they are, legally speaking, private entities, yet they act like the arms and limbs of the political system. As highly socially influential technology enterprises, Iranian digital platforms and startups are not exempt from this hidden policy. One could add multiple similar phenomena to indicate that Southern countries like Iran might employ some policies and institutions that are not practiced universally; nonetheless, they affect the employability of TA practices.

Last but not least, Iran's political and social sphere could barely be considered free. Although democracy, as a modern institution, has been practiced (however, poorly (Bertelsmann Stiftung 2024, 11)) for almost a century in Iran. This nominal democracy, one might argue, has maintained the Iranian public sphere mobilized and vibrant, even in the absence of free journalism and freedom of expression (Bertelsmann Stiftung 2024, 10). These societal debates also run in the technological realm, primarily through micro-blogging, which could be a promising source of knowledge for constructive TA. Another cultural feature is the lack of social capital (Zargham Afshar 2018) and high power distance (Hofstede Insights Groups 2023). This attribute makes it a challenging setting for TA to transfer the voices of the society to the power and vice versa.

## Scoping and methodology

### *Choosing the research context: the Iranian digital technology sphere*

While earlier we talked about the Iranian context as the case of our research, we justify choosing digital technologies as our research scope. The Iranian digital industry is affected by at least three major trends. The first is the sanctions, which make it hardly possible for the Iranian tech companies to trade with foreign markets and cooperate with global leaders; the second is the pessimism in the ideological governance system toward big tech digital companies; and, last but not least, the third is the restricted internet access regulations for the Iranian citizens.

Regarding the first trend, the Iranian digital technologies sector is not extensive by size or span. The share of the digital economy in the Iranian GDP (6.9% in 2020) as compared to the global average (22.5% in 2020) (Shanehband 2022) demonstrates the small size of this sector. Regarding its span, this sector is less reliant on hardware development and more dependent on the software sector since software development is less constrained by political limitations and economic sanctions. Hence, there are no tangible traces of self-driving cars, smart transportation, or smart energy grids in the Iranian digital technology sector. Nonetheless, some global trends, such as Industry 4.0 and digitalization, are being practiced in Iran (Sadreghazi 2021) as enablers for key industry sections (oil, gas, petrochemicals, and mining), but only as slowly as imposed by the sanctions. Yet, even this software sector barely offers innovative and state-of-the-art outcomes.

As per the second trend, Iranian digital technology policy is tied to security issues (Khoshnevis 2022; Vaezi and Maleki 2022). That is, among other reasons, why the software sector has survived mainly, if not only, to develop domestic versions of everyday platforms for Iranian users; so, developments in AI, web3, and such technological advances are considered too ambitious in the Iranian digital ecosystem. Thus, when we talk about the Iranian digital technology sector, we (mostly) talk about digital services in both public and private platforms (Shanehband 2022). These attributes make digital technologies a plausible, while not too broad, scope for our research.

As triggered by the third trend, Iranian digital technologies directly engage the public and the everyday lives of society. Accordingly, people talk massively about the country's digital technology policies, primarily through micro-blogging. Given that this research is investigating all TA paradigms, including (CTA), existing societal debate in our research scope is a decisive attribution. In other words, choosing digital technologies as our research scope enables us to gather symmetric input data and generalize our discussions beyond the TA paradigm.

### *Choosing research method and scoping empirical work*

The undeniable methodological challenge for this research is the lack of empirical data. As mentioned earlier, few publications reflect TA experiences in developing countries, Iran among them. Besides, TA is not a widely known field of work in the Iranian tech-policy sphere, and while there are plenty of TA-like studies among tech-policy researchers, there are no tools available to list them as inputs for systematic research. If there were, one might argue that they might not reflect the realities of Iranian confrontation with technologies due to probable censorship. So, with a lack of comprehensive

theories about TA in the global South on the one hand and a lack of written material as empirical data on the other hand, designing an inductive or deductive study to answer our research question seems unrealistic. So, we concluded that we should conduct abductive research, where some candidate variables are introduced, even though their necessity and sufficiency are not guaranteed. As Thompson discusses, abductive research is neither data-driven to induct nor theory-driven to deduct the theory; rather, it engages both data and theory (Thompson 2022). Abduction, accordingly, ‘*aims to find the most logical solution and useful explanation for phenomena*’ (Thompson 2022, 1411).

On the promising side of the data gathering comes the keen theoretical and philosophical debates among Iranian academic circles, not to mention tech-policy communities, concerning responsible and ethical technology, inclusive tech policies, ethical design, and similar fields.<sup>3</sup> However, these debates, being too sporadic, were not comprehensive enough to be used as the only input data source for our research, just like the Iranian TA-like reports and activities. So, we chose experts as our source of knowledge to collect our empirical data and picked the interview method as an eligible tool to proceed with our empirical work. Meanwhile, to enrich the quality of our research and double-check derived concepts, we used all aforementioned resources (TA-like activities and critical un-academic debates bearing the TA’s missions) as triangulation references (Abbaszadeh and Hosseinpour 2011). It is worth mentioning that the interview has been used in a similar setting, next to complementary material<sup>4</sup>, in cross-national studies (look, for instance, at (Hahn, Heyen, and Lindner 2023) and (Hennen and Nierling 2015)).

Regarding selecting our interviewees, the first circle included those engaged in the aforementioned debates. Then, we continued our purposive sampling by limiting the candidates to those who (1) are adequately engaged with the Iranian social and political sphere facing digital technologies, (2) have either worked on or taught TA, RRI, VSD, ST, and similar fields, or participated in TA-like activities. We chose the snowball or network sampling method, which aligns well with our sampling strategy (Teddlie and Tashakkori 2009, 171). After drafting the first candidates and interviewing them, we asked them to introduce and possibly connect us to experts and scholars who they think have something to share with us (Mohammadpour 2018, 369) as long as they pass our two prerequisites. Therefore, we stopped seeking interviewees when all the newly introduced people had already been contacted. Additionally, to make sure our interviewees’ list is reliable, we tried to maximize the diversity (Gall, Gall, and Borg 2006) by reaching out to both women and men experts, diversifying them based on their place of living<sup>5</sup>, and, more importantly, including those with extremist political standpoints (both right and left). Our expected diversity criteria were already fulfilled when we reached this point. Ultimately, we interviewed 24 people, including 11 women and 13 men, who all passed our prerequisites.

### **Scoping the ontological extent of TA**

The philosophically widespread notion of TA makes it challenging to speak of TA as a single concept. As conveyed in our definition of TA above, TA could be executed by different entities (such as policy advisory institutions, designers, and academic partners, among others) and uses various sources of knowledge (such as merely expert knowledge, participatory knowledge, or lay-people narrations). So, ontological and epistemological standpoints of TA are extended, and, one might argue, they could (and should) have

the potential of being even more extended while the scope of TA is expanding throughout time. The extended philosophical notion of TA makes it challenging to conduct cross-branch interpretations. To be more specific, while each TA practice could take various ontological and epistemological standpoints, analyzing them as a single entity, called TA, could be challenging. So, mounting the research on an ontological framework, where the relative ontological position of all ontologically possible practices of TA is apparent, seems like a solution.

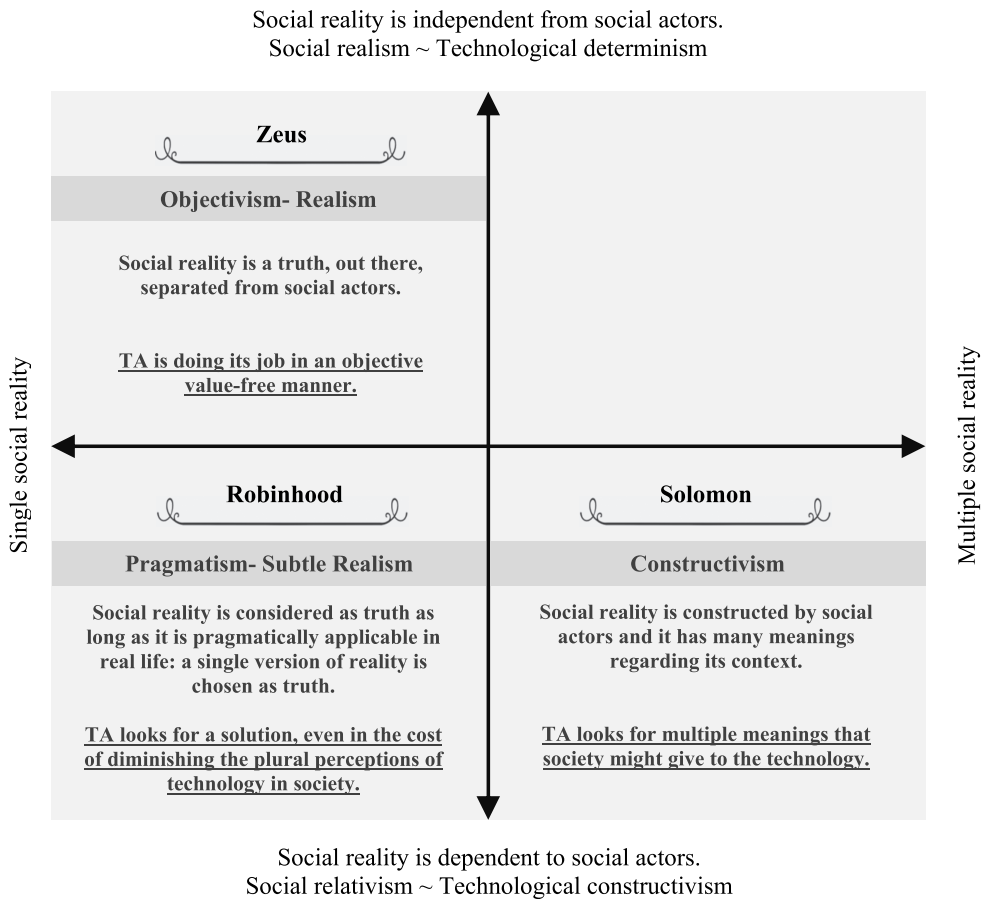
Taking TA as social research, the ontology matrix of social research seems an acceptable candidate: being ontologically inclusive, neither any TA practice falls off this matrix nor remains expelled since it is ‘*mutually exclusive and collectively exhaustive*’ (Collier, LaPorte, and Seawright 2008, 157). Tailored for TA by Naraghi and Ghazinoori (Naraghi and Ghazinoori 2022), this matrix explains the ontological position of TA paradigms in a way that, due to being ontologically inclusive, all realized present efforts and all potential future ones are included.

In the social ontology matrix, social reality (in the case of TA: societal meaning of technology) and its dependence on the social actor (in the case of TA: stakeholders, lay people, journalism, NGOs, and other actors) are crossed to shape a matrix of four (minus one<sup>6</sup>) cells.


- The horizontal axis on this matrix presents the status of social reality (social meaning of technology), which could be single or multiple; take the case of birth control pills as an example: this object could be perceived simply as a chemical with specific effects on the human body (singular), or a means to sin, a policy to control the population, an opportunity for women to control their right on their body, depending on the viewpoint of analysis (multiple).
- The vertical axis exhibits whether this societal meaning could depend on or be independent of social actors. This axis indicates whether the agencies of power owners, groups of interests, users, and other actors could or could not change the notion of birth control pills presented in the previous example.

Named after Zeus, Robinhood<sup>7</sup>, and Solomon, these cells can be briefly clarified as follows (Figure 1):

- (1)  $\aleph$  Where the societal meaning of technology is independent of the social actor, there will be only one social reality imaginable: the one that the social actor objectively observes. Here, societal meaning has a one-folded flat discoverable spirit and can be investigated from the outside world without getting engaged to the subjectivity of the multiple actors. Let us call this cell *Zeus*, who observes the world from beyond, and as the assessment body, it is expected to dispatch itself from subjective interpretations. Zeus looks at the birth control pill as a value-free chemical that needs to be regulated based on expert knowledge.
- (2)  $\beth$  Where the societal meaning of technology depends on social actors, there will be more than one reality since the actors may shape different realities based on their world lives and their interests and values so that multiple realities will emerge or, philosophically, be constructed. Let us call this cell *Solomon*, who knows the languages of all creatures and can get to know their worlds. Solomon would seek to understand how each social group would think about birth control pills and why.



**Figure 1.** Ontology matrix of social research, respective research paradigms, and metaphorically re-naming them tailored for TA practices (Naraghi and Ghazinoori 2022)- social reality, in TA research, is equivalent to the societal meaning of technology

- (3)  It is not always that multiple social realities are appreciated, even though the social actors are numerous and, accordingly, more than one subjectively constructed worlds exist. In the pragmatism quadrant, social actors and stakeholders choose one societal meaning of technology, wherein reaching a solution is more practical than discovering multiple realities. So, assessment bodies pick one of the multiple meanings as their yardstick and look for a singular valid solution that matches that reality. Let us call this cell *Robinhood*, who pragmatically tried to fight for a purpose in his chosen reality. Robinhood is the one that makes decisions about birth control pills based on the problem definition and leaves all unrelated narrations aside.

### Conducting the empirical work

The initial question of this research is ‘*What are the context-related considerations of expanding TA research into Southern countries such as Iran, to make TA’s scope more global?*’. This question, as stated in the literature review, conveys the critical approach

of our research. So, discovering the hidden power dynamics and focusing on the inapplicable aspects of TA in the Iranian context rather than functioning ones, the central concept that was inquired in the interview sessions was ‘how TA would be critically inapplicable in the Iranian digital technologies context if it were theorized as in the conventional literature’. Meanwhile, we needed symmetric narrations for each paradigm to stay ontologically inclusive and interpret our input data in an inter-paradigmatic setting. So, we divided each interview session into three sections:

- (1) To reflect PTA or *Zeus*, we inquired, ‘What attitude best describes *the behavior of Iranian regulators and policy-makers, as neutral bodies, toward diminishing social consequences of digital technologies?*’
- (2) To reflect pTA or *Robinhood*, we inquired, ‘*How do digital technologies’ stakeholders and actors depict digital technologies in Iranian society to safeguard public interests and repulse social consequences of digital technologies?*’
- (3) To reflect CTA or *Solomon*, we inquired, ‘*In what quality Iranian social groups can, and would, reflect their hopes and fears regarding the development processes of digital technologies?*’

Looking for interviewees’ *knowledge in narration* (Mohammadpour 2018, 118) or *narrative interviews* (Kvale and Brinkmann 2008) and obtaining the role of *miners* rather than *travelers* (Mohammadpour 2018, 119) for interviewers, we conducted our semi-open interview sessions. Nonetheless, framing the conventional TA theories without educating the interviewees was a delicate job. So, it was the duty of the interviewers to make sure which paradigm each narration belongs to and to ensure all paradigms are covered. To do so, the interviewers’ *theoretical sensitivity* (Strauss & Corbin, 1990) and having an *interview guide* (Bernard 2005) was crucial. So, to position the provided answers and narrations, we had our ontological matrix as a reference, first, by checking whether the answers reflect a single reality or multiple realities for TA, and second, by validating the assumption of their narration to see whether they are separating the social actor from the social reality or not. To elaborate on this strategy, we have selected three minor questions from the actual interview sessions, each close to one interview section (TA paradigm), to show both the direction of questions and the efforts to keep them on track.

- ‘*Let us separate the case of the Tehran Chamber of Commerce<sup>8</sup> from the Supreme Council of Cyberspace.<sup>9</sup> How and to what extent could this council safeguard the public interests while regulating digital technologies?*’
- ‘*Shall we go back to the Tehran Chamber of Commerce? How could it, or any other similar assembly, act as a responsible assembly toward the society or environment?*’
- ‘*You mentioned journalism as a setting for the public sphere. But, in our country, each newspaper represents a political party or governmental enterprise and reflects on their interests.<sup>10</sup> Not to mention that they are constantly watched by the authorities. So, I assume you agree that they barely reflect on public interests. Let us talk about other venues where the public can engage<sup>11</sup> in technology-related regulations.*’

In the end, it is worth mentioning that in almost all cases, not just a single interview session was enough, and the interviewer team had to arrange either follow-up

sessions or ask for post-interview explanations from the interviewees via text, voice, or over the phone. So, it was crucial to begin the initial coding of the written interviews right after each session to ensure they were comprehensive enough. In this stage, the coding was thin: we needed to derive shared concepts addressed in the narrations and intra each paradigm. Still, deriving ultimate variables was possible only through thick interpretations of these concepts and narrations since we were looking for critical, while inter-paradigmatic, analysis of our input data. Eventually, we sketched our variables by going back and forth with the first-handed codes, extracting descriptive concepts, and constantly cross-checking them with complementary data (TA-like practices as well as current critical TA-like debates). The next chapter reports the concepts that evolved from each interview question (intra-paradigmatic, thin interpretations) as the research results. Going beyond TA paradigms and diving more in-depth into extracted concepts (inter-paradigmatic, thick interpretations), three candidate variables are discussed to describe the different perceptions of TA in the Iranian context.

## **Results: how are TA paradigms perceived dissimilarly in the Iranian context?**

### ***How does Zeus mis- or mal-behave in the Iranian context?***

While the assessment body takes an objective position and, ontologically, commits to the Zeus quadrant, it is expected to be neutral and exclusive, as OTA tried to seek ‘*Neutrality as equidistant utility*’ (Torgersen 2019, 59). Here, TA should develop policy options from a value-free and ideology-free standpoint. Being committed to this ideologically neutral standpoint is a challenging job for PTA practices, as it is for Zeus as a TA paradigm. However, neutrality seems like a myth in the Iranian context. The values that the government safeguards are not only un-inclusive but also ideologically biased:

The Iranian government does not distance itself from the outcomes of its decisions. The government is a stakeholder in its own decisions and policies. In the case of the digital economy, the government sometimes positions itself as a competitor to domestic businesses by developing solutions and promoting their solutions in official venues. One other explanation of this attitude, one might say, is micro-managing the information flow through society.

In TA in general and Zeus Quadrant in specific, the dichotomy of antagonism or agonism is a critical issue. While objective TA must be value-free and deviate from none of the social and normative values (agonistic), developing countries’ political sphere behaves as a single-valued entity (antagonistic) (Delvenne and Parotte 2019). While antagonism defines Iranian political relations the best (Poorzaki 2020), it is unrealistic to expect the TA practices to have agonistic relations.

As a country with a religious ruling system and traditions, Iranian authorities have never successfully negotiated their social values with tech giants. It is an ongoing question of how authorities can talk these giants through adjusting some app features to keep their culture safe.

This pessimism in political relations is not only toward the other countries but also toward the public itself.

Historically, the government considers each modern technology a threat to national security. ‘...’. Banning the internet and social media is a clear message from the authorities to citizens: ‘We are the one who decides what you should see, watch, and read!’ Moreover, what people interpret from this message is, ‘We are afraid of you knowing too much!’

### ***How is Robinhood’s job ineffective in the Iranian context?***

Similar to Zeus’s territory, Solomon also faces institutional obstacles. Corruption (Corruption Perceptions Index 2023) and systematic rents, weak private sector (Bertelsmann Stiftung 2024), and relatively wide power distance (Hofstede Insights Groups 2023) are some characteristics that disturb the ultimate purposes of pragmatic TA activities or the territory of Robinhood in Iran. Here, actors and stakeholders are representatives who are expected to depict a single agreed-upon narration of the technology in their decision territory (the social reality). The participatory panel is expected to include as diverse actors and stakeholders as possible, but it might merely include those with political-ideological power. Also, in the Iranian context, the private sector is not an independent entity, and it is associated with governmental rents.

Look at national councils, associations, and all institutions that the authorities have assembled. All of them claim to be comprehensive and inclusive, but inclusive has a narrow definition in their mindset. They assume their assembly is inclusive by including all governmental bodies and ministries! At the same time, they miss actively engaging the industries, businesses, and, of course, the social actors and end-users.

Regarding the participation of citizens in pTA practices, Iranian TA-like activities might face some challenges as well: lack of social capital between the public and the official institutions, bridging social capital, causes little public trust in any official, government-led invitations. So, in the most extensive cases, the only social group that might accept invitations to the pTA gatherings is the one that is ideologically and hegemonically tied to the government. These sessions, then, turn into a chamber room where the only voice is the hegemonic standpoint of the government.

People might not trust to join the participatory events; [...]. They might prefer not to express themselves and their interests for many reasons: fearing speaking up, lacking hope in participation outcomes, and such.

It is also worth mentioning that counterhegemonic debates might be considered a crime in this context, even if they are loud enough to be heard.

### ***How can Solomon not be heard from the geographically distant Iranian context?***

In the Solomon Quadrant, socially constructing technologies are pursued: social actors are believed to be constructors of the social reality. This qualification, however, is inapplicable to Southern countries’ residents, Iranians among them, who are miles away from the technology developers. In other words, constructing technologies through the CTA efforts is shaped geographically around tech developers, who are geographically located in the global North.

We do not choose technology. Technology chooses us.



This raises the question of how the societal meaning of technology, as the object of assessment in CTA, would be discovered for Iranian citizens. This criticism is also reflected in Genus's thesis, stating the lack of potential for self-reflection of social actors in the assessment process (Genus 2006), which is a more serious issue for social actors living in the South: what about people who live far away from these developers?

Imagine you have the magic power to design the most inclusive technology for the Iranian community. Who would buy your design? Who would care? We are an isolated nation; even if we were not, we are [a] poor [country]! No business builds something for the poor!

In addition to the geographic distance, the value system of the Iranian society is different from that of the North, and it is more diversified.

We educate our young based on our culture and beliefs, and then social media distorts their mental model. Banning access to these platforms might seem harsh, but some rational reasoning supports it.

## **Discussion: candidate variables to distinguish Iranian perception of TA**

### ***TA's different political and institutional context: where is TA's playground?***

By *TA playground*, we mean the political and institutional context of the country where the TA is pursued, in our case, Iran. This candidate variable could perfectly align with *TA Habitat* (Hennen and Nierling 2015), where the parameters of global TA are introduced as political system, S&T decision-making system, socio-economic development stage, values, and ethics and engagements (Ladikas 2019). The two most critical parameters, we believe, are the political system and values. In the upcoming paragraphs, we will discuss how these parameters' *essence* might differ in Iran, not just their *status quo*. This analysis implies how Southern contexts, Iran among them, might not be hospitable habitats for conventional TA; instead, they need a more expanded scope for TA, where some pre-assumptions are doubted.

Our results suggest that power relations are systematically asymmetric in the Iranian political system, making it a slippery field for TA, regardless of its paradigm. While the politics of TA need agonism as its source of inspiration (Delvenne and Parotte 2019), Iran builds its political relations antagonistically (Poorzaki 2020). So, the Iranian political system considers *others* as *enemies* who would better be eliminated, not *peers* to negotiate. In TA discourse, this means eliminating the bargaining power of these *others* in the assessing process, which could deviate TA from its initial notion and ultimate mission. So, regardless of who is assessing what, this antagonistic eliminating attitude affects TA practices in Iran.

Like the political system, values are also conceived and treated differently in the Iranian context. While TA demands to include as many values as possible in the assessment process, Iranian policy-making institutions collect and define the values to be safeguarded in a *selective* manner. For instance, when it comes to Women's Rights as a value, the Iranian government has its own definition, which is neither compatible with international criteria nor the Iranian contemporary society. So, it would be critical to ensure that TA is not selective in including and defining the values of different social groups. We are trying to convey that, when it comes to resolving a TA-like policy,

driving in the value-free lane for the Iranian authorities seems more like a far-reaching recommendation (Naraghi and Javadi 2023). In addition, when it comes to independent TA practitioners in Iran, a Southern country where ideological governance is an inevitably substantial factor, being committed to the various social values and their conventional definitions takes some courage.

### ***A different object of assessment (assessee): what is being assessed?***

As Grunwald discusses, TA is assessing an *absent object*, which he argues is neither *technology itself* nor the *social consequences of technology* but the *societal meaning of this phenomenon* (Grunwald 2019). On disaffirming the consequences of technology as an object for TA, Grunwald brings the indeterministic notion of technology. Nonetheless, some scholars relate technology determinism to the distance between where technology is developed and used (Bimber 1994; Sand 2019; Thiere 2018).

This section suggests that when it comes to Iran, technological determinism is not a myth, and TA should also consider assessing the consequences of technology. Moreover, the assessee, or the object of assessment, needs to be well-defined regarding its agency to interact with society in both ways: how it affects society and how society affects it, if it does. We suggest that the realization of the extent of this agency is a crucial responsibility for the TA practitioner in Iran or other Southern contexts. Answering how the artifact, the assessee, could change the society and could be changed by the society is the key to uncovering this variable. We suggest that Iranian society is geographically, linguistically, and axiologically far from where the technology is developed. So, it cannot partake in constructing the *universal* societal meaning of technology; instead, it could construct some *local* societal meaning of technology while being affected by the universal meaning of it. So, the agency of technology in society and vice versa, which varies for various technologies, affects TA practices in Iran, a Southern setting.

### ***The different subject of assessment (assessor): who is assessing that?***

The assessment body is conventionally categorized as politicians, policy-makers, academicians, civil organizations, technology developers, and other organizations who handle the assessment. Nevertheless, equating the assessor to its institutional identity seems a somewhat naïve approach. Some variables determine the assessment body and its mindset from a deeper standpoint: the nexus of science and policy wherein the assessor is practicing assessment (Hoppe's typology) (Bauer and Kastenhofer 2019), the commitment to the political system (Hacking's types), and, as mentioned earlier, value system and hegemonic and counter-hegemonic expectations of the outside world (Delvenne and Parotte 2019). Inspired by all these categories and supported by our results, we suggest varying assessors by their independence from or dependence on the political power, its commitment to hegemonic debate (hegemonic power), and its authority to influence decision-making systems (executive power). Taking different standpoints in these variables, we believe, would extensively variate the ultimate destination of the TA. If the assessor possesses these powers, in the Iranian context, it would safeguard the selective values of the political system instead of safeguarding a broader set of public interests. As a result, it would not be surprising if the assessment outcome did

not fit into the conventional TA literature. We suggest that, in Iran, it matters who the assessor is and what kind of power they own.

Nevertheless, this would not be a dead-end for TA in Iran. The lack of public legitimacy for conventional tech-policy practitioners in Iran can push TA to seek alternative means creatively. These creative means could be running TA projects abroad, leaning on the knowledge base of exiled experts, mobilizing societal debates via activism, responsible journalism, and crowd-funded fact-checking activities, among other activities. So, even if the assessor might have no systematic power and executive authority in some Southern settings, they could still be considered as an assessor, as long as they have public legitimacy to support them for initiating change.

## Conclusion

### *Some policy implications of the research*

Our work tries to clarify how the TA theories and methods are precepted differently in the Iranian context. As the outcome of our research, we realized that this perception could be explained by asking three questions: *who* is assessing *what* and *where*?

- Where does TA take place? How are other entities treated in the TA? How inclusive/selective is TA in safeguarding values?
- Who does the assessment? How independent is it from the political power and hegemonic power? How extensive authority does executive power have in formal decision-making systems? What are the alternative assessors?
- What is being assessed? How much agency does it have toward the society? How do the assessee (the object of assessment) and society counter-define each other?

To elaborate on the implications of our research in practice, we would like to go back to where we began to design our study: the ontology matrix of TA. All our variables, *TA playground*, *assessor*, and *assessee*, can aid *Zeus*, *Robinhood*, and *Solomon* in designing a TA:

**Solomon:** When the societal debates of the assessee are extensive and profound, TA would better not be run by assessors who represent public institutions. Since they possess and commit to the hegemonic power, which is selective instead of neutral. So, they would be selective and value-laden in reflecting societal values in the TA playground. Besides, these assessors have the authority to ultimately execute their value-biased outcomes and misrepresent those social groups who do not share their value system with the political system. Here, Solomon, as the best-fitted paradigm, ought to ensure that neither the TA playground's antagonistic political relations nor the hegemonic political power of the assessor threatens the TA. Instead, Solomon could appoint and employ its assessor creatively among independent social actors, artists, and activists. In this way, Solomon reflects as many value systems as possible in TA by recognizing the role of the social actors in constructing multiple social realities.

**Zeus:** If the assessee raises little societal debates, then it would not hurt for the assessor to neglect counter-hegemonic debates since there are none. Similarly, the antagonism in the TA playground cannot sabotage the TA, its

mission, and its responsibilities. In this scenario, Zeus could be the fitted paradigm; since social actors play no role in constructing the social reality, there will be just one social reality. Zeus, accordingly, could choose its assessor among the governmental or parlemental enterprises. One example would be assessing Nano-technology in Iranian Science policy.

**Robinhood:** When the assessee has undeniable agency, but in the economy rather than society, the assessor needs to keep the optimum distance from the power. While not closing the doors to the counter-hegemonic debates, the assessor needs to have some formidable executive power to employ the outcomes of the TA. Meanwhile, the antagonistic playground might cause some unavoidable pitfalls for the outcomes of TA to be fully implemented. The assessor's bargaining power could be necessary to safeguard the values of the interest groups, regardless of their ideological tendencies. Here, Robinhood would be the best TA paradigm, where a single social reality needs to be chosen as a pragmatic setting for decision-making, while multiple social actors are involved in constructing the social reality. A fair example of this case could be environmental agreements, where sustainability is the core value and other aspects of reality are put aside to reach a practical solution.

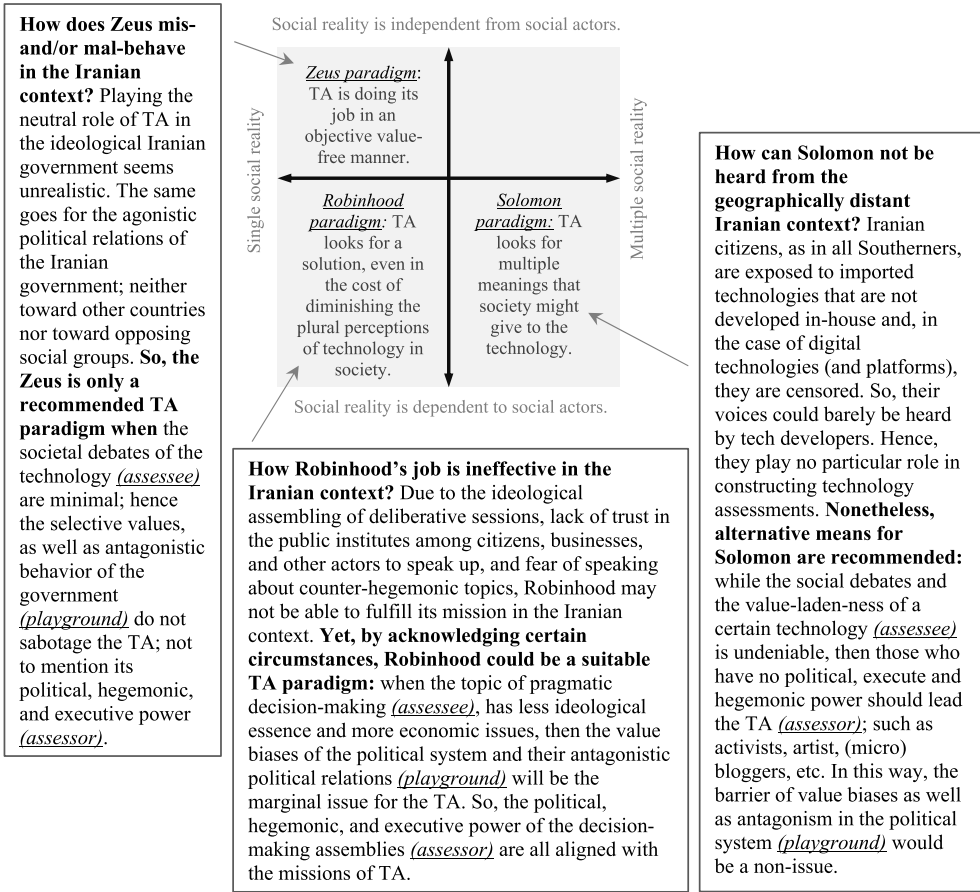
These intra-paradigmatic implications, next to the gist of the results (inter-paradigmatic analysis), are reported in [Figure 2](#).

### ***Research innovation and contributions***

While trending works on the TA in the Southern context focus more on adapting conventional TA literature and methods, our main contribution is to dig into the depth of narrations and realities of the Iranian context to critically investigate how, by acknowledging contextual differences, the scope of TA, its theories and methods, could be expanded. The underlying assumption of our contribution is committing to TA's definitions, missions, and potentials. Our second contribution is to present an inter-paradigmatic analysis of TA in the Iranian context instead of focusing on a single one. To reflect on narrations of all TA paradigms, we innovatively used the ontological matrix of TA: we used this philosophical tool for gathering symmetric qualitative data through our interviews, reporting our results, and presenting policy implications of our work. [Figure 3](#) depicts our innovations and contributions, showing how they are counter-related and build our research path.

### ***Research limitations and potential further research***

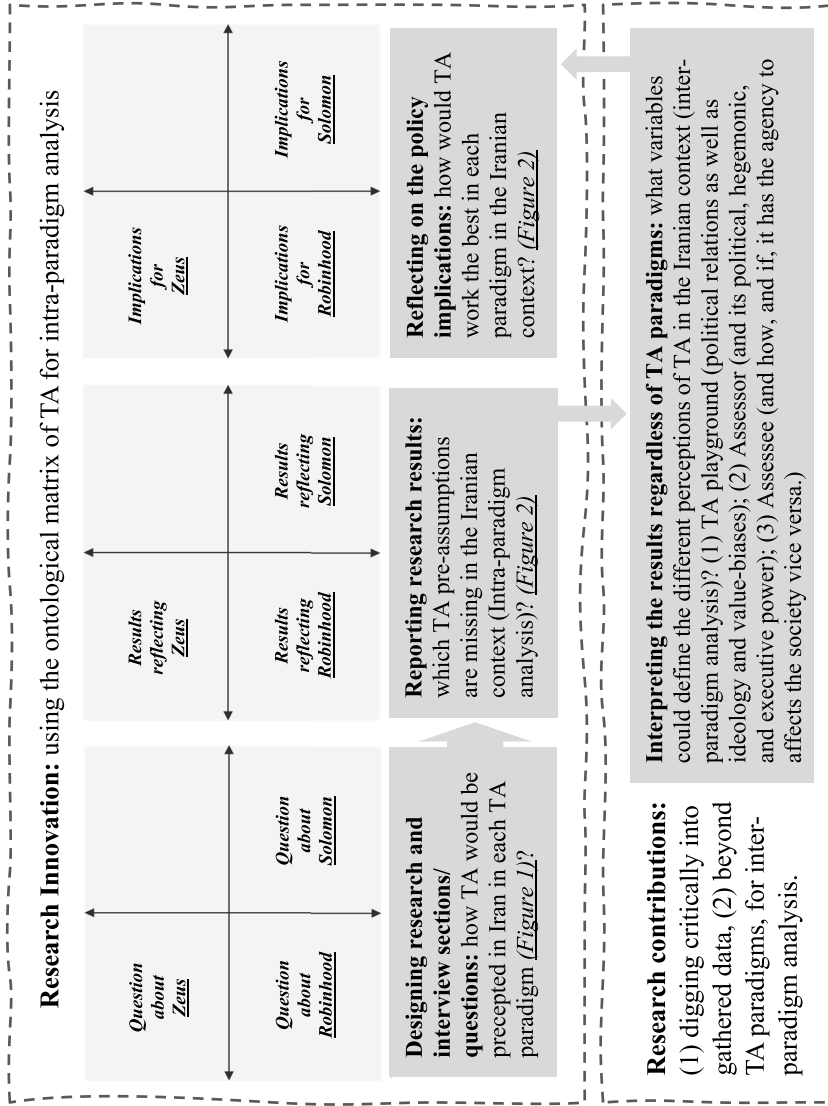
While this paper could inspire researchers who pursue an alternative mission for TA practices in the global South, it faces some undoubted limitations that could be raised in further research. As discussed earlier, the lack of empirical data and limited literature reflecting TA in the global South make it impossible to design inductive and deductive research. Being abductive research, our work lacks scientific generalization. Moreover, expanding the geographic scope and including more developing countries will enrich the input concepts and output results. So, comparative studies, while more Southern settings with well-defined contextual similarities and dissimilarities are engaged, could come up with more valid research outcomes. Also, as mentioned above, different



**Figure 2.** Intra-paradigmatic analysis of the Iranian perceptions of TA (results), alongside policy implications (conclusion), reflexing inter-paradigmatic variables (discussion) in each paradigm.

Southern industries might have different exposures to conventional TA studies; elaborating on the notion of the technology, the industry it serves, and the hospitality of those contexts toward TA could be a valuable inquiry. Additionally, Southern citizens might tend to censor themselves more while discussing critical topics. Not to mention that their voices are barely heard by tech developers. These might affect qualitative social and political investigations regarding TA, specifically in the Solomon paradigm, where multiple constructed societal meanings are perused. So, critically revising the definition of technology constructivism and determinism in the South could further contribute to this research field. Additionally, these trends could fuel institutionalizing creative alternatives for Southern assessors, whose authority to administrative change might be minimal, yet their efforts to reflect the realities of the quiet Southern citizens are priceless.

Despite all these limitations, what we imply in our work is that, when it comes to the developing world, TA theories and methods should be generous in defining, precepting, and framing the problem due to the unneglectable contextual differences. While TA could be described as a unified concept in the North, it should be conceptualized



**Figure 3.** Research summary, innovation, and contributions.

more diversely in the global South and, in the meantime, remain identified as TA. Our work, accordingly, is a critical and comprehensive step to conceptualize this diversification.

## Notes

1. Emphasizing on the official rate is due to the fact that there is no single rate to trade hard currencies in the Iranian currency market, trade, etc. (Sabeti, Khatami, and Mirtaheri 2019).
2. Regarding the technological development, Iran's Global Innovation Index (GII), measured annually by World Intellectual Property Organization (WIPO), ranked as 60 among 132 countries in 2022, has been almost steady in the 2015–2021 period (Shanehband 2022). Also, according to the latest available data on 2017, Iran's Gross Domestic Expenditure on Research and Development (GERD) was measured as 0.83% of GDP (Sadreghazi 2021).
3. To name a few, some venues for these debates which meet the missions of TA without being academically or scientifically articulated, are some critical documentaries produced by the Iranian policy-making bodies (Saeidinezhad 2021; Sohani 2015), next to a handful of influential critical panel discussion series by scientific associations, cumulative non-profit blogs, etc. Most of these practices might not yet have proper funding or specific policy outcome, but they are fuelling and vibrating the scientific communication, and in some cases public engagement.
4. The Country Reports; which is unavailable in the case of Iran.
5. Since the number of Iranian immigrants, amongst them expert immigrants, is dramatic, we must have included viewpoints of those who have experienced living and working in foreign counties as well.
6. Where social reality is independent of social actors, it will be beyond actors' will to construct multiple realities. So, the cell where actors are observers of social reality, and social reality is not singular, will be vacant.
7. In the Persian version of our work, we have called this quadrant Phoenix after an Iranian myth. In this myth, a phoenix has raised a boy (Zaal) as his own son. When Zaal decides to leave phoenix and join the human society, the bird offers him three of his own feathers and asks Zaal to burn one of them whenever he is in trouble and needs help. So, this feather is there to solve the Zaal's problems in a way that the phoenix offers.
8. Chambers of Commerce are deliberative entities where which each member represents interests of its community and bargains them; so, ontologically speaking, while the social reality is single, it is not independent from the social actors. This represents Robinhood.
9. As mentioned earlier, Supreme Councils are allegedly deliberative assemblies. Yet, they objectively reflect the values of the governing system and do not recognize various value systems of the society. So, ontologically speaking, there is just one social reality which is independent from the interests of social actors and only reflects the political system's values. This represents Zeus.
10. In this case, social reality is dependent on the social actors; since it reflects values and interests of a specific social group. Meanwhile, the social reality is not multiple; since one standpoint is chosen. This represents Robinhood.
11. Engaging public in the debate stands in an ontological position where the social reality is dependent on the social reality and it constructs multiple social realities. This represents Solomon.

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