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## ABSTRACT

Inclusive design in information and communication technology (ICT) is the development of information and communication technology artifacts that are accessible and easy to use for as many people as possible. Human diversities must be considered when producing these inclusive design artifacts. It is not only important for abled people but also extends to people with disabilities, the elderly and anybody challenged with using these artifacts. Yet, few designers and developers adopt inclusive design methodologies in their practice. This study seeks to identify and understand the factors that influence the implementation of inclusive design practices in organisations. The methodology was based on a qualitative enquiry approach. Semi structured interviews were used to collect data from South African organisations and thematic analysis employed for analysis. Of the five factors presented in the findings, diversity was shown to be the most influential in the implementation of inclusive design practices in organisations. These results have implications on organisational culture and practices.

## Keywords

Inclusive design in ICT, diversity, organisational culture.

## INTRODUCTION

Organisations and experts involved in the development of software are challenged at developing artifacts that are inclusive and can be used by as many people as possible, including users with physical or mental impairments, limited computer literacy and other socio-economic factors cause users to hardly interact with an organisation's restrictive information and communication technology (ICT) artifacts (Fuglerud, 2014, Dhoundiyal, 2019). Many stakeholders ignore the requirements for inclusivity at varying stages of the system development life cycle (Zhu et al., 2020), rendering the designed and developed software products and services inaccessible and not usable to most.

Inclusive Design (ID) has been advocated for as the development of ICT artifacts that are accessible and easy to use by the broader population (Steward, 2020). Inclusive design is not only important in the lives of abled people but also extends to people with disabilities, the elderly and anybody who feels challenged by ICT artifacts. The inclusive design approach is traditionally perceived as an innovative strategy of building software solutions that meet the needs and capabilities of a diverse entire population (Mosca et al 2018). To build such a product, designers

use several tools and techniques that support them in the application of inclusive design approaches. For example, designers must ensure that each of the elements on the user interface can be experienced in more than one way and should accommodate for a range of circumstances (Spivak, 2020). Designers should not only possess technical skills, but also have both listening skills and empathy to produce effective design outcomes (Galford et al. 2015). For example, a user accessing the artifact for the first time will look for introductions, a list of activities or training material whereas an experienced user will know exactly what they need to do and quickly complete the task while multitasking (Spivak, 2020). In addition, having comparable options can increase the chances of meeting the unique needs and abilities of all users, without compromising the quality of content (Spivak, 2020). Designers should be able to maintain a coherent user interface that employs well established design conventions and familiar patterns to reinforce what is required and improve user experience (Spivak, 2020). Designers can also adopt ‘methods that calculate design exclusion, i.e., what percentage of the population is excluded from using a product based on its features’ (Correia de Barros, 2022). Despite the various tools available to designers, there remains a gap between theory and practice – on how to build software solutions that meet the needs and capabilities of a diverse entire population (Mosca et al 2018). Aside from the methods and tools, there are contextual factors that influence how designers implement the inclusive design approach. This study seeks to explore these factors and provide an explanation as to what factors influence the implementation of inclusive design practices in organisations. As such, the study posed a question on what the factors are and how they influence ID practices.

## **RELATED STUDIES ON FACTORS INFLUENCING INCLUSIVE DESIGN**

### *Team Diversity*

Personal biases lead designers to design for users who are just like them, to overcome this bias, it is best to employ a diverse team of designers or a designer who has a sense of empathy (Spivak, 2020). Collaboration and inclusion of persons with disability in the design process leads to unique insights into their needs and requirements (Correia de Barros 2022). Several researchers have advocated for a diverse design team when advocating for inclusive design. Diversity can be defined as people’s natural differences and the variations of abilities, inabilities, knowledge, experiences, culture, and skills, it is a reality of life that is difficult to ignore (Fang & Hua, 2021). Inclusive design as a set of methodologies draws upon these human diversities and abilities to inform, shape, and create artifacts that are accessible by the broader population (Steward, 2020). The assumption of a homogeneous customer base with similar likes, problems, needs, values, and cultures helps to simplify the process of creating ICT artifacts, however end users, whether internal or external have different requirements and in some cases, specialized needs (Wan & Poitevin, 2020). To meet these diverse needs, the development team’s composition, methodologies, and behaviours play an important role for the success of a project. A team’s composition for example can consider how diverse it is in terms of its demographic makeup and pay attention to issues of gender, age, ethnicity, nationality, religion, abilities, and inabilities (Kilduff et al., 2000). Hewlett et al (2013,30) report that a ‘team with a member who shares a client’s ethnicity is 152% likelier than another team to understand that client’. It is well established the diversity and inclusion practices in the workplace significantly contribute to an organization’s innovativeness (Chaudhry et al 2021), team performance and resilience (Diegmann & Rosenkranz, 2017), speed to market and software functionality (Günsel et al 2012) that addresses their customer’s needs. It is therefore important for organisations to create inclusive workplace by developing a dynamic support ecosystem containing diverse inclusion groups, buddy systems and job coaches, creating an environment for open communication and feedback (O’Donohue & Struckman, 2020).

### *Management Support*

Management support for any project’s success is crucial. When advocating for inclusivity and addressing the needs of all people, having a diverse management team has a positive influence on the decision-making processes and performance outcomes within the organisation (Guo et al., 2017). Senior management support is vital to the implementation of inclusive design within an organisation as it leads to enhanced system design practices other than

just meeting business requirements (Zhu et al., 2020). A manager's role is to guide and enable the work of a team and need to communicate with their team to assess their work, understand barriers and help to find solutions (O'Donohue & Struckman, 2020). Management support and commitment amongst stakeholders is a necessary precondition for being able to conduct a user-centred process (Fuglerud, 2014). When management actively supports and drives the implementation of projects and initiatives that follow an inclusive approach, it sends a powerful message to other members, that the organisation seeks to understand individual needs, embraces diversity and inclusion in designing their products (Wan & Poitevin, 2020). Thus, management support and their commitment influence the implementation of inclusive design projects (Fuglerud, 2014).

### *Organisational Culture*

An organisation's culture is commonly theorised as shared values, norms and deeply held beliefs of employees, and visible in corporate practices, statements, symbols, and artefacts (William 2022). Organisations that focus on developing an organisational culture that values the contributions of a heterogeneous workforce (Ndudzo, 2015) and have a shared understanding of delivering on products and services that are accessible to all their customers have positive influence towards the implementation of inclusive design projects. This culture shapes the behaviour of employees (William 2022) and influences the organisations' effectiveness in the implementation and delivery of their products and services. Organisations with a culture of integrating accessibility-related standards into their culture and processes influence their effectiveness in the implementation and delivery of accessible products and services. This helps rid attitudinal barriers as organisations are required to address the needs of people with disabilities and other inabilities throughout the product development lifecycle, and to document their efforts (Horton and Sloan, 2014,107).

Given that organizational culture significantly contributes to how values are addressed in products and services design and development (Hussain et al 2020), it is important then, that organisational culture integrates inclusive design methodologies to cultivate a culture of inclusivity that dismantles barriers for all people who use those products and services.

## **METHODOLOGY**

A qualitative inquiry approach was adopted for the study. Data were collected from nine participants who were part of software development teams in the Western Cape Province of South Africa. A snowball sampling technique was adopted to identify respondents that had a wealth of experience in software development. Semi-structured interviews were used to elicit information from participants. The emergent themes from literature on *factors influencing inclusive design implementation* were used as a guide for the research instrument. Prior to data collection, ethics protocols were observed, by firstly applying for ethics from the institutions to conduct the study; and secondly by obtaining ethical clearance and consent from the participants and the organisation they worked for. For each organisation, one participant, the head of the development team participated in the interview. All participants were informed that participation was voluntary, and that all information will be kept confidential and anonymised. All interviews were recorded with the consent of the participants. After each interview, participants had the opportunity to listen to the interview to add additional information for clarification purposes.

After each interview, initial data analysis followed. This step required the researcher to listen to each interview recording and transcribe it. During the transcription process, notes made during the interview, were added to the transcription which allowed for the researcher to relive the interview. After each transcription, initial coding followed – a process through which the researcher sought to identify key issues that were pertinent to the research question and the emergent themes from literature. After initial coding, the researcher made use of the NVivo software programme to manage and organise the data set thereby assisting and facilitating analysis (Miller & Salkind, 2002).

## FINDINGS AND DISCUSSION

### Descriptive findings

Data were collected from nine (9) research participants who were part of the systems development teams in their organisations. All participants had experience and was active in the planning, analysis, design, testing, implementation, and maintenance system development phases. Not all participants were involved in the development phase, however most was actively involved in development. The biodemography of the research participants was required to get an in-depth understanding of the participants responses, enriching the interview observations. The researcher posed the biodemographic questions to each participant at the start of each interview before engaging the interview questions. The researcher used this data to enhance the analysis of the narratives collected in the interviews.

Table 1 depicts the biodemography of the research participants. More females participated in the interviews than males. Participants were between the ages of 26 and 62 with between 6 and 42-years' experience working in a professional environment. 3 participants are of the coloured ethnicity, 5 white and 1 participant preferred not to disclose her ethnicity. Seven of the participants had more than fifteen years of experience as software developers and the majority were of white racial background. It was unusual that most respondents were female and older than twenty-five given the history of systems development projects in the country. Four (4) of the respondents' highest educational achievement was an Honours degree, three (3) completed bachelor's degrees and of the remaining two (2), one had a certificate and another a Master's degree. The job titles of the participants highlighted that all participants were active in software development teams in their organisations.

The study acknowledges that the diversity of the research participants is limited and that besides the two ethnic groups interviewed, neither blacks, Indians, nor other ethnic groups responded to the invitation. This development was also necessitated by the qualified participants who responded. The study was essentially focussed on the key informants' expert knowledge and not how diverse they are. In other words, while data on age, gender, ethnicity, education, experience, and job title were collected, their analyses showed that teams were created mostly on the merit of education (qualification) and experience (skill). As such, there was no significant evidence to show any other correlation based on other demographic elements apart from that most respondents were female.

*Table 1: Biodemography of research participants*

Respondents	Age	Gender	Ethnicity	Education	Experience	Job Title
P1	39	Female	Prefer not to say	Honours	8	Business Analyst
P2	41	Female	Coloured	Certificate	20	Manager
P3	62	Male	White	Honours	42	Business Analyst
P4	42	Female	White	Honours	20	Systems Analyst
P5	45	Female	White	Bachelor's Degree	22	Director
P6	51	Female	Coloured	Bachelor's Degree	28	Director
P7	44	Female	Coloured	Masters	23	Manager
P8	26	Female	White	Honours	6	Systems Consultant
P9	58	Male	White	Bachelor's Degree	35	Manager

## Empirical findings

### *Perception of Diversity*

Findings showed that diversity was categorised into two areas: inherent and acquired diversity. Inherent diversity received more discussion and was seen to be important in understanding South Africans and providing products and solutions for their market. According to respondent P1:

*diversity in the context of South Africa is something that needs to be fostered, celebrated rather than resisted. People with diverse cultures, languages, backgrounds bring different dimensions to projects. People with the same backgrounds have the same viewpoints. Diversity brings more creative problem solving and solutions to the table. In our company, we have a very rigorous employment equity policy in support of diversity goals.”*

Diversity was also seen to include *different personalities and characters* (respondent P4) and should not be seen as just *about gender, sexual orientation, background, disabilities, culture, age, mental health. It is more than that – it is all of humanity as a collective* (P5). According to respondent P6, considering all the diversity facets of people is important

*because you can easily misunderstand somebody. A simple example was my experience with a speech therapist. My son has a disability and was struggling to understand and comprehend certain words. After some investigation it was understood that from a cultural perspective those words have a different meaning to what the therapist understood the words to mean. Understanding diversity is critical to be able to interact.”*

Acquired diversity was not regularly mentioned but was identified as an important element for organisations to consider. Respondent P7 mentioned the different ways of thinking, different skills, and job levels; whilst respondent P9 identified the *different ways of working and communicating as part of diversity passed through a work culture*. According to respondent P9 *all these types of diversity are important for inclusivity and inclusivity must have a balanced approach*. To achieve the balanced approach and ensure inclusivity in the design and development of software artefacts, Hunt et al (2018) calls for organisation leaders to have a more ‘granular understanding of the dynamics across inherent and acquired diversity dimensions. This is of paramount importance for the successful implementation of inclusive design approach because acquired diversity constructs such as personality, programming experience, and social skills between members can act as a source of frustration (Vasilescu et al 2015).

Most respondents acknowledged that they fail to incorporate inclusive design approaches in their design and development processes. For example, respondent P1 speaks of how they *never look at inclusive design as one of the principles during the design phase, it’s just something we haven’t consciously thought about in our environment. If the team is diverse in nature, we won’t require to get someone else on board to assist with the project*. A consistent perception was that most teams saw diversity to encompass race, gender and skill set to perform a task, and less from the perspective of people with disability and vulnerabilities. Respondent P8 agreed to this view, stating that *what I think is lacking is from a disability point of view, that is always never factored in. In our development, catering for the needs of people who are visually impaired or in terms of accessibility to our systems, to be honest, we haven’t really taken that into account*. Respondent P4 felt that the challenge was not the lack of awareness, since having the right people in the room brings in the diversity aspect; but the challenge was the fact that *we don’t think about diversity from the perspective of the vulnerable, we are completely ignorant. From experience we wouldn’t necessarily include people from the disabled groups to give input. It’s always retroactively that we realised that we should have included diversity. We need to have a check box and question whether diversity has been considered during the design and development phases.”*

### *Acquired diversity influences team performance*

Selecting a team that had members who complimented each other was noted as important. Participants were more vocal on the need of having acquired diversity first then complimenting this with inherent diversity. A consistent

claim was that acquired diversity enabled the actual work to be done, allowed innovations, creativity, and people with different ideas to learn from each other (respondent P4). Respondent P2 clarifies:

*“During the planning phase, for example, I won’t use my cultural background, but I’ll use my skills and background obtained in the retail industry. This is what makes me different from another entity in my team. The retail industry is very rigid and its very much process driven. When I moved to this organisation, I found that they were working on a project which entailed defining a process that I had previous experience of, but in a retail context. I brought my knowledge and my skills from that experience. We contextualised our different environments, consolidated knowledge and packaged it. We reused some of what I’ve already done, it was based on industry standard practice and met audit requirements in terms of policy and accountability. So that’s how team diversity works, its people working collaboratively to come up with creative solutions.”*

Respondent P8 echoed these sentiments by stating that *when we initially think of diversity we think of culture and ethnicity, but I think it’s not necessarily an important factor. You need diversity of skills and diversity of team members involved across the organisation that needs to be part of the project. It’s the most important aspects to having an inclusive design project.* In support of these views was respondent P9 who claimed that *team diversity to us implies skills based, you need the subject matter expert, the analyst, a good developer, a good project manager. This is the most important type of diversity to get the best outcome of your project.* These findings are in line with researchers who have found that acquired diversity or task-related diversity positively influences team performance benefits such as improvements in decision making, problem-solving, creativity, and innovation (van Knippenberg et al, 2020; Horwitz and Horwitz,2007). Most respondents saw acquired diversity as imperative to outcomes, and only respondent P6 voiced that inherent diversity was critical in closing the blind gaps during design and development, *and that a team needs different personality types and that a good composition of a team should have the analyst, the driver personality, the sunshine yellow extroverted individual and then somebody that brings you back to earth and somebody to show you the feelings side of things. This makes a great team.”* Given the fact that most respondents consistently applauded acquired diversity as the core makeup of a good team, this study reiterates Fazelpour and Steel (2020) to call for more studies that focus on explaining to team leaders and top executives how inherent diversity might benefit team performance, especially when it comes to inclusive design.

### **Management support**

A common perception from the respondents was that project success was dependent not only on the design and developers’ ability to deliver on the project, but also on *management’s involvement, awareness, and support in all phases of the development process, from initiation to implementation, to be able to appreciate the need for what is being advocated for by the inclusive design approaches* (Respondent 8). In this way, one would have *access to the right people and resources* (P5) because *top management lead strategic goals and initiatives, therefore form a very important part of the development process* (P3). Access to financial resources was important because the implementation of inclusive design approaches requires *extra time allocated to the project, additional resources and in the end, it costs money. The support for it (inclusive design) must be in place outside of the development team* (P9). Respondent P1 agrees and explains that *change management, which is what would happen if inclusive design were to be incorporated in their design and development processes, would be an easier process with the support of management. Some solutions may have financial implications in terms of cost and recurring cost, which needs to be approved by financial sponsors. Such support will not be obtained if they don’t understand how the system or solution is going to change the landscape and how it will benefit them.* The lack of awareness on the changes required was noted by most respondents indicating that *sometimes management doesn’t understand what the end user is doing or wants from the system, and they [management]have their own stance or viewpoint. They are not on the ground to ask more questions, if they don’t understand, they will just resist the change* (P2). They lack the big picture which is important for them to render the support (P5).

Management’s responsibility was to steer and implement policy changes, specifically in advocating for diversity changes in the organisation and ensuring that the organisation has the systems, processes and technologies in place that supports the implementation of those policies (P2). To some respondents, there was a need for a project

champion from the executive and therefore interchanged management support with project champion (P4). Respondent P8 agreed noting that as a senior manager and part of the top management team, she would not consider herself as a project champion for diversity and inclusivity. She had *never consciously and explicitly thought to ensure that the team I lead and the projects I sit on are diverse and inclusive in nature. I usually lead to ensure project requirements are met. Now there will be changes, I will bring it up with my staff. We need to instil diversity as a formal underlying discussion item.* These findings align with those in literature and further confirm that inclusive design depends on management support (Zhu et al 2020).

### *Inclusive design as a costly exercise*

Inclusive design methodologies were perceived to add an extra burden to the design and development process, which affected the time to market of the product. Respondent P2, questioned the overall benefits of inclusive design towards the early completion of the project: *“Is it worth the development effort as it adds between 15 and 20 percent to the development effort, is it worth doing that when compared to having one or two people that will complete an application once off?”* Whilst these sentiments were not recurring, Respondent P9 vocalised a similar concern:

*It has extra cost and additional testing cycles, additional resources, there’s no point in developing this whole function and then you don’t get somebody who’s impaired to actually use it, you need to sit with them, observe them to check how it works, if you test yourself, your bias is towards you, and you can see and hear everything. The limiting factor is the extra cost, time and resources required through the development phases.*

Respondent P3 explained that most of the solutions were not designed with inclusive design approach in mind, and if they are to reconsider doing so, then most of their business processes will have to be reengineered. That is 30% of the time off. These concerns have also been documented in prior studies. For example, Mendez et al (2019) and Lundgard et al (2019,18) report on how designing for and with people with disabilities (PWD) directly is costly, both in terms of money and time because it usually ‘involves securing access to specialized materials and technologies, from low-tech solutions to high-tech devices. To address these concerns, designers and developers should include inclusive design approaches right from the start of a project, which would then reduce the need for redesign later, which is far more costly and time consuming, will be reduced (Bue Lintho and Begnum, 2018)

### *Organisational culture*

A consistent viewpoint from all respondents was that an environment conducive to the team should be fostered to enable inclusive design implementation. The organisation *should embrace the differences the team members bring to the team* (Respondent P3) to allow team members *to learn from one another because ideally, they would all be from different backgrounds* (Respondent P4). However, in some organisations, a silencing culture to those who were seen not have the necessary technical skills prevailed as Respondent P4 explains:

*“I did find in some of the development activities, there was a lot of unfairnesses. It was evident that individuals with more technical know-how their voices are heard and that they are given preference to raise their opinion of what is the possible solution. There was very little, in my experience, opportunity for the one initiating the change to have enough voice to express their desire.”*

A silencing culture was also noted by respondent P6 who had to formally communicate the impact of this culture *on the development process to the project manager and all the way to top management.* According to most respondents an organisational culture that embraced team diversity and considered everyone’s voice was able to *not only develop and grow the individual team members but also improve the organisation itself through performance improvement* (Respondent P7). For most organisations to have a diverse team, respondents tended to highlight their recruitment process where the South African Employment Equity Act (EEA) was emphasised. The goal of the EEA is to ‘promote the transfer of skills to attain adequate involvement of black people in the operational, professional, and executive decision-making processes’ with the intent of fostering racial diversity and the introduction of novel and innovative business ideas (Mofokeng et al 2018). All respondents noted that they have a diverse team, specifically, inherent diversity and race was the most frequently cited characteristic. However, given the lack of

expertise in the South African information technology sector, specifically with regards to accessible software development, Respondent P5 found the policy not adequate in addressing acquired diversity as much as they would like and felt that the *organisation can do better*. Respondent 9 agreed with these sentiments and indicated that acquired diversity is difficult to come by, especially from the designated groups. Horwitz and Jain (2011) noted that even though the EEA has been around for fifteen years, South Africa continues to have the ‘anomaly of an oversupply of unskilled and semi-skilled labour and a shortage of high-level skills, especially technical and managerial skills’ (310). Recently, some gradual changes towards the EEA in the workplace can be reported, however, the challenge on how to address EE in a context that requires highly skilled employees that will drive the Fourth Industrial Revolution (4IR) remains (Oosthuizen and Mayer 2019).

Findings also showed that organisations should support a culture of continuous learning because of *uncertainties such as what COVID-19 presented to us. It brought about the need for organisational change in how we approach the issue of inclusive design* (Respondent P2). According to respondent P4, their organisation has a unit that champions issues of diversity and inclusion, but states that *having such an office does not necessarily translate in the actual design, implementation and delivery of services that are accessible to all. There remains a gap between advocacy and the actual doing*. To achieve full diversity, both inherent and acquired diversity, organisations should strive for a culture that values and fosters diversity through the implementation of equity policies and legislations such as the EEA; and invest in a continuous learning culture that allows employees to acquire new knowledge, share experiences by encouraging international rotations for example (Hunt et al 2018) and participate in team building efforts that promoted team cohesion. It is through continuous learning that team members perceived not to possess acquired diversity can grow and contribute to improved organizational performance.

## CONCLUSION

The objective of this study was to identify and understand the factors that influence the implementation of inclusive design practices in organisations. The study was based on the qualitative research method. Data were collected using semi structured interviews from designers and developers in South Africa. The findings present five factors that influence the implementation of inclusive design practices in organisations: the perception of diversity, and how it influences team performance, management support, cost, and organisational culture. The implications of these results were discussed. While team diversity was shown to be the most influential factor, an interesting perspective arose, one that might need investigating in future studies. It was established that team diversity might not necessarily be literal but also a diversity of skills and expertise. Essentially, a design team member with vast design experience that caters for differently abled populations could be more valuable and affordable to source than involvement of people with disabilities themselves in the team (unless that member is a design expert as well). The perspective of representability and inclusivity is thus pronounced more importantly than auditing who should be on the team. As such, if a team had such an experienced member who understood the needs of those populations previously excluded, then the team is considered well diverse. Consequently, while team diversity is essential, what is more important is understanding its most beneficial value and meaning in inclusive design projects. One limitation noted in this study is the low response rate. This limitation had no significant effects on the results as the empirical findings are shown to be substantiated in literature. The study was restricted to the cross-sectional time-horizon, aimed at studies conducted over a short period of time hence was limited in the number of respondents. This limitation only restricted the depth to which analysis and findings could be triangulated. Future studies can consider using the longitudinal time horizon. In their findings, longitudinal studies analyse a sizeable number of responses, an approach more appropriate for depth in medium to long-term research projects. Using inductive approaches to theory, the researchers could apply observations gained to further understand and explain the phenomenon in depth.



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