

A SOCIO-TECHNICAL ACCOUNT OF HOW A SYSTEMS DEVELOPMENT METHODOLOGY IS USED IN PRACTICE

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Abstract –

This paper reports on research into how IT practitioners use an information systems development methodology (ISDM) with a focus on describing how use is bound up in everyday social and organisational structures. The paper adopts an interdisciplinary approach to inquiry known commonly as “social informatics” (SI) providing a sensitising frame in which to understand the use and enactment of a methodology in the workplace. The paper extends a model of organizational analysis by applying Lamb & Kling’s (2003) social actor theory concentrating on the relationships among IT practitioners, the ISDM, and a larger social milieu surrounding its use. An interpretive case study, relying primarily on interview data, was used to seek an in-depth understanding of a dynamic, complex, and multi-faceted phenomenon — ISDM use — with a large Australian bank. The main contributions of the paper operationalises social actor theory in terms of its ability to explain the method enactment process; and provides an extension of theory of ISDM use at an individual, project, organisational, and industry level.

Keywords: Socio-technical perspective, Social actor theory, Information Systems Development Methodology, IT practice.

1 INTRODUCTION

This paper reports on research into how IT practitioners use an information systems development methodology (ISDM). The focus of the paper is on describing how use is bound up in everyday social and organisational structures. The paper extends previous research by adopting an interdisciplinary approach to inquiry known commonly as “social informatics” providing a sensitising frame to understand better the use of the methodology in a particular organisational context. According to Kling *et al* (2005) social informatics (SI) research focuses on the relationships among people, information & communication technologies (ICTs) – in this case an ISDM – and a larger social milieu that infuses meaning and purpose surrounding its use. The research approach makes use of Lamb & Kling’s (2003) social actor theory by demonstrating its plausibility to illuminate an under-researched aspect of information systems practice – the context of methodology use – at the individual, organisational, project and industry level.

This research is important as the role of ISDMs in increasingly ambitious development projects, undertaken to construct complex inter-organizational infrastructures, is not well understood. What we do know is that partial ISDM use is common with widespread adaptation of methodologies in use. There are many technical reports on how ISDMs are adapted in use (Reimenschneider & Hardgrave, 2002; Lindstrom & Jeffries, 2004) but little detailed examination at a number of levels (individual, project, organisation, industry) of how and why this occurs. This paper examines ISDM use and adaptation from a socio-technical perspective across all four levels in order to provide a more complete understanding of the method enactment process.

According to Avison & Fitzgerald (2003) ISDMs are important for two main reasons: first, based on some life-cycle model they break the IS development process into phases or iterations; and secondly,

they provide tools, techniques and procedures to assist developers in their work. For instance, ISDMs address many of the roles required in developing information systems such as determining or regulating activities and providing resources to support actions. However, despite the existence of formal approaches for developing software for several decades, the literature is consistent in reporting that only about half of all organisations actually follow a methodology (Fitzgerald, 1998; Avison & Fitzgerald, 2002). Why are methodologies not used more? Research to date has yet to report on this situation fully. One reason offered for a lack of understanding of ISDM use was that prior notions of software engineering have encouraged us to regard software as the straightforward outcome of a technically managed process not influenced by outside influences. Yet, a review of research in IS highlighted the fact that human factors are as important as technological factors (Avison *et al*, 2001). A small, but growing body of research has been conducted on the specific topic of methodology use. The work that has been carried out is limited in its ability to consider the complex social and organisational context of methodology use. Most field research on methodology use (with the noted exception of the following socio-organisational studies: Fitzgerald *et al*, 2003; Vidgen *et al*, 2004; Kautz *et al*, 2004; Backlund, 2004; and Aydin *et al*, 2005) has a positivist-style method engineering and tool orientation that brings focus to structural aspects of the methodology, but without any consideration of the many individual, project, organisational, or industry level issues. In short, the prevailing approach to understanding “use” in information systems research to date has neglected the messy and complex way people work and live, and the dynamics by which institutional processes and structures shape ISDM use.

Based on the findings of a detailed case analysis, this paper details a fresh approach for understanding methodology use across multiple levels by conceptualizing the IT practitioner as a social actor and method user. The case example adopted an analytical orientation (Kling *et al*, 2005:7) in that the intent was to contribute towards developing theory about ISDMs in institutional and cultural contexts. The approach to theory building, with an emphasis on concept development and operationalisation, made use of Lamb & Kling’s (2003) social actor theory to illuminate an under-researched aspect of information systems practice – the context of methodology use within a large Australian bank.

By taking a socio-technical analytical scheme, the paper (a) compliments the above mentioned socio-organisational studies; (b) provides a grounded description opening the black box of method enactment showing how ‘social context’ influenced ISDM use in a large IT department of a major Australian bank; and (c) by mapping the case interview text to the sixteen pre-defined codes, we have operationalised Lamb & Kling’s (2003) social actor theory in terms of providing an extension of theory of ISDM use at an individual, project, organisational, and industry level.

The rest of the paper is organised as follows. In section 2 we discuss our theoretical approach to the inquiry. In section 3 we give a brief overview of the case and describe the conduct of the study. In section 4 the case findings are presented and analysed. In section 5 we provide a closing discussion.

2 THEORETICAL FRAMEWORK

In this section we discuss the theoretical approach to conducting the study, and define what it means to use and enact a method. By adopting a social informatics (SI) frame the paper presents an argument that ISDMs are social institutions that exert their own types of agency, and that ISDMs also interact with human agency in the systems development process. In this role, it will be argued that ISDMs and people can only be examined fully through socio-technical perspectives, and that the technical components of the methodology cannot be fully understood separately from the social and organisational context in which they exist. According to Lamb & Kling’s (2003) social actor theory, people’s individual autonomy (their agency) and their behaviours are shaped by the social norms, institutional forces, and the social and physical structures that surround them. This approach reflects what Orlikowski & Iacono (2001) identify as the ‘ensemble view’ of technology where ICTs are components of a more complex socio-technical ensemble that include people, work practices, and institutional and cultural factors. In terms of this research example in *The Bank*, structure includes

work procedures mandated by the ISDM, office layouts, the day-to-day interactions within and among project groups, and authority structures based on power and expertise among the bank's IT department. Given this view, IT workers can be seen as complex social actors acting in constrained ways, rather than simple "users" of the ISDM (Lamb & Kling, 2003), and the function of ISDMs are largely institutions or structures around which social actors — in this case the IT practitioners who are the main focus of the analysis — operate.

According to the above argument, we define use or enactment of the ISDM as a process or capability in which social actors (IT practitioners) respond in a dynamic interplay between social context and intentions (their agency) to determine a systems development approach for a specific project situation. Given this view, the case analysis applied the Lamb & Kling (2003) *user as social actor* model as a conceptual lens to understand methodology use within a single organisational setting. The *user as social actor* is a context-centred research model specifying a matrix of social relationships and is comprised of the following constructs (Lamb & Kling, 2003:213). **Environments:** methodology use needs to recognise the regulated and/or institutionalised practices of the bank, and other associations or locations that circumscribe organisational action. **Affiliations:** people work together with the methodology comprising social networks (both professional and organisational). These networks exist within the bank but also apply to the IT industry as well, and to a wider national and international context. **Interactions:** social actors see themselves as organisational members working with others and using (a methodology and other media such as email, telephone) in support of their interactions. Information and resources are mobilised as people engage with *affiliated* organisations. **Identities:** IT workers are defined by their avowed presentations of the self and ascribed profiles of organisation members as individuals (analyst programmer) or a collective entity (IT professional). This model of method use is comprised of the above four dimensions and a further sixteen behaviours of connected and situated individuals. Table 1 presents the four dimensions along with empirical examples from the case study data.

3 THE CONDUCT OF THE STUDY

The research method adopted in this study is that of an interpretive field study (Walsham, 1995). As pointed out by Kling *et al* (2005), people's interpretations of an ICT are based on prior beliefs, and the perceived new opportunities and demands it creates. How people interpret an ISDM is important because IT workers with different interpretations will adopt and use the ISDM differently. Therefore, an interpretive case study was chosen to produce a subjective understanding of phenomena. In terms of methodology, the case aimed to produce an understanding of the social context of the phenomenon and the process whereby the phenomenon influences and is influenced by the social context. In the researcher's role as an outside observer, the semi-structured face-to-face interview was chosen as the primary data source.

The sampling strategy for the interviews included a combination of purposeful and theoretical sampling (Schwandt, 2001:232). Three occupational functions within *The Bank* were selected for their similarities as well as their differences. The unit of analysis for the case study were IT professionals comprised of project managers, systems developers, and method support personnel within the systems support and systems development division. All *semi-structured interviews* were guided by an interview protocol and interviews with IT practitioners dealt with the following issues: reasons or motives for using the method; the conditions that shaped their use; and the enactment process itself. The average length of each interview was approximately one hour. Interviews were taped. A total of thirty interviews were conducted with twenty-five informants from different projects and at varying levels in the organisation. Sixteen interviews were carried out in the first round in December 2003 and a further fourteen interviews in the second round in March 2004.

To commence analysis, the researcher created and operationalised a list of codes prior to fieldwork (*c.f.* Table 1). By operationalisation, we mean that social actor theory was expressed in coded elements that could be identified in textual analysis. In attempting to gain some kind of theoretical

understanding of the dynamism and complexity of the text, the Lamb & Kling (2003) model was used in a form of content analysis where the text was systematically listed, coded and categorised according to the sixteen behaviours of the connected and situated individual. The list of researcher-constructed labels that best captured the description of the phenomenon was then applied to the text to codify and extract the data associated with each interview – a form of content analysis. This same format was carried through the entire thirty interviews. The form of data therefore consisted largely of event histories about what happened, and who did what, when, and why – that is, events, activities and choices over time. This approach to analysis accords with Langley's (1999) quantification strategy where descriptive patterns of events could be discerned, counted and the *a priori* model mapped. By mapping the interview text to the social actor theory, we have extended the existing theory by showing how the use of the methodology within context interacts with social actors across four interconnected levels.

4 FINDINGS

The study focussed on an Australian bank. The banking and financial services sector was chosen because of the extremely important role that IT plays in the success of companies in this industry, and the bank selected has extensive experience and use of an in-house developed methodology. The Bank's IT division consists of approximately 700 people, and has developed and documented an internal methodology applicable for development and maintenance tasks. The ISDM is based on traditional 'waterfall' systems development life cycle (SDLC) phases, commencing with a feasibility study and concluding with testing and implementation. Maintenance is not seen as a phase of the lifecycle, but an iteration of software evolution. The ISDM is also aligned to an in-house project management methodology. New versions of the in-house ISDM are updated and introduced on a regular basis as development approaches evolve. The in-house methodology covers all new development, package acquisitions and any planned changes to existing systems, except urgent fixes. An intranet site including the manual and templates of all the documents required at different stages of the lifecycle is made available to all IT staff.

According to the four dimensions of the social actor, a key aspect influencing use involves the so-called *identity roles* of the social actor. The interviews were designed to explore and identify a range of identity factors including conditions, meanings, compatibility and events. Examples are shown in the table display, but space limitations prevent the inclusion of supporting narrative evidence. Another key aspect influencing participation were the *interactions* of the social actors as they mobilised information in their engagements with affiliates in the workplace. Respondents were asked to describe the interaction-related incidents and conditions that influenced their use of the ISDM. From the transcripts, a range of interactions were identified, coded and counted according to the coding scheme depicted in Table 1.

Table 1 shows that two dimensions (identity and interactions) are suitable and sufficient in representing the *social actors' roles* involving methodology use. From Table 1, the identity factors identified as most influential include [ID-LEGIT] the use of the ISDM legitimises their role as an IT worker in the eyes of the business user client, and [ID-EXPERT] knowledge of the ISDM can define the IT worker as an expert or novice. Both codes refer to positive reasons for ISDM use. From Table 1, prominent interactions for maintenance workers that served to influence the enactment of the method include: [IN-TAILOR] the IT worker tailors the ISDM in pragmatic and ingenious ways as part of the design documentation process; and [IN-CONST] using the ISDM dictates and constrains their role within the bank – it tells IT workers what they must do – it's the bank's way thereby enforcing the culture, rules, regulations of the bank, and the politics of systems development, etc. The most prominent code [IN-ACTION] mandates the generation of specifications that become actionable documents requiring a sign-off at each stage ensuring business clients maintain power and control over the development process. Coding totals for the Affiliations and the Environment were less prominent. A discussion of the sixteen behaviours of connected and situated individuals follows.

Affiliations: By focussing on organisational and professional relationships connecting an organisational member to industry and national networks, the transcripts indicated there is considerable disappointment with executive level support for the internal methodology; and a general feeling from junior staff that management should be more proactive in mandating and promoting its use. This was commonly felt to be a major inhibitor to the overall use of the ISDM. There was also common mention of a strong reliance (a business partnership) with a major hardware and systems software vendor and a large established Australian telecommunications carrier. In fact, continuous co-operation between the technology partners and systems architects [A-NET] was required at many phases throughout the development lifecycle and is mandated via the ISDM to gain joint signatures at important junctures.

Environment: The *environment* framework drew attention to stabilized and institutionalised practices within The Bank. The code [E-STAND] was stated as most influential. This meant that all interviewees knew that the ISDM was mandatory and was used as a co-ordinating, controlling and project management mechanism. Most within the bank understood this rationale and were accepting of its purpose i.e. the culture of the organisation, the social systems and networks, politics and policy (ie. institutional factors) were strongly evident. However, as much of the focus within IT was on maintaining the many large legacy systems that support business processes and internal clients, most of IT work involves applications that are maintained and operated on large mainframe computers. Therefore, most of these applications were developed using the traditional systems development life cycle in a lock-step fashion that conformed to the original intent of the in-house methodology. Many IT workers are involved in the on-going maintenance and support of these legacy systems, however they do not now see the methodology as necessary to their day-to-day duties, and in fact see the methodology as an impediment to their work.

Interactions: According to social actor theory *interactions* refers to the information and media of exchange as IT workers engage with affiliates and each other (other social actors). In terms of *The Bank*, the ISDM is seen as a vehicle to bring together project members to coordinate their tasks. The interviews identified some difficulty in establishing a new agile development approach based on the rational unified process (RUP) in web-based applications. These negotiations involved intensive personal contact with the method support department to modify the method to suit local contingencies of the project development approach. The *interaction* code [IN-TAILOR] identified pressure from projects that require an alternate approach to the traditional SDLC, and to modify the methodology to incorporate these new techniques. *The Bank* has an internal web site for the repository of the methodology and all enhancements to it, although many staff are not aware of it, and many say it is difficult to locate on the corporate intranet. This aspect may be a negative influence, however the database on the corporate intranet is heavily used by business clients and project managers to monitor project status [E-COMP].

Identities: The *identities* dimension describes the declared presentation and visible identity of the individual as an organisational member. Salaries and pay are performance based. Many business analysts are internally trained in IT and have substantial local business application and systems knowledge. These people are valued for their knowledge of legacy systems [ID-EXPERT]. Titles such as senior or principal consultant indicate their status and rank. IT expertise and more importantly business systems knowledge is highly valued. Each IT practitioner realises their IT knowledge is important, but knowledge of the business application is more important [ID-LEGIT]. The majority of IT staff are full-time employees although some are contract and outsourced on a skills need basis. However, with the change in technology and a recent down-sizing in the IT industry some staff were made redundant in a significant internal job-shedding exercise [A-EXCH]. Annual performance reviews were a major contributor to maintaining employment and is a clear example of macro-level, institutional factors impacting at the organisation level. Many staff felt morale was low and resented the down-sizing exercise. Older and more experienced IT practitioners have 'grown up' with the methodology in the bank. The older workforce is more comfortable with its use and knows its value [ID-EXPERT]. Many newer staff had no training in the method at all [ID-COMP].

To summarise the case findings we claim that we have extended the existing social actor theory in the field of IT by identifying indicators of ISDM use as a process of contextual interaction. We have shown that it is plausible to analyse the interview text by creating meaningful codes representing the four dimensions of social actor theory. Furthermore, we have extended the framework of social actor theory by showing how it is applicable and transferable to another case situation. We have also extended the results of previous socio-organisational studies by describing method use in terms of the interactions between people, the ISDM and context.

5 DISCUSSION & CONCLUSION

By applying the framework of Lamb & Kling (2003) with social informatics concepts we have been able to describe how method use takes place within a contextual setting. We have extended the Lamb & Kling's framework by providing a richer understanding of the interrelationships between the four dimensions and the social actor, and the consequent relationship they have for the choice, application and use of the ISDM within *The Bank*. In addition, this research has illuminated the applicability of the social actor framework at the individual, project, organisational and industry level. Lamb & Kling (2003) suggest that the four dimensions of affiliations, environment, interactions and environment and the intertwined relationship between those dimensions and the social actor(s) will impact on the design, use and consequences of ICTs. In relation to the use of a ISDM and *The Bank*, the impact of institutional constructs and context such as culture, politics, socio-economic pressures, industry pressures and the like have been identified. Further, at the individual level (of the social actor), their identities, their social networks, culture and politics in terms of social standing within the organisation were also illuminated. This was particularly evidenced in the sometimes individual, sometimes shared beliefs of the social actors.

In accordance with SI literature (Kling *et al*, 2005:26), the Bank's ISDM was conceptualised as part of a larger socio-technical ensemble, and its use was portrayed in a functional way. Using Lamb & Kling's argument, IT practitioners' (actors) agency was channelled through a complex, multilevel system of networks and organisational affiliations. It was found that IT practitioners used the methodology in various functional roles — a rational role: to sub-divide the project into manageable steps, demonstrating progress and to reduce risk and uncertainty (an avowed presentation of their *identity* as IT workers); and in a political role: to provide reassurance that proper processes are taking place, to shield developers from conceding to unreasonable deadlines and demands from user departments, or as an audit trail of decisions if the project fails in the future while interacting with a variety of other people (end users, project managers, systems developers from other projects and colleagues within the same project team). IT practitioners also interact with other IT workers in multiple social contexts — the *environment* including the office floor, the project spanning multiple players in dispersed geographic locations; and are subject to environmental conditions such as intense competition across the entire finance industry in Australia and globally, and a down-sized IT industry resulting in recent company job losses.

Finally, one case study of thirty interviews to establish the transferability of the framework and to establish codes for content analysis is deemed to be sufficient. However, the findings are not suggesting that we can use the case as a 'test' of the framework. Rather, the case succeeds in establishing the plausibility of the Lamb & Kling (2003) model by providing evidence of its capacity to provide meaningful analytical codes accounting for the use or otherwise of the ISDM; and as argued, provides a fresh perspective on contextual issues surrounding ISDM use than reported on before.

Social Actor Dimensions	Characteristics & Behaviours of Connected and Situated Individuals (Lamb & Kling, 2003:213) adapted to this topic	Empirical examples from the case study data	Code count
Affiliations [A]	Social actor relationships are shaped by networks of organisational affiliations [A-NET]	Hardware and telecommunications partners have a mandated role in verifying the specifications	7
	Relationships are dynamic, and related informational exchanges change with flows of capital, labour, & other resources [A-EXCH]	Down-sizing in the IT industry generally, and a tight IT labour market. This is a socio-economic macro-level influence.	5
	Relationships are multilevel, multivalent, multi-network ie. local/global [A-MULTI]	Project managers are required to deal with IT workers & business clients from various sections (social networks) within the bank to complete the project. Power is vested with the business clients.	9
	As relationships change, interaction practices migrate within & across organisations [A-CHANGE]	Some projects outsource aspects of development to specialist software houses who use a different methodology and this can create challenges in fulfilling the banks sign-off process.	4
Environments [E]	Organisational environments exert technical and institutional practices (standards) on the company and their members [E-STAND]	ISDM use is supposedly mandatory. It's part of the work culture. All systems work (except urgent fixes) must adhere to it, and the ISDM demands extensive documentation.	25
	Environmental dynamics require a display of overall competence [E-COMP]	Placing the ISDM on the Intranet creates an online presence displaying the project status and associated documentation. This is IT policy.	7
	ICTs are part of the organisational environment and require a substantial investment [E-INVEST]	The bank has a significant ISDM investment in personnel, development tools, techniques, and in-house training. There are rules, regulations & norms that specify how systems are developed.	4
	ICTs are part of the industry, national, and/or global environment and many software vendors invoke infrastructure richness that promotes use [E-INFRA]	Method support bemoaned the fact that other proprietary ISDMs were fully online, & acted as a knowledge repository of design decisions, thereby promoting a positive use of an ISDM.	3
Interactions [IN]	Organisational members seek to communicate in legitimate ways [IN-DOCN]	The ISDM mandates documentation throughout all phases & calls for meetings, both formal & informal among affiliates to review them.	21
	Organisational members build, design and develop interactions that make information actionable [IN-ACTION]	The ISDM mandates the generation of specifications becoming actionable documents requiring a sign-off at each stage. This is the work culture imposed by business clients on IT.	25
	ICTs become part of the interaction process as people transform, tailor and embed available informational resources into connections and interactions [IN-TAILOR]	Method in use, the IT worker tailors the ISDM in pragmatic and ingenious ways as part of the design documentation process	17
	As organisational members, people perform socially embedded, highly specialised actions on behalf of the organisation [IN-CONSTR]	Using the ISDM dictates and constrains their role within the bank – it tells IT workers what they must do – it's the bank's way.	25
Identities [ID]	Social actor identities have an ICT use component [ID-COMP]	The competent use of the ISDM defines (some of) their identity as an IT worker	10
	ICT-enhanced networks heighten multiple identities as expert or novice [ID-EXPERT]	Knowledge of the ISDM can define the IT worker as novice or expert	16
	ICT-enhanced connections among organisation members transcend roles (project-based [ID-HYBRID])	The ISDM can be used differently according to roles they occupy within the project group	7
	Social actors use ICTs to construct identities, legitimise their role, and control perceptions [ID-LEGIT]	Use of the ISDM legitimises their role as an IT worker in the eyes of the business user client	21

Table 1. Multidimensional View of the Social Actor, Codes and Coding Totals.

References

- Avison D and Fitzgerald G. 2003. *Information Systems Development: Methodologies, Techniques and Tools*, (3rd ed.) McGraw Hill, London.
- Avison D, Fitzgerald G, & Powell P. 2001. Reflections on Information Systems Practice, Education & Research: 10 Years of the Information Systems Journal, *Information Systems Journal*, 11, 3-22.
- Avison D. & Fitzgerald G. 2002. *Reflections on Information Systems Development 1988-2002*, Information Systems Development: Advances in Methodologies, Components, and Management, edited by Kirkova *et al.* Kluwer Publishers.
- Aydin, M., Harmsen, F., van Slooten, K. and Stegwee, R. 2005. On the adaption of an agile information systems development method, *Journal of Database Management*, 16:4, 24-40.
- Backlund P.2004. Adopting the Knowledge Embedded in New Methods – The Challenges of Aligning Old and New Practices, *European Conference on Information Systems*,
- Fitzgerald, B. 1998. An Empirical Investigation into the Adoption of System Development Methodologies, *Information & Management*, 34, 317-328.
- Fitzgerald B, Russo N & Stolterman E. 2003. Software Development Method Tailoring in Motorola, *Communications of the ACM*, 46(4), 64-70.
- Kautz K, Hansen B & Jacobsen D. 2004. The Utilization of Information Systems Development Methodologies in Practice, *Journal of Information Technology Cases and Applications*, 6(4), 1-20.
- Kling R, Rosenbaum H, & Sawyer S. 2005. *Understanding and Communication Social Informatics: a framework for study and teaching the human contexts of ICTs*, Information Today, Medford NJ.
- Lamb R & Kling R. 2003. Reconceptualising Users as Social Actors in Information Systems Research, *MIS Quarterly*, 27(2), pp 197-235.
- Langley, A. 1999. Strategies for Theorising from Process Data, *Academy of Management Review*, 24(4), pp 691-710.
- Lindstrom L. & Jeffries R. 2004. Extreme Programming and Agile Software Development Methodologies, *Information Systems Management*, Summer, 41-52.
- Orlikowski, W & Iacono, S. 2001. Research Commentary: desperately seeking the ‘IT’ in IT research – a call to theorising the IT artefact, *Information Systems Research*, 12(2), 121-134.
- Reimenschneider C. & Hardgrave B. 2002. Explaining Software Developer Acceptance of Methodologies: A Comparison of Five Theoretical Models, *IEEE Transactions on Software Engineering*, 28(12), 1135-1145.
- Schwandt T. 2001. *Dictionary of Qualitative Inquiry*, 2nd Ed, Sage.
- Vidgen R, Madsen S & Kautz K. 2004. Mapping the Information Systems Development Process, *Proceedings of the IFIP WG8.6 Working Conference on IT Innovation*, Dublin, Ireland.
- Walsham G. 1995. Interpretive Case Studies in IS Research: Nature and Method, *European Journal of Information Systems*, 4(2), 74-81.