# INTELLECTUAL CAPITAL MODEL DEVELOPMENT TOWARDS ADAPTIVE RE-USE SUCCESS: AN ANALYSIS ON HISTORICAL DEVELOPMENT OF CASE STUDIES

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# Abstract

Adaptive re-use can be a significant strategy for achieving sustainability as it ensures a continuous building life-cycle and prevents it from destruction. Adaptive re-use projects have their own unique environment and specific challenges to ensure success. There are complex designs and construction problems unique to adaptive re-use projects thus specific skills and expertise are required. As Australia's building stock ages, more and more attention are being turned to adaptive re-use projects and the critical factors towards its success. The literature review identified and regarded project management as a critical success factor for these projects. Given the extremely complex and conflicting construction challenges we contend that construction management is a critical success factor. The aim of this paper is to identify the unique problems in the adaptive re-use process of historical buildings. It is a highly specialized field with significant learning accumulated and significant levels of intellectual capital created within the project teams. Two case study projects with similar project teams are examined to explore the relevance of the concept of reflexivity. We propose an intellectual capital model for project success to understand how to capture, transform and accumulate intellectual capital within project stakeholder's communities who are dedicated to adaptive re-use projects. The model is a step towards the development of a practical construction management methodology grounded in theory and empirical observations.

**Keywords:** Adaptive re-use, critical success factors, knowledge management, intellectual capital, case study methodology

# INTRODUCTION

In late 1970s to early 1980s, the Australian Council of National Trusts defined 'recycling' as the best method to protect and maintain the historical building with new uses (Latreille 1982). Approximately 106 adaptive re-use projects have been analysed within that time related to functions and the benefit of recycling. However, the data is no longer relevant to the present situation due to new era of construction industry.

Adaptive re-use project has the complexity of the design and construction aspects. As example, the complicated regulations and requirement, the complicated of the process and involve with multidiscipline with different background. This paper focused on the issues

occurred around the complexity of adaptive re-use projects. According to Ball (1999) and Kurul (2007), lack of professional expertise in the adaptive re-use project leads to project failure. The cause of the project failure is that there is no expertise to reduce or overcome the complexity during the transformation process. In addition, incomplete and inaccurate design information also contributes to the complexity of the process (Shipley, Utz and Parsons 2006; Karim 2007). The reason behind this complexity is dealing with historical elements that need to be treated with care and skill. The empirical observations discussion on unpredictable circumstances elements is not included in this paper and it will be explored further in the interview data collection and analysis (second stage) of the study. This study will attempt to make two contributions towards knowledge accumulation. Firstly, by defining a set of critical success factors in proposing an intellectual capital model of project stakeholders' in regards to overcome the complexity issues in adaptive re-use project. London and Chen (2004) defined intellectual capital as a collection of skills, experience, competences and knowledge in organizations. It generally explains that the accumulation of intellectual capital would involve human capital, organizational capital and social capital.

The case study analysis on knowledge accumulation of complexity issues and critical success factors is the second contribution in this study. This is considered as to show the critical link between the past, present and future adaptive re-use projects. The involvement of multiple disciplines of stakeholders is also a key element to this study. Their understanding of history and the method of collection, creation and transfer of knowledge will support the management of intellectual capital in adaptive re-use projects.

To overcome the issues of complexity, this study seeks to propose the model to managing intellectual capital of multidiscipline project team members through knowledge management initiative and critical success factors. This paper begins by discussing the literature related to the root of complexity in adaptive re-use and the critical success factors. Since this paper is an on-going PhD research study, this paper set a limitation where the experiences and views of multidiscipline stakeholders are not included.

## LITERATURE REVIEW

## Adaptive re-use

The terminology of adaptive re-use can be interpreted in many different ways; however, all of the definitions are inter-related. Adaptive re-use can be defined as building recycling (Latreille 1982) which involves unique and complex processes (Bullen 2007; Kurul 2007) without altering the building façade (Tatum 2003), changing the intent of structure, interior spaces and building functions (Gorgolewski 2008; Cys 2008) to meet modern user's needs (Clark 2008).

This paper defines adaptive re-use as a process of transformation of the functions, the structures and the fabric or building envelope of historical buildings to new and contemporary design and construction process. The process is complex and needs to be managed appropriately and skilfully as there are multiple project stakeholders that may involve directly or indirectly through a knowledge approach in relation to creation, transfer, learning and sharing of knowledge.

## **Complexity issues**

Kurul (2007) argued that there are barriers in adaptive re-use because of limited project stakeholder's knowledge and understanding of adaptive re-use processes and thus led to

complexity. This means that the limited knowledge and understanding on the process can increase the degree of project complexity. It can also lead to other issues where there are lacks of skill of project stakeholders due to limited adaptive re-use of knowledge. Within the limited knowledge and expertise, the design and construction confrontations or problems are impossible to be well managed. According to Shipley, Utz and Parsons (2006), lack of expertise of the design team can lead to poor design and cause client dissatisfaction with the design. It is considered as serious issues and makes it vulnerable towards the entire adaptive re-use project.

Inaccurate and incomplete information about the history of the buildings and the related information on design could contribute to the complexity in adaptive re-use project. It can be exemplified as inconsistent specification of workmanship and material clauses and such internal risks can affect the project implementation and project performance. Typically, the complexity in adaptive re-use project is mostly related with design development. Pham (2006) stated that incomplete information during the design process is the source of complexity in adaptive re-use projects. The similar issues were stated by Gorgolewski (2008) that lacking clear information would provide a challenge to the architect in the early phases of design decisions and contribute complexity to the entire process. It is important to investigate and locate the original information, as it will reflect the design and negatively affect the whole project schedule. This relates with issues on the project management processes such as insufficient time of completion and risk of losing a historical significance of the original fabric resulting from negligence (Karim et. al 2007).

Differences in practice and discipline of multidiscipline stakeholders contributed to the difficulty in obtaining collaboration in making decision, especially in solving the adaptive reuse problems. An example of adaptive re-use problems that could occur during design development process is the design changes. Any further design changes will challenge the architect as it involves design amendments and increases the number of unscheduled meetings. Thus, it will effect on the project performance, for example, the construction project time and project cost will be extended from the original time and cost estimated (Ali, Kamaruzzaman & Salleh 2009). It is ideal if the architect has specialized experience in capturing the client's requirements, as they are unique building types. It is also critical that the design team has specialized experience and knowledge in heritage conservation. However, it is also important to all multidiscipline stakeholders to nurture and have the responsibilities to collaborate at any decision stage to avoid complexity to the entire adaptive re-use process.

On the whole, the lack of expertise, inaccurate and incomplete information and multidiscipline collaborative difficulties can be linked with understanding the critical factors contributed to the project success. As Baccarini and Collins (2003) notes, the critical success factors are important influences that contribute to project success. It can also enhance the ability of project stakeholders to forecast future project, identify potential problems and prepare the resources to the entire process (Khang & Moe 2008).

#### **Critical success factors**

Success in re-using historical building can be achieved through good planning at the early stage, followed by systematic process and full concerns by the project leader and project team to the project completion (Latham 2000). The systematic process involve with preparation feasibility study and building assessment on historical buildings. The role of project leader

and project team towards achieving success is related with the level of workmanship (expertise) and the collaboration. Since this study is related with historical buildings, this study presumes that preserving the historical value of historic buildings into new design is also critical factor for project success.

#### Feasibility study

Planning is an important stage for adaptive re-use process and possible creates the route of success to the projects. This is considered as the critical practice in planning stage is the preparation of feasibility study for the adaptive re-use project. The benefit of feasibility study by Watson (2009a) noted that "planning stage is related to how, when and where the project is to be carried out". Hence, as a critical factor for success, the feasibility study must be simple, flexible and contain accurate information for project resources such as material, workmanship and equipment for running the projects. Latreille et al (1982) suggested that to develop good feasibility studies, it is required and important to analyse all development cost including construction cost, new services cost, fireproofing cost and the degree of finish required. In particular manner such as delay in completion can also push up the development cost and need to be aware by the quantity or cost surveyor. It is related to cost planning for adaptive re-use projects and it should consider the initial cost and it is carefully distributed for the future running cost within the client's budget or fund (Watson 2009b). On the other hand, Watson (2009a, b) stated that the key to a successful adaptive re-use project lies on having no problems on cost thus the complexity of future adaptive re-use project can be reduced or avoided.

#### Building assessment by qualified and expert teams

Clark (2008), a professional project manager in Baltimore, United States mentioned that the investigation and assessment of the building condition by qualified and expert teams is a step to project success. A good assessment can help to reduce the unpredictable circumstances and avoid costly problems.

#### Good workmanship

The actual work on site must be performed with a high level of expertise to avoid errors and poor workmanship. Most importantly though is that with existing buildings, a level of adaptability and creative problem solving skills are required from the construction teams because often unpredictable circumstances can arise as redevelopment unfolds. A responsive attitude to such a creative construction problem solving environment is critical to project success. Clark's experience with adaptive re-use project proposes steps to success, but it is not associated with knowledge approach to project success (Clark 2008).

#### Collaboration

According to Roecker (2008), a potential critical success factors in adaptive re-use are to have the project stakeholders' collaboration and the historical dynamic. The collaboration refers to multiple partners and users involvement to adapt to the architecture and history in sustainable revitalization as input in design decision. Later, Clark (2008) also defines that a high level of collaboration between professional experts including the client or project manager, architect, contractor, historic conservator and the local preservation office as critical for adaptive re-use success.

#### Preserve the historical value of historic buildings in the new design

The history focused on the architectural that embeds spatial relationships within the buildings, meaningful information in the inter-relationships between environmental,

economic and cultural/social categories. The heritage building's history is to be interpreted in the context of contemporary design and in particular of a formal, spatial, structural, material and program (Roecker 2008).

In summary, complexity issues and critical success factors elements that contributed to intellectual capital model in this paper are as follows:

1- Causes of complexity

- Lack of expertise and knowledge in adaptive re-use
- Inaccurate and incomplete historical information
- Stakeholders collaboration difficulties

2- Critical success factors

- Good feasibility studies
- Building assessment by qualified and expert teams
- Good Workmanship
- Collaboration

3- Preserve the historical value of historic buildings in the new design

The professionals involved in adaptive re-use projects should integrate the context of complexity and critical success factors together with the higher level of skills as accumulative intellectual capital. This paper proposes that the accumulative intellectual capital on tacit knowledge about project complexity and critical success factors through human-capital based could benefit to the project success. Thus, this paper will develop the framework of adaptive re-use process within the knowledge approach that consist of the creation and transfer process of intellectual capital. The knowledge creation from intra-project knowledge and knowledge transfer to inter-project knowledge is necessary and important to continue and enhance the success of future adaptive re-use projects in intellectual capital approach.

## **Intellectual Capital Model for Adaptive Re-use Success**

This section proposes a model of project success that supports the development of intellectual capital through critical success factors and the complexity issues (Figure 1). The model shows the importance of understanding the input by project teams in producing complex issues to enhance the experience and expertise of project stakeholders. The important point here is what and how they learn and share their tacit knowledge (experience and expertise) gained from previous projects within similar project characteristic. Experience and knowledge will critically enhance adaptive re-use project to ensure a continuous success. This model is composed of complex issues and proposed success strategy (highlighted from critical success factors literature) as a collection of intellectual capital elements. The following six components will explain how the intellectual capital relates with complexity issues, critical success factors and the connection of historical and architectural significance; providing knowledge creation (inter-project) and transfer (intra-project) for future references to enhance the project performance and promised success.

The Project Critical Success Factors Strategy Complexity Issues Sharing and Learning Knowledge Creation and Knowledge Transfer Intellectual Capital

#### The Project

The Project represents adaptive re-use project that includes design and construction activities in relation with preserve the historical value of historic buildings in the design decision for new functions. It consists of the challenges and critical success factors strategy to achieve project success and provide existing intellectual capital for an adaptive re-use project. It will then utilise the strategies of the stakeholders through the process of sharing and learning to undertake the complexity. All created knowledge shall then be transferred to the intellectual capital of the project and serve as valuable information for future reference. This is particularly important and beneficial for the stakeholders who may be working back together to enhance the future project performance. It will also benefit project stakeholders who may not be involved with similar project previously as added knowledge in managing the design and construction process and challenges for future projects.

## Critical Success Factors Strategy

At this stage, expertise can be assessed in terms of multidiscipline's experience and qualifications in carrying out the projects. Expertise may increase the creativity in providing design, highly skilled in managing the construction and high quality of workmanship in relation to heritage factors. It is also extended expertise in identifying all the channels that could provide source of information on historical buildings in helping to provide the best result for the entire development process. Establishing collaboration among multidiscipline project stakeholders is considered critical to achieve a consensus on the result of good design and construction.

This study also contributes new knowledge in intellectual capital by proposing process-based factors in relation with feasibility studies and building assessment on the historical building condition. This is the unique characteristic of the model suggested by this study, as it is not applicable in common projects. It is very critical for multidiscipline stakeholders to have the excellent knowledge in preparing two important documents for adaptive re-use project. First, provides good feasibility studies in relation with controlling the cost from initiation stage to the occupation stage since this type of project is full of surprises and unpredictable circumstances (Clark 2008). As well as providing good building assessment on structure and fabric could give the benefit to the new functions in terms of safety. The argument is not every multidiscipline stakeholder could prepare good building assessment without specific expertise in this process.

## Complexity Issues

The issues in this model that are synthesizes from literature review are lack of expertise and knowledge in adaptive re-use, inaccurate and incomplete historical information and stakeholder's collaboration difficulties.

## Sharing and Learning

The group should develop an understanding on the key problems to solve and develop approaches to solving future problems through the development of a particular group culture. Knowledge sharing is critical factor in achieving organization's success (Cohen & Levinthal 1990 in Jasimuddin 2008). Knowledge is important in the historic environment because transforming historical buildings is full of richness in interpretation. Shared understanding about the importance of history in relation to the building, hence history of the area and

history of the building is significant and a shared understanding and respect for this amongst the stakeholders is critical.

Hence, it is important to identify that there is a history with some of the key stakeholders and project team members associated with adaptive re-use projects. The project stakeholders in many cases may have developed a shared learning capacity over time within the group. As often it is a specialized, small and unique market segment, a group may have previously collaborated and carry out all the activities and processes of adaptive re-use projects. This is an ideal situation whereby the teams can capture what they have learnt from past projects and share their knowledge to the current project.

## Knowledge Creation and Knowledge Transfer

An important part of understanding the creation and transfer of knowledge within a shared professional collaborative environment often comes with a shared history. It is important to identify a working history with some of the key stakeholders associated with adaptive re-use projects. The group may have developed an intellectual capital which is then aided by past project completion. Past involvement in adaptive re-use processes particularly during design brief development makes it much more comfortable to confront the problems related to design creativity and flexibility, design information and stakeholders' collaboration for the current project in hand. As it is with a new and different project, new approach and solution are created and later transferred into the intellectual capital for future project undertakings (Senaratne & Sexton 2011).

#### Intellectual Capital

It is an accumulation of information, knowledge of issues and solutions. Identifiable approaches in handling a situation and many other valuable inputs that are generated by actual experiences. The intellectual capital would serve as the main reference for having a better outcome with a faster response time due to its prior occurrences in other similar projects.



Figure 1: Intellectual capital Model for adaptive re-use success

The knowledge created and transferred reflects the different backgrounds of project stakeholders and impacts upon how they individually and collectively approach the current issues. Shared understanding about the importance of history in relation to the building and the area is significant and a shared understanding and respect amongst the stakeholders is critical.

Research questions generated from the above model based on the findings from project management and adaptive re-use literature and need to be tested in related case study are as given below.

- 1. To what extent does 'historical' knowledge contribute to the combined intellectual capital on adaptive re-use projects?
- 2. How do stakeholders experiences contribute to the intellectual capital required for adaptive re-use project success?

The research question one, to what extent does 'historical' knowledge contribute to the combined intellectual capital on adaptive re-use projects will be answered in case study document analysis.

## **RESEARCH METHODOLOGY: CASE STUDY DOCUMENT ANALYSIS**

This study is using a case study methodology using a qualitative data collection and analysis method. The methodological design for this study is summarized in figure 2. This study presents the exploratory and preliminary results and describes the data collection and analysis from the two case studies. The first step towards developing an understanding on the unity and wholeness of the particular case begins with developing a deep understanding of the history of the original buildings and the relationship with the historical development analysis

for adaptive re-use. The second step is an empirical study involving interviews with the multi-disciplines teams. However, this paper only focuses on reporting the document analysis. The historical documents that were reviewed were conservation management plans, contract documents, drawings and other related project documents. Two completed adaptive re-use projects in Geelong were selected and used and the detail of the case studies is explained in the following sections.



Figure 2: The methodological design

## **Case studies**

A case study methodology was considered appropriate to explore the role of design management of intellectual capital as a mean to ensure project success. According to Kurul (2007), a case study approach enables us to develop a holistic and meaningful view of reallife events. It also facilitates "getting inside the project or the minds of individuals", to uncover explanations (Punter 1989, Larkham 1996 in Kurul 2007). According to O'Leary (2004), case study can produce a knowledge contribution in itself because a case study is unique and interesting with an intrinsic value. Through the analysis of case studies, we can begin to develop theory and exploratory case studies can bring new understanding. Most importantly, case studies can provide strong supportive evidence for a proposed conceptual model. The evidence from the 'real world' provides anecdotal evidence to support a theory. Besides that, the research provides concrete findings that will assist in generating a new theory in relation to project success for adaptive re-use projects. Once the development of the two buildings was completed, they were transformed from unused wool stores to a modern university. The redevelopment was undertaken in two different eras, 1990s and 2000s. The paper of course has limitations in relation to data collection and data analysis because the empirical study has not been completed yet.

## Archival analysis

To support the data analysis from the interviews, the documents for both case studies will be used towards understanding the completed projects. The documents analysis in this paper has been used for the development application for approval and along with the project life-cycles until completion and occupation stage. The analysis on related documents is important as documentary is evidence that reflects on the importance and significance to the history of the area (Geelong, Australia) and the buildings (the former Dalgetys Woolstores and former Dennys Lascelles Woolstores) for adaptive re-use application. The discussion on the documentation analysis understands the historical value in regards to manage the complexity of adaptive re-use process. It is also related to the experience on knowledge creation and knowledge transfer to future projects and developed intellectual capital particularly for adaptive re-use success.

# CASE STUDY DISCUSSION: ADAPTIVE RE-USE PROJECT OF FORMER WOOLSTORES TO UNIVERSITY

The importance of information or knowledge in the history of the original buildings in relation to develop a historical development for intellectual capital in adaptive re-use projects will be discussed in this section. The decision to develop Deakin University in the Dalgety Woolstores and Dennys Lascelles Woolstores is influenced by historical factor and the importance of protecting the historical heritage. According to the statement of significance in the Victorian Heritage Database states that "the architectural significance of this building relies on the retention of the remaining parts of the wool store complex". In this section, there are two significant relationships of Dalgetys Woolstores and Dennys Lascelles Woolstores are discussed.

# Historical development of buildings: the adaptive re-use project background and the significant of former Dalgetys Woolstores

The Dalgetys Woolstores have been built through seven major stages. The building is four storeys and it was used and functioned as wool storage and business until the mid-1980s. In 1990s, the action to protect this woolstores was started with a national architectural competition to conversion of these buildings to appropriate functions. The design competition was held in May 1993 and the local firm McGlashan Everist won this competition with the function of a university. The refurbishment of the wool stores includes removal of the three floors of hardwood timber. The construction strategy that has been used by contractor is to maintain the structural conditions; the floor has been removed from the roof all the way down to foundation steps. The top floors have been used as scaffolding for roof refurbishment work. The architect for this project won the Royal Australian Institute of Architect's President Award for recycled buildings in 1997. The winning criterion was based on the following:

- The design and management skills of the architect and his team when dealing with client and contractor.
- The level of achievement of identification, maintenance and enhancement of the heritage value is quite high in this project. The merging of a existing and new components, provide comfortably and naturally into space and light quality for a different building function as been successfully achieved.

As evidence, there is collaboration and sharing attitude among the design team with other disciplines such as the contractor and at the same time oversee the interests of the client requirements and ensured a quality preserved historic value as stated in Conservation Plan prepared by Alan Willingham in 1994 based on building's condition assessment. The most important are the issues on design flexibility and information provide guidance, learning process and mutual sense in proposed the appropriate design decision for modern and smart university. As described in Authentic Heritage Services Pty Ltd Report for Local Government Planning Scheme, "the architect was reviewed based on their design and ensuring the retention of as much of the original building fabric as possible as part of their contemporary design" (Victoria, 2010). This is important of blended the knowledge about design and cultural significant related with historically and architecturally in the development of intellectual capital for future re-use projects.



**Photo 1:** the front view (external) of former Dalgetys Woolstores; the signage, the parapet and the external wall were maintained

*Photo 2:* inside the building, the timber structure were maintained and merged well with new staircases

**Photo 3:** inside the building, view from the 4<sup>th</sup> floor

Statement of cultural significance in Authentic Heritage Services Pty Ltd report was prepared by Dr. David Rowe, the heritage advisor for the City of Greater Geelong, stated that this building have architectural and historical significance at a LOCAL level. "The architectural significant attached with design qualities that associated with the late 19th and early 20th century of Dalgety and Company Limited Woolstores". The design qualities includes redbrick external wall and parapet wall, roof and the rainwater downpipe, lintel above openings, doors and windows and the signage of "Dalgety Company Limited" need to retain those remaining parts of the wool stores complex. The report also stated that "the historically significant building are associated with the development of the Dalgetys Woolstores from 1891, 1929 and 1940 and parts of the building also have associations with the Geelong architectural firm of Laird and Barlow, and later, Buchan Laird and Buchan" (Victoria 2010).

# Historical development of buildings: the adaptive re-use project background and the significance of the former Dennys Lascelles Woolstores

One of the largest wool stores was erected in adjacent with the Dalgetys woolstores in 1934. The original plan of Dennys Lascelles Woolstores is to accommodate more than 25,000 bales of wool which cover over 3.5 acres of floor space. The Dennys Lascelles Wolstores was equipped with lifts and modern wool-handling appliances (Victoria 2010). The Dennys Lascelles building was constructed by C.J. Taylor and Sons in May 1934 based on a design by Buchan, Laird and Buchan.

In 2009, the six storeys of the Dennys Lascelles Woolstores have been redeveloped for new functions as the Alfred Deakin Research Institute, the Deakin Geelong Health Precinct and the Alfred Deakin Prime Minister's Library. This section of the wool stores complex was officially opened as Deakin University on 10 June 2009. The project cost to refurbish 1934 sections was approximately \$37M AUD and was a joint project between Deakin University and the Victorian and federal governments. On the other hand, the collaboration, sharing and mutual sense existed at the beginning/early stage. This project was also funded by the Commonwealth and Victorian Government who provided approximately \$15.6M each. The project started on October 2006 and was completed in 2009. The project manager was the Facilities Management Services Division at Deakin University. Again, the architect responsible for the design of former Dennys Lascelles is a local professional architect, McGlashan Everist. This study assumes that the project stakeholders (focused on architect, project manager and contractor) applied and developed the knowledge transfer and knowledge creation through the attitudes of learning, collaboration, sharing and mutual sense among multidiscipline in Dalgetys Woolstores project in 1993 until 1996. This refurbishment project has been constructed by Wycombe Constructions. Thus, future stage in this study is to explore the intellectual capital among multi-disciplines stakeholders in managing the adaptive re-use stages from both projects.



Photo 4: the external view of the former Dennys Lascelles Woolstores, more creative and well merged between the existing external walls with wall cladding
Photo 5: the internal view, new staircases inside the existing brick wall and timber floor
Photo 6: the internal glass partition with the face of former Prime Minister Alfred Deakin (1903-1910) /after the building/ is for The Alfred Deakin Prime Ministerial Library of Deakin University

According to Authentic Heritage Services Pty Ltd report, the heritage advisor for the City of Greater Geelong, the former of Dennys Lascelles Woolstores have cultural significance which is architecturally significant and historically significant at a LOCAL level. Architectural significant demonstrates some original interwar qualities on unpainted and redbrick external wall, windows, doors and the signage below the parapets wall that stated "Dennys Lascelles Ltd Woolbrokers". It also relies on the retention of the remaining parts of the wool stores complex. The report also mentioned that "historically significant is associated with the development of the Dennys Lascelles Ltd woolstores from 1934, and in more recent years as part of the Deakin University Waterfront Campus" (Victoria 2010).

As a summary in the case study discussion, the Dennys Lascelles woolstore has proposed to create an exciting multipurpose environment, providing light filled spaces of varying dimensions. The historical value of this building merges with technology, and environmental

sustainability as a critical part in design development for Dennys Lascelles that the stakeholders learned from Dalgetys woolstores. The location of this building at well-known corners and waterfront views also provide /the answer/ that understanding the history of the area (surrounding) and buildings itself is important and critical in the way to get the intellectual capital. The decision on designing Deakin University is under historical influences and its importance of protecting the architectural and historical significance. According to the statement of significance in Victorian Heritage Database stated that "the architectural significance of this building relies on the retention of the remaining parts of the wool store complex". This study provides assumptions that the knowledge creation in Dalgetys projects has been transferred as accumulative intellectual capital or knowledge to achieve project success.

# CONCLUSIONS

This paper considered lack of expertise and knowledge about/on adaptive re-use, inaccurate and incomplete historical information and the difficulty of getting multidisciplinary stakeholders collaboration could cause difficulty to achieve adaptive re-use success. However, this study suggested critical success factors strategy which could provide intellectual capital for multidiscipline stakeholders as the best strategy to overcome the complexity and achieve success especially for the difficulty of transformation process. In relation with the case study preliminary analysis on the contribution of 'historical' knowledge, there were initial findings that critical success factor is in used in the beginning process. As for example, the architect used his expertise to define the sources of historical information for design purposes and to get development approval particularly, information on assessment of buildings significance. The critical success factors are identified in case study is collaborative problem solving according to the winning criteria "the design and management skills of the architect and his team when dealing with client and contractor". However, there is an assumption for this study that this project has prepared good feasibility studies, building assessment by qualified and expert teams and good workmanship for the construction process. There is little theoretical development and empirical research in relation to developing an intellectual capital influenced by critical success factors to overcome the project complexity. We began exploring the proposed Intellectual Capital Model for adaptive re-use projects success into two heritage listed buildings which were located in an Australian city adjacent to each other and had architectural and cultural heritage significance and were developed more than ten years apart largely by the same project team and client. The document analysis provides substantial background towards understanding the nature of the projects within a case study research methodology. The document analysis is ongoing. This paper has served to described the historical characteristics of the project in order to give an indicate the scope of knowledge, expertise, collaborative problem solution skills required in order to respond to the complex design and construction issues that may have arisen.

## **Further research**

This study is a part of an on-going research for a PhD on the critical success factors and intellectual capital in the adaptive re-use projects. The chosen case study provides the guidance in establishing research aims and identifying research questions for knowledge creation and knowledge transfer from one project to another. In addition, it also gives attention to investigate what happened in the time period between project 1 and project 2 in terms of knowledge gained from experience and other external factors.

The contextual background of the two adaptive re-use projects provides a unique situation to explore the knowledge and skills gained from internal experiences (inter-project knowledge and intra-project knowledge) and external experiences (from external sources during the gap between completion time) that contribute to the development of intellectual capital within the project team members. We propose three situations that could contribute to the pool of intellectual capital of adaptive re-use projects (Figure 3).



Figure 3: Summary of on-going research framework

Situation 1 is what and how knowledge creation in project 1 managed. How project stakeholders understands historical significance of the building and area towards integrating client requirements with existing structure. It also involve with design review approach in preparing the document for development approval on historical buildings. Other specific identification in project 1 is how the project stakeholders overcome adaptive re-use issues during the processes of changing the building functions, the steps taken to solve the problems and the approach taken in knowledge accumulation and management within human-based capital and historical dynamic capital. However, the potential critical success factors of adaptive re-use projects remained as intellectual capital mechanism in this study.

The distance or gap between project 1 and project 2 is the second situation in this study. The aim is to investigate the knowledge contribution from project 1 and the distance period. The positive assumption was a better knowledge on heritage when they were involved with related heritage projects. The negative assumption could be a blunt of their knowledge on heritage due to their involvement with many common projects within the year gap. It could influence the knowledge creation and knowledge transfer to project 2 when the similar stakeholders are working back together.

Situation 3 involves with project 2 that started more than 10 years after project 1 was completed. The investigation on knowledge impact from project 1 successful criteria and the knowledge change (positively and negatively) from the distance period is critical to understand the intellectual capital in human based capital and historical dynamic capital. The interconnection between situation 1, situation 2 and situation 3 results could be providing a dynamic managing approach in managing the intellectual capital uniquely for adaptive re-use project.

This study will further embark on the empirical phase and face-to-face interviews with project team members, the client, and document analysis on key project documents. To ensure the validity of the situations, the project manager, client, the architect and the

contractors chosen are of the same person for both projects. The empirical data analysis will seek to refine the conceptual model proposed and evaluate its effectiveness in relation to critical success factors for multi-disciplinary design management with different backgrounds, skills and knowledge for continued success of future adaptive re-use projects.

# LITERATURE

Ali, AS, Kamaruzzaman, SN & Salleh, H, *The characteristics of refurbishment projects in Malaysia*, Facilities, vol. 27, no. No.1/2, pp. 56-65, 2009.

Baccarini, D & Collins, A, *Critical success factors for projects*, Faculty of The Built Environment, Art and Design Curtin University of Technology, Australia, 2003. <a href="http://espace.library.curtin.edu.au/R/?func=dbin-jump-full&object\_id=20333">http://espace.library.curtin.edu.au/R/?func=dbin-jump-full&object\_id=20333</a>>.

Ball, R, *Developers, regeneration and sustainability issues in the reuse of vacant industrial buildings*, Building Research & Information, vol. 27, no. 3, pp. 140 – 8, 1999.

Bullen, P, *Adaptive reuse and sustainability of commercial building*', Facilities, vol. 25, no. 1/2, pp. 20 – 31, 2007.

Clark, D, From Eyesore to Opportunity: Adapting an Older Building for a New Use, Buildings, vol. 102, no. 4, 2008.

Cys, J & Lawrence, J, *Recent Pasts*, in S Elwazani, S Malhis & J Al-Qawasmi (eds), The Fifth International Conference of the Center for the Study of Architecture in the Arab Region (CSAAR 2008B), College of Architecture and Arts, Petra University, Jordan, vol. Vol. B, pp. 3-16, 2008.

Gorgolewski, M, *Designing with reused building components: some challenges*, Building Research & Information, vol. 36, no. 2, pp. 175-88, 2008.

Jassmuddin, Sajjad. M, A holistic view of knowledge management strategy, Journal of Knowledge Management, vol. 12, no. 2, pp. 57 – 10, 2008.

Karim, SBA, Kamal, KS, Wahab, LA & Hanid, M, *Risk assessment and refurbishment: The case of Ipoh Railway Station Perak, Malaysia*, paper presented to MICRA 2007, Malaysia, March, 2007.

Khang, DB & Moe, TL, *Success criteria and factors for international development projects: A life-cycle-based framework*, Project Management Journal, vol. 39, no. 1, pp. 72-84, 2008.

Kurul, E, *A qualitative approach to exploring adaptive re-use processess*, Facilities, vol. Vol. 25, no. No. 13/14, p. 16 pages, 2007.

Latham. D, Creative re-use of buildings, 2 vols., Donhead, Dorset, 2000.

Latreille, A, Latreille, P, Lovell, PH, Australian Council of National Trusts. & Historic Buildings Preservation Council (Vic.), *New uses for old buildings in Australia*, Oxford University Press, Melbourne, 1982.

London, K & Chen, J, *Firm social, cultural and intellectual capital: strategic indicators of international client satisfaction*, paper presented to Clients Driving Innovation International Conference, 2004<<u>http://eprints.qut.edu.au/27358/></u>.

O'Leary, Z, The essential guide to doing research, SAGE, London, 2004.

Pham, NH, *Complexity of Data Rich Architectural Environments*, Research thesis, Doctor of Philosophy thesis, Deakin University, 2006.

Roecker, I, Sustainable Revitalization: An Adaptive Reuse Strategy for the Society Buildings of Vancouver's Chinatown, in S Elwazani, S Malhis & J Al-Qawasmi (eds), The Fifth International Conference of the Center for the Study of Architecture in the Arab Region (CSAAR 2008B), College of Architecture and Arts, Petra University, Jordan, vol. Vol. B, pp. 33-48, 2008.

Senaratne, S. & Sexton, M., *Managing Change in Construction Projects: A Knowledge-Based Approach*, Wiley-Blackwell – RICS Research, United Kingdom, 2011.

Shipley, R, Utz, S & Parsons, M, *Does adaptive reuse pay? A study of the bussiness of building renovation in Ontario, Canada*, International Journal of Heritage Studies, vol. Vol. 12, no. No. 6, p. 15 pages, 2006.

Tatum, M, What is Adaptive Reuse? <u>http://www.wisegeek.com/what-is-adaptive-reuse.htm</u>, 2003.

Victoria, G, Geelong Woolstores Conservation Area : Geelong Historic Buildings, <u>http://vhd.heritage.vic.gov.au/</u> database, 2010.

Victoria, SG, Victoria's Planning Schemes (PSO Indexes), Department of Planning and Community Development, retrieved 17 December 2010, <<u>http://www.dse.vic.gov.au/PlanningSchemes/></u>.

Watson, P, A methodology for attaining and assessing project success for rehabilitation projects, Journal of Building Appraisal, vol. Vol. 4, no. No.3, p. 9 pages, 2009a

Watson, P, *The key issues when choosing adaptation of an existing building over new build*, Journal of Building Appraisal, vol. Vol. 4, no. No. 3, p. 9 pages, 2009b.