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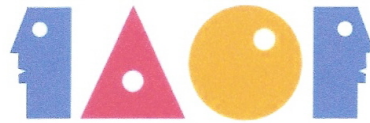
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MODELLING THE BEHAVIOR OF AN ENTREPRENEUR: THE CASE OF NEVIL SHUTE AND THE BRITISH AVIATION INDUSTRY

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Abstract

As well as being a best-selling novelist Nevil Shute was the founder and managing director of a prominent British aircraft manufacturer during the inter-war period. The paper uses the models developed by Sarasvathy (2001) and Hurley Hanson et al. (2013) and Shute's own writings on his career to analyse the nature of his career. The paper found that Shute's experience indicates that entrepreneurial behaviour and the success of entrepreneurs not only depends on the context of the industry in which they operate, but also the level of dynamism within that industry. Models such as the H-H model, whilst useful in profiling entrepreneurial careers, need to take into account broader environmental influences.

Keywords: Entrepreneur; Aviation; Entrepreneur career; Entrepreneurial behaviour, Entrepreneurial Thinking

"I would divide the senior executives of the engineering world into two categories. The starters and the runners, the men with creative instinct who can start a new venture and the men who can run it to make it show a profit. They are very seldom combined in the same person." (Shute 1954, p. 169).

Introduction

Academics have encountered a number of difficulties in studying the behaviour of entrepreneurs. The first, and perhaps most important difficulty, is that there is no common agreed definition of what constitutes an entrepreneur and entrepreneurial behaviour. One definition that encompasses both these aspects and which has received

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some acceptance is that they involve "a process by which individuals – either on their own or inside organizations – pursue opportunities without regard to the resources they currently control" (Stevenson, Roberts & Grous-Beck 1989 in Hurley-Hanson et al 2013). Bearing this definition in mind much of the literature argues that entrepreneurs are different from other business people, both in how they reason and how they undertake their careers (see Sarasvathy 2001 and Burton, Sorensen & Dobrev 2016 for discussion). To capture these career differences Hurley Hanson et al (2013) proposed a new model for examining high-tech entrepreneurial careers, and in doing so argued for a better alignment between high-tech entrepreneurs and career development models. In explaining their model, they utilised Steve Job's career as an illustrative example to: "better reflect the realities of pursuing a career in the high-tech computer industry" (Hurley-Hanson et al, 2013).

By applying the model only to high-tech entrepreneurs in the 21st century, the authors limit the model's potential to compare and contrast entrepreneurs across generations, or in other fields. This hampers the model's ability to gain deeper insights into what makes entrepreneurs entrepreneurial and in explaining the role they play in dynamic industries. In this paper, therefore, the authors make use of this model in such a way as to provide an opportunity to examine and extend its usefulness. It is proposed to do this in a couple of ways. First an examination of how the reasoning patterns of entrepreneurs might support a different career path to non-entrepreneurs is undertaken, drawing upon Sarasvathy's work (2001) as well as that of the Hurley Hanson et. al. model. Secondly,

the model is used to examine the engagement of a particular individual who exhibited entrepreneurial reasoning tendencies at the inception of a high-tech industry from the past. This approach will enable a critique to be undertaken that will add robustness and an enhancement of the usefulness of the Hurley Hanson et al (2013) model. It will also be possible to overcome one of the other limitations of entrepreneurial studies, that being the tendency to concentrate on the development of theories of entrepreneurial behavior, rather than on the application of theory to the individual endeavors of entrepreneurs. One reason for this neglect has been the difficulty in establishing the motivation behind the individual efforts of contemporary entrepreneurs, who are often not so forthcoming in reflecting on their own behavior. There are, however, opportunities for studying the cases of some individual entrepreneurs and their behavior especially where they have written or publically spoken about their working lives. By undertaking this narrative research of field texts it will be possible to identify underlying themes relevant to a deepening understanding of the career trajectory of entrepreneurs in high-tech industries.

In this case the past industry that will be examined is that of aircraft manufacture, which went through a period of rapid technological change in the 20th century, and embodied a fairly high degree of technical sophistication. This was particularly true in the first half of the century, and it involved the work of a number of prominent entrepreneurs. Notable amongst these was the case of Nevil Shute who, although better known as a best-selling novelist, worked as an aeronautical engineer and

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was the founder and managing director of a successful British aerospace manufacturer (Airspeed Limited). Nevil Shute Norway (his full name) was born in London in 1899, spent most of his life working in England, but lived his final years in Australia, where he died in 1960. He made use of his shortened name, Nevil Shute, as his pen name in order to protect his engineering career from any potential negative publicity that might arise from his novels. One of the great advantages of studying the entrepreneurial career of Shute is that he worked in an industry that involved substantial technological change in a relatively short time frame, and also because in his later life he wrote and reflected on this work and the entrepreneurial activities it involved. In addition, in his novels he often drew on his experiences in the industry and portrayed fictional entrepreneurs in a favorable light. It is possible, therefore, to use his case as a proxy for examining entrepreneurial behaviour and career pattern.

The purpose of this paper, therefore, is to make use of both the models developed by Sarasvathy (2001) and Hurley Hanson et al (2013) to analyse the degree to which Shute was an entrepreneur. In doing so it is determined how easy it is to use both theories to analyse the behaviour of a specific entrepreneur operating in an industry that is both high tech, and going through a period of rapid technological change. In the first section a review is undertaken of the manner in which entrepreneurs can be identified. This is followed by sections on the context of the evolution of the aircraft manufacturing industry and its attraction to entrepreneurial types of people. Sections are then provided on Shute's career and

the phases through which it passed. In the final section some conclusions are made.

Identifying the Entrepreneur

In identifying the key characteristics of entrepreneurs Sarasvathy (2001) differentiates entrepreneurs from non-entrepreneurs, based on their reasoning approaches, which impacts their engagement in business. Entrepreneurs, it is argued, focus on a long term vision and freely use the resources available to them (such as their knowledge, experience, and partnerships) to create and iteratively shape the path to that future. In contrast non-entrepreneurs focus on the effects of their actions and seek to manage their environment using existing frameworks and resources in the most efficient and effective way. In summary, entrepreneurs' preference is for action first with limited planning, whereas non-entrepreneurs plan before they take action (Spilerman 1977). Besides using Sarasvathy's characterisation of the "entrepreneur" it is also possible to apply the Hurley-Hanson et al (2013) model for high-tech entrepreneurial careers (hereafter referred to as the HH model) to explore the career stages of a case study personality as they co-evolved within a growing high-tech industry (Jones 2001 in Hurley-Hanson at al 2013). The HH model consists of three areas, which reflect the broader literature on career progression. These are career stages, career phases and career ages. Career stages are characterised by the entrepreneur's decision-making in the context of their past, present and future. Entrepreneurs cycle through the stages multiple times, which is unlike traditional career models, which have a linear progression. These decisions re-

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flect the entrepreneur's unique career concerns, psychological needs, and development. Career phases usually reflect the company the entrepreneur is involved with at the time. Career ages refer to the age of the individual at specific career stages. For entrepreneurs there appears to be no linearity between ages and phases (Hurley-Hanson et al 2013).

The most complex part of the model is the section dealing with career stage, which is where the entrepreneur is focused in starting and building a company or company division. Hurley Hanson et al (2013) identify four stages which may occur in each phase: 1) Reconnection, 2) Transition and transformation, 3) Reflection and 4) Death. In the Reconnection Stage the entrepreneur draws upon their inner voices and vision to examine and re-engage with the world on their own terms and to influence those around them. The Transformation/Transition Stage refers to the entrepreneur's strategic approach. Yu (2013) suggests this can be described as three discrete processes – strategic visioning; overcoming resistance and sustaining change momentum. In strategic visioning the entrepreneur employs a set of simple rules that allows those working with them to deliver radical innovation. The entrepreneur overcomes resistance by adopting a forward looking logic of consequence rather than an experience based logic of appropriateness. They sustain change momentum by bypassing formal structures, experimenting with multiple options until a way forward is found.

In the Reflection Stage, entrepreneurs encounter barriers that are overcome by reconnecting with their inner voice, vision and social networks. The triggers for the barriers are often periods of significant change that come out of the blue and fundamentally change the individual's environment or self. These barriers: "serve as a reminder of mortality, emphasizing the importance of following one's heart, finding something to love and never sett[ling] for second best" (Steve Jobs in Richardson & Arthur, 2013, p. 46). Reconnection shapes the entrepreneur's learning, adaptation and the realisation of opportunities. It is a period of generativity (Erikson 1963). Finally, the Death Stage refers to the individual's death and the impact this has on the organisations they are involved with at that time.

In the remainder of the paper an examination is provided of the British aviation industry from the period just before, to just after, Nevil Shute's involvement (1908 to 1940). This is provided in order to demonstrate the airline industry's dynamic and high-tech nature. Using the HH model an examination is then provided of the interaction between the industry context on Nevil Shute's career. Some past research has recognised that some firms and industries generate more entrepreneurs than others (Burton, Sorensen, & Beckman, 2002; Elfenbein, Hamilton, & Zenger, 2010; Gompers, Lerner, & Scharfstein, 2005; Klepper & Sleeper, 2005; Sorensen, 2007). Sarasvathy's reasoning profile is subsequently used to explain these career choices. As an entrepreneur, it is expected that Shute's career path and reasoning would align with the Hurley-Hanson et al and Sarasvathy models. Shute's career path should demonstrate his ability to use his capabilities and

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connections to pursue his passion(s) within a dynamic high tech industry. Finally, a contrast is given of the findings with Hurley-Hanson et al.'s (2013) profile of Steve Jobs to assess the usefulness of the framework in deepening understanding of the entrepreneurial career path.

The Growth Of The Early British

Aeroplane Industry (1908 - 1940) In Britain, as in many countries, military interests drove the birth and development of the early aviation industry (Owen 1999, pp. 296-7). The first English aeroplane flight took place in 1908 at the Farnborough military airbase, and the first orders for military aircraft was in 1912, which was the same year that the Royal Flying Corps was created. Two years later the Royal Naval Air Service was formed. The industry grew quickly from inception through rapid technological change and high levels of technical expertise. Technological developments were stimulated by high quality aeronautical research carried out at the Royal Aircraft Establishment and National Physical Laboratory and several universities, principally Cambridge and Manchester. The founders of the early aviation firms were well trained engineers, many of whom could be described as entrepreneurial. These early entrepreneurial engineers (such as Frederick Handley Page, Thomas Sopwith, Robert Blackburn, and AV Roe) played an important role in the development of the industry.

Military demand during the First World War (1914-1918) transformed the industry from a cottage industry, consisting of a collection of workshops, into a vast and complex industry.

Leading manufactures in the industry became substantial enterprises, with the largest, the Aircraft Manufacturing Company (Airco) employing 7,000 people by 1918 (Owen 1999, p. 297). Immediately after the war (the early 1920s) the industry went through a painful contraction. Government contracts, which were the lifeblood of the industry dried up and the Government for a period did not provide any ongoing support. There was at this time a surplus of fuselages left over from the war so production runs were limited by low demand. To survive some aeroplane manufacturers diversified their production into fields such as motor cars, furniture manufacturing and milk churns. For example, Airco was initially sold to the parent company of a car manufacturer before being put into liquidation and its assets sold to Airco's chief engineer, Geoffrey de Havilland who used them to set up his own business (Fearon 1969, pp. 476-9). The aircraft manufacturing industry at this time was, therefore, small and dominated by a group of very dedicated pre-war producers and new enthusiasts whose aviation interests had been aroused during the war.

By the mid-1920s the shakeout in the industry was completed, and between 1924 and 1930 the employment, output and exports of the industry doubled (see figures in Table 1). Although the average number of orders were initially small, sales increased from 1923 onwards. At the 1930 Census there were still 38 companies operating in the airframe industry although 16 of them accounted for 90 per cent of production (Fearon 1974, p. 237). During the 1930s, however, technological change was to create pressures on these

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Table 1. Selected statistics on the British aircraft production industry 1920 to 1939

	Employment No	Production Aircraft no	Air Ministry Orders* Aircraft no	Exports* Aircraft no
1920	Na	na	na	635
1921	Na	na	na	503
1922	Na	na	na	319
1923	Na	na	na	246
1924	11,735	503	563	188
1925	Na	na	448	148
1926	Na	na	805	150
1927	Na	na	392	140
1928	Na	na	835	358
1929	Na	na	615	525
1930	21,322	1,456	864	317
1931	Na	na	na	304
1932	Na	Na	na	300
1933	Na	633	na	234
1934	23,774	1,108	652	298
1935	35,032	1,807	893	453
1936	75,000	2,218	1,830	na
1937	Na	2,827	2,218	na
1938	128,000	2,800		na
1939	140,000	7,940		na

*The number of aircraft exported and ordered by the Air Ministry were higher than the number produced in 1924 because of the war time stocks still not having been exhausted.

Source: Hayward 1989, p. 14; Edgerton 1991, p. 26.

companies to merge and create larger companies.

The introduction of metal construction meant the manufacture of stronger aircraft, and allowed for greater speeds to be achieved, but it also required greater technical effort than wooden construction. The growing complexity of design and production required more team work and a broader distribution of skills. Aircraft design and manufacturing changed from a reliance on intuitive skills to a more systematic and scientific approach. Design development and pro duction all increasingly required integrative skills and a sophisticated management system. More investment in testing and experimental facilities were required. The new construction methods involved an increased commitment to development and testing, the acquisition of new machinery and changes in manufacturing process (Ritchie 1997). This meant that metal airframe production, could only be undertaken by large and well equipped firms with skilled workforces and sophisticated design teams. The first all metal stressed skin, civil monoplanes entered service in the United States in 1933

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and within a few years, monoplanes had replaced biplanes.

Technical progress in other related areas consisted of incremental innovations, a number of which originated in Britain; e.g. the variable pitch propeller and slotted wing. Other innovations included the introduction of retractable undercarriages as well as lighter more powerful engines. These technological changes had the effect of creating greater economies of scale in the industry, which were to increase considerably the costs of entry into the industry and to eventually put pressure on firms to merge. These pressures did not become especially acute until the early 1930s, but once they emerged it became difficult for small independent firms to survive. By 1935 most firms in the industry had grown to a reasonable size, with the eleven largest firms in Britain all employing between 1,000 and 2,000 workers (Edgerton 1991, p.25).

The appeal of the early British aeroplane industry to entrepreneurs Using Sarasvathy's (2001) reasoning theory, it becomes clear that that for an industry to be attractive to an entrepreneur, it should provide opportunity for the entrepreneur to develop their passion and proactively shape their career. To enable this process, the industry should provide opportunities for the individual to rapidly develop their knowledge, experience, and partnerships. In the case of aviation, the early days of the industry called for individuals with high levels of technical skill, which could be acquired either through university or technical college engineering degrees/diplomas. The rapid growth of the industry, fueled by Government investment in the devel-

opment of military aeroplanes, provided significant career growth opportunities. Interesting and challenging work for individuals with technical capabilities were readily available and the tiny industry attracted dynamic and driven individuals (e.g. Frederick Handley Page, Thomas Sopwith, Robert Blackburn, and AV Roe) who worked together in a tight and dynamic industry ecosystem. As the industry developed these individuals rose quickly through firm ranks. As Shute notes: "It was exciting to be in aviation in those days, because development went at such a pace… In aviation at that time there were opportunities on every side for those who had the wit to take them" (Shute, 1954, pp. 28-29). In the early stages the need for firms to create economies of scale were not so great as aeroplanes were mainly manufactured from wood and could be constructed by relatively small organisations (Shute, 1954, pp. 103-4). This meant that start-up costs for new firms were small, which encouraged entrepreneurial individuals to start businesses in the industry.

"In those days the capital requirement to start an aeroplane manufacturing company was not large, judged by modern standards. In 1930 the demand for small two- and three seater aeroplanes for personal and club flying was brisk all over the world. These units were small in value and since wooden construction was still the rule no very great numbers had to be produced to manufacture at a profit; the cost of jigs and tools for a given design was small by modern standards". (Shute 1954, p. 104).

The shakeout of the industry at the end of the war favoured those with

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entrepreneurial flare. The rationalisation of the industry led to two pathways – one pathway led to specialised aviation products; the second pathway to diversification into other industries. Both pathways created significant creative opportunities for entrepreneurs, who generally shy away from bureaucratic management roles.

For many firms the pioneer spirit and enthusiasm for aviation was strong enough to overcome any poor financial returns they received, and the intense desire of individual enterprises to remain independent made rationalisation of the industry difficult to achieve. Some consolidation, however, eventually took place, encouraged by the increasing technological demands of the industry.

After the rationalisation of the industry, the Air Ministry recognised an ongoing threat of war and started to reinvest into the industry. To promote competition and production capacity, and to keep a reserve of design and production teams together the Air Ministry spread its contracts among 15 airframe and 5 engine manufacturers. This meant that despite it being only a small market an unusually large number of companies remained in the industry manufacturing aeroplanes on a small scale. The ecosystem of the industry was therefore strengthened. This allowed entrepreneurs to build capability by utilising their connections to move into areas where their passion lay, however it also limited entrepreneurs starting up in the industry. Shute himself later commented on this change:

"As the swift years went by the capital required for profitable operation doubled and redoubled every year as aeroplanes grew larger and as wooden aircraft ceased to sell and had to be replaced by metal construction, but in 1930 forty thousand pounds seemed reasonable capital for such an enterprise" (Shute 1954, p. 104).

Shute's Career Phases

Turning more specifically to Nevil Shute's career phases it is possible to use Sarasvathy's reasoning model to identify possible motivations for career changes. Shute's career can be broken into the following phase's, which reflect where he was employed: the early internships; De Havilland; the Airship Guarantee Company (part of Vickers); Airspeed (Shute's own company); and the Royal Navy (the course of Shute's life and career are provided in Table 2).

Shute graduated with a third class degree in engineering science from Oxford University in 1922, aged 23 years old. While undertaking his degree studies Shute, used initial contacts provided by the Professor of Engineering at Oxford, and following up himself, secured summer internships with Airco and the De Havilland Aircraft Company (1920 and 1921) (Shute 1954, p. 27). Both positions involved working with Geoffrey de Havilland in the design offices. This allowed Shute to balance his mainly theoretical studies at Oxford with applied work, which he found much more interesting. De Havilland was an experienced aircraft designer and builder, his planes having been used in the First World War. In 1920 de Havilland was Chief Engineer

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Table 2. Career phases: these usually reflect the company the entrepreneur is involved with at the time. Career ages refer to the age of the individual at specific career stages. For entrepreneurs there appears to be no linearity between ages and phases (reference).

Career Phases (and Shute's age). Shute lived from 1899 to 1960.	Literary career phases – books published and publication dates in italics
Environment at the time: In the 1920s A number of famous people (e.g. de Havilland & Sopwith) set up own companies to pursue their aeronautical dreams. In contrast a number of great designers (e.g. Wallis, Camm & Mitchell) were content to design planes for others Oxford University (education) 1920 (aged 21 years) Internship with Airco (design office) assisting owner 1921 (aged 22 years) Internship with De Havilland Aircraft Co. (design office) assisting owner 1922 (aged 23 years) Degree in Engineering science awarded.	
Full time work: De Havilland – stress engineer 1923 (aged 24 years) Joins De Havilland as stress engineer (calculator) but sees a lack of opportunities (A tipping point)	1923 wrote his first unpublished novel
Full time work: Vickers – chief calculator, deputy chief engineer 1924 (aged 25 years) Joins Vickers Ltd to develop airships becomes Chief calculator on R100 (British Government contract) 1929 (aged 30 years) promoted to Deputy Chief Engineer of R100, becoming chief engineer when boss (Wallis) leaves. In 1930 (aged 31 years) the R101 disaster occurs and the British government cancels all airship programs despite the success of R100 – Shute unemployed (A tipping point). Environment at time: In the late 1920s it was generally believed recreational flying would increase in popularity. By 1930 demand for recreational flying aircraft was brisk – start-up capital requirements were small.	Published his first novel: 1926 Marazan Changes pen name to Nevil Shute
Full time Work: Airspeed Ltd in York (Managing Director	

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1931 (aged 32 years) Teams up with talented De Havilland trained designer Tiltman to found Airspeed Ltd. – directors Hewitt (funding through shares), Lord Grimthorpe, Alan Cobham(local and aeronautical contacts). Company set up to make sell aircraft and gliders for private flying market. Low startup, manufacturing costs, big demand, easy profits. (wooden construction). Shute comments that he is a 'quick decision maker and implementer with definite ideas about aero design'.	1931 So Disdained 1932 The Lonely Road No writing from 1933 to 1938.
Environment at time: Collapse of recreation flying market due to Depression (1929 to 1939) (A tipping point).	
1933 (aged 34 years) Airspeed shifts to designing and building small scale commercial passenger aircraft – Courier & Envoy – heavier and costs more. New investors sought, move to bigger premises in Portsmouth.	
1933 Shute made Fellow of Royal Aeronautical Society for retractable undercarriage for the Courier and R100.	
Airspeed (1934) Ltd in Portsmouth: Part owner 1934 (aged 35 years) associates with Tyneside ship builder Swan Hunter & Wigham Richardson Ltd (new investor holding controlling interest). 1935 (aged 36 years) Envoy sales pick up	
Environment at the time: In 1936 the Air Ministry issues Specifications T.23/36 for a twin engine training aircraft.	
1936 (aged 37 years) Joins Society of British Aircraft Contractors allowing Airspeed to bid and win a government contract for training aircraft. Adapts Envoy to build A10 Oxford. 1937 (aged 38 years) first prototype flies out. Significant recognition – becomes standard trainer for RAF and British Commonwealth Mid 1930s (8,500 built) company is large scale manufacturer employing over 1,000 people over several sites. 1938 (aged 39 years) Shute resigns over disagree-	

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ment with Board whose focus was on making standard models. Shute's interest on designing. This was a tipping point for Shute.	1938 returns to writing & publishes Ruined City (1938) & What Happened to the Corbetts (1939).
Full time work: Environment at time: 1939 – 1945 WWII Navy 1940 (aged 41 years) Commissioned lieutenant and promoted acting lieutenant commander, Royal Naval Volunteer Reserve, with former boss from Vickers (Dennistoun Burney). After the war returns to writing.	Publishes An Old Captivity (1940), Landfall: A Channel Story (1940), Pied Piper (1942), Pastoral (1944) and Most Secret (1945).
Post 1945 Focus on writing	The Chequer Board (1947); No Highway (1948)
Australia 1948 – Flies his own plane to Australia 1950 – Emigrates to Australia Tipping point: Fed up with high taxes and regulations in England, Shute emigrates to Australia.	A Town Like Alice (1950); Round the Bend (1951); The Far Country (1952); In the Wet (1953); Slide Rule (1954) which gave an account of his life to 1938; Requiem for a Wren (1955); Beyond the Black Stump (1956); On the Beach (1957); The Rainbow and the Rose (1958); Trustee from the Toolroom (1960); Stephen Morris (1961); the last two published posthumously. Several of his novels were made into films, i.e. A Town Like Alice (1956), and On the Beach (1959).

at Airco working on wind tunnel research. The rationalisation of the industry at the end of the war, meant in 1921 Geoffrey de Havilland, was able to buy out Airco's aviation assets and use them to set up his own company – the De Havilland Company. Upon graduation Shute took up a permanent position with De Havilland as a Calcu

lator (stress engineer), undertaking calculations on such things as fuselage structures, propellers and wings. This period exposed Shute first hand to de Havilland's conversion of the huge wartime company Airco into a much smaller, and dynamic company. This initial education and work experience, therefore, provided Shute with a com-

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prehensive knowledge of engineering, aviation, and early entrepreneurial activity and start-ups in the aeroplane manufacturing industry. The experience and connections Shute developed at this time underpinned the development of his future entrepreneurial career (as per the Sarasvathy model). It also supports the past work on entrepreneurs which emphasis that many entrepreneurs have experience working in other organisations prior to founding a new firm (Dobrev & Barnett, 2005; Freeman, 1986; Sorensen & Fassiotto, 2011).

By 1924 Shute was dissatisfied with the lack of opportunity for advancement at De Havilland and so he secured a job with the Airship Guarantee Company; a subsidiary of Vickers, to work as Chief Calculator on the R100 airship project as part of the newly developing airship program under the Chief Engineer, Barnes Wallis. Barnes Wallis, who was largely technical college trained (he also undertook extension classes at the University of London), was a brilliant scientist who later went on to develop the bouncing bomb in the Second World War. In 1925 the design work for the R100, the largest airship ever designed, was just beginning. The R100 was part of a British Government contract to design and build a passenger carrying airship (R100) in competition with a government built one (the R101). This allowed Shute to pursue his design passions. In 1929, at 30 years of age Shute was promoted to Deputy Chief Engineer of the R100, rising to acting Chief Engineer when Wallis left in 1930 to join the Vickers aircraft factory. The successful maiden flight of the R100 to Canada would have been a crowning achievement for Shute.

Shute's move to Vickers allowed him to enjoy rapid promotion and to hold positions of considerable responsibility. In a very short time he consolidated, extended and built an important network of connections in the industry, which were to prove invaluable in his later career (as per the Sarasvathy model). This early development period of Shute's career also provided him with a good understanding of his traits, tastes and abilities and a strong vision and determination about what he wished to achieve (as per the Sarasvathy model). It also provided him with the experience of seeing two companies established in the aviation industry, providing him with some knowledge of start-ups.

After the fatal crash of the rival government R101 airship in 1930, the government cancelled the airship building programme and Vickers closed its airship subsidiary. Instead, of seeking work elsewhere in the Vickers company, or in the wider industry, Shute partnered with the talented de Havilland trained designer, A. Hessell Tiltman to establish their own company. Tiltman had worked with Shute on the R100 and together they founded the aircraft manufacturing firm; Airspeed Ltd. A key motivating factor in their deciding to start Airspeed, was the fact that the existing industry structure allowed Shute and Tiltman to start small, limiting the investment needed. The ending of the airship program was to prove an important tipping point in his career, allowing him to found his own organisation at the age of 31 years. Tiltman and Shute's abilities complemented each other – Tiltman had more design experience and Shute had considerable knowledge and skill as a stress engineer. In addition, Shute's

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ability to network in the industry appears also to have been good for a relatively young person. Besides Shute and Tiltman the other directors of the new company were E. Hewitt, Alan Cobham and Lord Grimthorpe. The famous aviator Amy Johnson was also one of the initial subscribers of shares in the company. Alan Cobham was a famous test pilot for the De Havilland Company and proved important later to the company in making sales of the company's aircraft. The ability of Shute and Tiltman to attract fellow board members Hewitt and Lord Grimthorpe was also impressive as they were prominent people in Yorkshire, where the company was originally based (Anderson 2011).

The first board meeting of Airspeed was held at the end of April 1931. Shute was 32 years old at this time. In attempting to found a company at this time Shute seems to have had a strong preference for independence and autonomy over security and a clear vision about being his own boss and working with Tiltman to design and construct aircraft of his own (Anderson 2011). In trying to maintain a degree of autonomy Shute, and Tiltman, were by no means unique in the aviation industry in Britain at this time. The aviation industry in Britain in the 1920s had a number of famous people who relished the idea of designing and building aircraft of their own, such as Geoffrey de Havilland and Thomas Sopwith, who were driven by a desire to not only design and build aircraft, but were also keen to run their own companies in order to pursue their own aeronautical dreams. These types of people can be contrasted with the still quite brilliant designers of the day, such as Barnes Wallis, Sydney Camm

(the designer of the Hawker Hurricane and other iconic aircraft) and R.J. Mitchell (the designer of the Supermarine Spitfire), who lacked the same degree of entrepreneurial spirit and were content to spend their lives designing planes for the companies that employed them.

The original intent of the new company founded by Shute and Tiltman was to build small aircraft and gliders for the private flying markets, as in the late 1920s it was felt by many that recreational flying would increase in popularity (Shute 1954, p. 104). This market, however, collapsed during the depression at the same time that the company was being founded and Shute and Tiltman were forced to change their emphasis somewhat. They did so by shifting to designing and building small scale commercial passenger aircraft (Anderson 2011, p. 81).

Production by the company was originally based at York, but later it was moved to Portsmouth when larger premises were needed. The company first produced the AS.1 Tern glider for promotional purposes and then the AS.4 Ferry, ten passenger, three-engine, biplane, which was sold to companies who used it for joy riders and short haul passenger flights . The company then developed the Airspeed AS.5 Courier a six-seat single-engine, fast light aircraft, which first flew in 1933. This plane was envisaged as being suitable for small airlines. The move toward the design and construction of passenger aircraft was extended by the subsequent development of the Airspeed AS.6 Envoy a twin-engine, light passenger aircraft. This aeroplane proved to be fairly popular and over 50

were built and sold. The Envoy was more than three times the weight of the original three-seater on which the first capital estimates of the company had been based an illustration of how the emphasis of the company had changed in a relatively short time (Shute 1954, p. 140).

To finance the construction of the Envoy new investors were sought and the company restructured. This new investment helped to finance the shift to Portsmouth, but was to change the nature somewhat of the company's direction. In 1934 the firm became the Airspeed (1934) Limited after a partnership with the [Tyneside] ship builder [Swan Hunter & Wigham Richardson Limited] who purchased a controlling interest in the company.

During 1935 sales of the Envoys picked up, both in Britain and overseas, and in 1936 the company joined the Society of British Aircraft Contractors, the members of which who were the only companies then permitted to tender for military orders in Britain. In response to an Air Ministry Specification issued in 1936 for a twin-engine, training aircraft, Airspeed was able to bid for it by adapting the Envoy and developing what became known as the A10 Oxford. Orders were subsequently placed by the British Government for a first lot of 136 aircraft, which had the effect of allowing for a more economical flow-line production at the Portsmouth factory. The Oxford's first prototype aircraft flew at Portsmouth on 19 June 1937. With development and sale of the Envoy and the Oxford the company had become a substantial and profitable company. Despite the initial setbacks and tribulations, especially regarding finance,

Airspeed was eventually able to gain significant recognition with the Oxford, which eventually becoming the standard advanced multi-engine trainer for the RAF and British Commonwealth, with over 8,500 being built. From the mid-1930s onwards the company was transformed from being a small experimental designer of specialized aircraft to becoming a large scale manufacturer employing over a 1,000 men and women at multiple sites (Anderson 2011).

Shute by this stage was having trouble working with the Board of the company, as it tended to want to mass produce the standard Envoys and Oxfords, rather than design and develop new aircraft. In April 1938, aged 39 years old, Shute resigned as managing director of the company, at a time when the company had given up much of its design work in order to concentrate on the mass production of Oxfords. Tiltman remained with the company until 1948 when he too left to start up his own consulting company, at a time when most design work at Airspeed was finished. After Shute left Airspeed the company continued to grow and in June 1940, the [De Havilland] Aircraft Company purchased from Swan, Hunter and Wigham Richardson, Ltd., that company's holding of Airspeed ordinary shares making it a subsidiary of De Havilland. In 1951 Airspeed was merged with De Havilland. With the outbreak of the Second World War (1939) Shute joined the [Royal Naval Volunteer Reserve] as a sublieutenant in the hope he would be able to captain a small ship as sailing was one of his pastimes (Shute, 1954). Instead he was placed in engineering where he worked with his former boss at Vickers (Dennistoun Burney) in de-

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signing and creating on military engineering projects. Towards the end of the war he had become head of engineering in the [Directorate of Miscellaneous Weapons Development](#), responsible for developing new equipment to help the war effort. He was a prolific writer during this phase. After the end of the Second World War Shute retained an adventurous nature and in 1948 he flew his own aeroplane to Australia and back and on returning to England decided to emigrate to Australia, which he did in 1950. He lived there until his death in [Melbourne](#) in 1960 after having a stroke.

The Stages of Nevil Shute's career

Hurley Hanson et al. proposed four stages in their high-tech entrepreneur career model – Reconnection, Transformation, Reflection and Death. In this section Nevil Shute's career phases are reviewed, acknowledging that entrepreneurs can circle through these stages many times as they move through their career. From the literature available, evidence of all stages at each phase of Shute's career were not found. What was found, however, find was all stages across Shute's entire career. Wherever possible the analysis was supplemented with Shute's own observations at the time.

Reconnection

Shute's experienced the Reconnection Stage in several phases of his career. For Shute this reconnection stage occurred after a significant change in his environment prevented him from pursuing his passion at the pace he wanted. At these tipping points Shute reconnected with his inner voice and vision to re-engage with the

world and those around him on his own terms. For example, at De Havilland Shute saw no opportunity for career progression so he moved to the Airship Guarantee Company. At this firm there was less competition from experienced peers so he had a chance to make a name for himself. Being at the start-up phase of the project, he was able to indulge his passion again and build his skills, connections and leadership skills. Shute described this process as follows:

"Three consultants were employed to teach me the fundamentals of my job and carry out research into the methods. Professor Bairstow was our authority on aerodynamics, Professor Pippard on structures, and Mr. J.E. Temple was the most practical and useful of them all because he had been Chief Calculator for Wallis on the design of a former ship, the R.80, built by Vickers at the conclusion of the war. My job was to get together a staff of calculators to do the work on R.100, translating the theories of the consultants into the forces and stresses in each member of the ship and so providing the draughtsmen with the sizes for each girder and each wire". (Shute 1954, p. 37).

After the R101 airship disaster, the sudden closure of the Airship Guarantee Company opened up the possibility for Shute and Tiltman to draw upon their own knowledge, experience and connections to start their own firm, Airspeed, which they did. In writing about his decision to set up the new company Shute said:

"After the responsibilities that I had been carrying [at the Airship Guarantee Company] I should not have rel-

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ished the return to a drawing office on half the salary I had been earning; I had grown accustomed to making quick decisions and seeing them carried out. Moreover, I had very definite ideas about the design of aeroplanes."(Shute 1954, p. 103).

"In these circumstances I decided that before seeking another job I would try my hand at starting a small aeroplane manufacturing company of my own. I was well placed to do this …. I went into conference with Tiltman and found that he was game to try it with me. We had a nucleus of drawing office staff and foremen with good aeroplane experience who had confidence in us and who wanted to go on working with us; as a technical unit to build aeroplanes we had a good deal on our side". (Shute 1954, p. 104)

As Airspeed grew the final tipping point for Shute occurred. The creation aspect of the business was replaced by bureaucratic management; which Shute did not like. As he described later:

"Ahead of the managing director of Airspeed Ltd, stretched an unknown number of years to be spent in restraining men from spending too much time in the lavatories in order that the aeroplanes might cost the taxpayer less". (Shute 1954, p. 167).

He also seemed to be able to make a distinction between industry leaders on the basis of whether they were entrepreneurs or managers, or as he called them starters or runners (see the quote at the beginning of the paper). Shute depicted himself as a starter who enjoyed the excitement of innovation, design and creative engineering and

entrepreneurial activity, but who was ill-suited to the more mundane types of large scale corporate management work that he ended up doing. As his disillusionment grew with Airspeed, Shute reconnected to his other passion, creative writing. In his early engineering days Shute had written novels as a hobby in his spare time but for the first five years at Airspeed he wrote nothing because of the heavy weight of work he had to undertake. Stepping back from day to day operations at Airspeed allowed him to reconnect with his writing.

Transformation

The transformation stages in Shute's career occurred in firms where he was an integral part of their rapid growth. His time at Airco, De Havilland and the Airship Guarantee Company provided him with first hand exposure to others strategic visioning, and the tactics used to overcome resistance and sustain change. These lessons informed Shute's set up of Airspeed.

During the Airco/De Havilland transition, Shute observed first-hand how de Havilland and Walker (the firm founders) made do with little resources around them to start and build the new firm.

"Airco at that time was near its end as a company manufacturing aeroplanes and de Havilland and Walker were already making plans to start a new company of their own. The new company was in a tiny way of business, and they were still glad to have my unpaid work, for money was very tight. To run the lathes and milling machines power was needed, and the cost of

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bringing electric power to the site was probably prohibitive to the infant company. Mr. Hearle and Mr. Mitchell, his foreman engineer, got hold of an old German Benz aero engine from some scrap heap; gas was available on the site, and so they set it up to run on coal gas to drive the machinery… for two or three years". (Shute 1954).

Working closely with de Havilland and Walker he had the opportunity to do "the hack work for two great designers, listening to their sane, practical experience" (Shute 1954, p. 28). He also "had a magnificent chance to get a knowledge of all sides of the business, and I think [he] took advantage of it … as the new projects came to life upon our graphs and columns of figures de Havilland and Walker still spent long periods cogitating upon our drawing boards, to [Shute's] immense benefit. (Shute 1954, p. 28).

At the Airship Guarantee Company Shute was again exposed to the pursuit of a vision in a totally new field with limited resources under brilliant mentors. He learnt to balance and overcome both internal and external pressures in building the R100. External pressures came from the competition of the heavily funded, R101, government development team. Internal pressure came again from working in a start-up organization with little resources strengthening his ability to do more with less. Lack of a bureaucracy allowed the team to adapt quickly to challenges that arose. This was in sharp contrast to their government competitors. As the airship was built and less design work was needed Wallis looked to other opportunities, allowing Shute to rise to Chief Engineer within five years (Shute 1954, p. 58).

Shute learnt valuable lessons on how to overcome resistance and sustain change which he later applied at Airspeed.

The six years Shute spent on the R100 project gave him great experience and responsibility for both money and lives. They increased his respect for private enterprise and his dislike of bureaucracy (Smith, 1976)

People who worked for him commented:
"he had a very practical approach to any problem, derived from an essentially practical training. He told his [team] what he wanted, and then left them to get on with it in their own way (Smith, 2002, p. 51)."

At Airspeed Shute put into practice what he had learnt from early exposure to start ups at De Havilland and the Airship Guarantee Company. Tenacity and contacts were needed to secure initial funding for the company's formation. Determination and strategic vision were needed to battle through the early growth stages. As Shute notes: There was no time to be lost, for our days were numbered till the capital ran out… It was essential to get publicity and results with this machine [their first production and one of the first sailplanes developed in the UK], because our capital was fast running out (Shute 1954, pp. 115-116).

With the help of a German pilot, Airspeed captured the British gliding records for altitude and distance, thereby raising the profile of Airspeed. That finished our trials with the Tern [the sailplane], and we did no more with sailplanes. The machine had served its purpose and had proved that

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we could build something quickly that would fly well (Shute 1954, p. 117). In running the company both Shute and Tiltman had definite views that it could not simply follow what the large more established companies were doing, but had to be innovative if it was to survive. This drive for innovation also suited the natural creative inclinations of both Shute and Tiltman, and generated a core vision for the company that they created. The strategic approach of Shute (and Tiltman) therefore was to attempt to design and build high performance, innovative aircraft. They were however flexible in that they responded to the dramatic changes in the market at the time, and quickly switched from the product of small recreational aircraft to passenger aircraft. In terms of their contribution to innovative designs Shute and Tiltman, when they built the Courier, created the first British manufactured aircraft with a retractable undercarriage and also used the plane to make important contributors to the development of inflight refuelling.

Shute was made a Fellow of the Royal Aeronautical Society in 1933, because of his work on the development of the hydraulic retractable undercarriage for the Courier, and for his work on the R100. It seems that Shute stepped away from Airspeed as his ability to pursue his passion fell away and his interest in the firm diminished. He came to realize that the company that he had created was not exactly the sort that he had originally envisaged, and was entering a stage of development that he himself was not suited to running. This hampered his ability to create a strategic vision, overcome resistance and sustain change. As he notes:

"In April 1938 my Board decided to attempt to quell the disputes that were plaguing the company by getting rid of me, and in this they were probably quite right. …. In Airspeed the time for the starters was over and it was now for the runners to take over the company. I was a starter and useless as a runner; there was nothing now for me to start, and I was not unwilling to go after the first shock to my pride" (Shute 1954, p. 169).

Reflection

Shute's career as a novelist set up an iterative reflective cycle in his career phases. In writing about his time at the Airship Guarantee Company, he said:

"I have always liked to do two jobs at the same time; one helps you to rest from the other and the fact that in the evenings my mind was fully occupied upon the novel gave me a clearer view of the airship problems next morning, I think, than some of my colleagues could achieve" (Shute, 1954, p. 42).

His first novel was completed in 1923 (whilst he was at Oxford University), but his first published novel did not appear until 1926 while he was working at Vickers. Except for his time at Airspeed when he did not write, he averaged a book a year from 1931 to 1932, and 1938 until his death. All in all, twenty-four novels and novellas of Shute have been published as well as an autobiography (Slide Rule 1954). In his books Shute's heroes tend to be middle class doctors, solicitors, accountants, bank managers, engineers or scientists with aviation and engineering providing the backdrop for a number of his novels. In a number of in-

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stances both men and women engaged in entrepreneurial activities are held up as especially virtuous types. "Death alone keeps the typical Shute hero from a stoic return to his daily rounds" (Smith 1976, p.25) A number of his more famous novels were made into films including Landfall, Lonely Road, Pied Piper (1942 and 1990 as Crossing to Freedom), On the Beach, No Highway, A Town Like Alice (in 1956; also serialized for Australian television in 1981), and The Far Country.

Death

Shute experienced two "death" stages in his career. The first occurred when he stepped away from Airspeed. "So ended a chapter of my life. I have never gone back to manufacturing and I shall probably not do so now, for that is a young man's game. Industry….is a game played to a hard code of rules; I am glad that I had twenty years of it as a young man, and I am equally glad that I have not had to spend my life in it till I was old. My gladness is tempered with regret, for once a man has spent his time in messing about with aeroplanes he can never forget their heartaches and their joys, nor is he likely to find another occupation that will satisfy him so well, even writing novels." (Shute 1954, p. 171).

When Shute left Airspeed in 1938, the company had orders of £1,262,000 and employed 1,035 people. It was just beginning to show a profit. Two years after Shute left the company the company became part of the De Havilland Company. The close partnership between Airspeed and De Havilland's resulted in Airspeed building 56 per cent of the Oxford, the twin engine trainer plane upon which most of the

pilots for Bomber Command were trained (Shute 1954, p. 170).
After Airspeed Shute became a prolific and successful writer, writing up to his death in 1960. Two of his novels were published posthumously. Smith (1976), in writing his biography of Shute, noted his ability to weave technical knowledge into fiction narrative that appealed to the common reader whilst "providing a remarkably reliable portrait of mid-20th century man and his concerns" (Time Magazine, 1960, p.96).

Was Nevil Shute an entrepreneur? In assessing whether Shute's career as an engineer exhibits the characteristics of an entrepreneur as defined by Sarasvathy a comparison can be made to the career of Steve Jobs. Like Steve Jobs, Shute drew upon his own education, skills and networks to create a company that was innovative and creative. Unlike Jobs, Shute's education and background was a particularly comprehensive one, combining as it did an academic education, with applied training and exposure to both leading aircraft designers and entrepreneurs at a very young age. Both Jobs and Shute were not enthusiastic about theoretical study, being more interested in the practical aspects of the industries in which they respectively worked.

Both Jobs and Shute sought out responsibility at early ages. Jobs started Apple at 21. Shute started Airspeed at 32, but had held responsible positions since the age of 24. Unlike Jobs who honed his skills along with the growth of his own firms, Shute benefitted from being exposed to two start-up firms (De Havilland and the Airship Guarantee Company) before starting his own. Both Shute and Jobs

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were ousted from their own companies – Jobs retreated into the creative ventures of NeXT and Pixar; Shute into his writing. Both Jobs and Shute contributed significantly to the development of innovative products that fundamentally changed their industries. For example, NeXt workstations were used by Tim Berners-Lee to invent the World Wide Web; and a version of Shute's hydraulic retractable undercarriage is still being used by aircraft today.

In relation to the H-H model, Shute's career does seem to pass through similar distinct stages to that of the high tech entrepreneurs studied as part of the model's development. In his early years of working in the industry he finds a definite ideal of the sort of work that he wished to undertake in the industry, which could be considered to be a Reconnection stage. A general strategic approach is development (Transition/ transformation stage) with a definite interest in developing innovative designs, however with a degree of flexibility that enabled the company to respond and grow. Considerable barriers were overcome in the process, especially in terms of raising the necessary capital. His writing provided an ongoing mechanism for him to reflect on his life. In the end the Death stage is entered, not with the failure, but instead with its success, which has the result of ending Shute's involvement by creating a company that required the managerial and administrative skills not possessed by him, and for which he had little interest in acquiring.

Probably the most important aspect of Shute's entrepreneurial vision was although he had clear ideas of the company that he wished to create and types of aircraft in 1931 he and Tiltman quickly changed their approach in changing circumstances. This was very much a product of the industry in which they were operating, which was going through a phase of rapid technological change, which in turn changed very quickly the nature of the market for aircraft.

These changes in technology, increases in economies of scale and changes in demand for aircraft away from private markets towards commercial passenger and military aircraft meant that it was difficult for the type of company envisaged by Shute and Tiltman to survive. In the post-Second World War period there have been a number of small producers of light, recreational aircraft that have prospered alongside of the large scale commercial and military aerospace companies, but in the 1930s it was the development of commercial passenger aircraft and especially military aircraft that dominated the industry. The small scale recreational market in contrast collapsed with the depression. The technical dynamism of the industry attracted both Shute and Tiltman to it and gave them an opportunity to enter it as entrepreneurs, but also created conditions that they had to adapt to for their enterprise to survive. This they were able to do and the company a successful undertaking but by 1938 had created a very different type of company than they had founded.

Conclusion

Shute in his twenty-year career in the aeronautical industry exhibits a number of the characteristics of an entrepreneur as envisaged by Sarasvathy,

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and Hurley- Hanson, et al. The high-lighted characterises by both Saras-vathy, and Hurley-Hanson, et al. are useful at explaining and understanding the career of Shute. Shute's own re-flections on his work in the aeronauti-cal industry do help to flesh out some of the aspects of the nature of an entre-preneur's education and motivation. In particular they highlight the impor-tance of considering both environment and how an individual engages with a dynamic environment in assessing whether an individual can be consid-ered an entrepreneur or not.

Many researchers of entrepreneu-rial studies acknowledge that high tech industries undergoing rapid techno-logical change attract entrepreneurial types of people and provide them with opportunities to develop new products and companies. Shute would appear to have been one of these types of people, as he was attracted to aircraft manufac-ture in the 1920s and 1930s because of its dynamic nature, but who also left the industry when it was increasingly becoming one based on the large scale production of low cost units. He also later expressed very clear views that by the late 1930s he wasn't really suited to large scale corporate management, having a far greater inclination towards the development of new ideas and products rather than the running of es-tablished enterprises.

Shute's experience would appear to indicate that the existence of entre-preneurial behavior and the success of entrepreneurs not only depends on the context of the industry in which they operate, but also the level of dynamism within that industry. A high tech indus-try undergoing rapid technological change, alters the very conditions of the industry affecting the nature of en-trepreneurial activity and opportunities available. Models such as the H-H model, whilst useful in profiling entre-preneurial careers, need to take into account broader environmental influ-ences. The analysis in this paper sug-gests that it is how the individual re-sponds to these environmental influ-ences that supports their classification as an entrepreneur following an entre-preneurial career path.

Shute's work in the aviation in-dustry took place at a time of consider-able change and technological innova-tion. It was also a time of considerable economic change in Britain and the international economy which was to have an important impact of the suc-cess of his entrepreneurial endeavors. The aeronautical industry in Britain in the 1920s and 1930s is a good example of one which was both very dynamic technologically, and one where there were a number of entrepreneurs who were active. The industry both at-tracted entrepreneurial types and gave them the opportunity to establish new ventures and develop new and im-proved products at a relatively young age. Industry context, therefore, is im-portant to the activities of entrepre-neurs. The character of Shute's educa-tion and background also provides in-sight into what makes an entrepreneur, combining as it did a formal academic education, applied work through in-ternships and exposure to the start-up work of others. Finally, in terms of the H-H model Shute's entrepreneurial ca-reer came to an end ot with his literal "death", but with a change in career, as is the case with many entrepreneurs.

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References

Anderson, J. (2011). Parallel Motion – a Biography of Nevil Shute Norway (Kerhonkson, New York: The Paper Tiger).

Birley, S. & Westhead, P., (1994). A taxonomy of business start-up reasons and their impact on firm growth and size. Journal of Business Venturing 9, 7–31.

Burton, M.D., Sorensen, J.B., & Dobrev, S.D. (2016) A careers perspective on entrepreneurship. Entrepreneurship: Theory and Practice, 40(2), 237.

Burton, M.D., Sorensen, J.B., & Beckman, C.M. (2002). Coming from good stock: Career histories and new venture formation. In M. Lounsbury (Ed.), Research in the sociology of organizations (Vol. 19, pp. 229-262). Bingley, U.K.: Emerald Publishing.

Carroll, S.J. (2013). Steve Jobs as an Artist. Journal of Business and Management, 19(1), 25-32.

Carter, N.M. Gartner, W. B., Shaver, K. G., & Gatewood, E. J. (2003). The career reasons of nascent entrepreneurs. Journal of Business Venturing, 18(1), 13-39.

Croft, J. (2000) Norway, Nevil Shute (1899–1960). In Australian Dictionary of Biography. Vol. 15, (Melbourne: Melbourne University Press, pp 498–499).

Dobrev, S.D., & Barnett, W.P. (2005). Organizational roles and transition to entrepreneurship. Academy of Management Journal, 48(3), 433-449.

Edgerton, D. (1991) England and the Aeroplane: an Essay on a Militant and Technological Nation. (Basingstoke, UK: Centre for the History of Science, Technology and Medicine).

Elfenbein, D.W., Hamilton, B.H., & Zenger, T.R. (2010). The small firm effect and the entrepreneurial spawning of scientists and engineers. Management Science, 56(4), 659-681.

Erikson, E.H. (1963) Childhood and Society. New York, WW Norton & Company.

Fearon, P. (1969) The formative years of the British aircraft industry, 1913-1924. Business History Review, 43, 476-495.

Fearon, P. (1974) The British airframe industry and the state, 1918-35. Economic History Review, 27 (2), 236-251.

Freeman, J. (1986). Entrepreneurs and organizational products: Semiconductor firms and venture capital firms. In G.D. Libecap (Ed.), Advances in the study of entrepreneurship, innovation, and economic growth (pp. 33-52). Greenwich, CT: JAI Press.

Gompers, P., Lerner, J., & Scharfstein, D. (2005). Entrepreneurial spawning: Public corporations and the genesis of new ventures, 1986-1999. Journal of Finance, 60(2), 577-614.
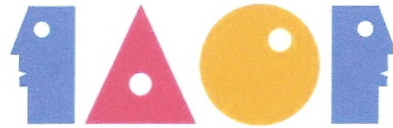
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24

Hayward, K. (1989) The British Aircraft Industry (Manchester: Manchester University Press).

Howard, H.Y. (2013) Decoding leadership: how Steve Jobs transformed apple to spearhead a technological informal economy. Journal of Business and Management, 19(1), 33-44.

Hurley-Hanson, A.E., Giannantonio, C.M. & Sudek, R.A. (2013) High tech entrepreneurial careers: a model of stages, phases and ages. Journal of Business and Management, 19(1), 11-24.

Hurley-Hanson, A. E., & Giannantonio, C. M. (2013). Staying hungry, staying foolish: academic reflections on the life and career of Steve Jobs. Journal of Business and Management, 19(1), 1-9.

Klepper, S., & Sleeper, S. (2005). Entry by spinoffs. Management Science, 5/(8), 1291-1306.

Lammers, D. (1977) Nevil Shute and the decline of the 'imperial idea' in literature. Journal of British Studies, 16 (2), 121-142.

Masefield, P. (1982) To Ride the Storm: The Story of the Airship R101(London: Kimber).

Owen, G. (1999) The Decline and Revival of British Industry Since the Second World War (London: Harper Collins).

Richardson, J. & Arthur, M.B. (2013) Just three stories': the career lessons behind Steve Jobs. Stanford University Commencement Ad-

dress. Journal of Business and Management, 19(1), 45-58.

Ritchie, S. (1997) Industry and Air Power: The Expansion of British Aircraft Production 1935-41 (London: Frank Cass).

Sarasvathy, S.D. (2001). What makes Entrepreneurs Entrepreneurial?. (United States: Darden Business Publishing).

Scheinberg, S. & MacMillan, I.C. (1988) An 11-country study of motivations to start a business. In: Kirchoff, B.A., Long, W.A., McMullan, W.E., Vesper, K.H., & Wetzel, W.E. (eds.) Frontiers of Entrepreneurship Research (Wellesley, MA: Babson College, pp. 669–687).

Shane, S., Kolvereid, L. & Westhead, P. (1991) An exploratory examination of the reasons leading to new firm formation across country and gender. Journal of Business Venturing, 6, 431–446.

Shute, N. (1954) Slide Rule: the Autobiography of an Engineer (London: William Heinemann Ltd.)

Smith, J. (2002) Nevil Shute: A Biography (Creskill NJ: The Paper Tiger).

Sonnenfeld, J. A. (2013). Steve Jobs' immortal quest and the heroic persona. Journal of Business and Management, 19(1), 59.

Sorensen, J.B. (2007). Bureaucracy and entrepreneurship: Workplace effects on entrepreneurial entry.

The International Journal of Organizational Innovation Vol 9 Num 1 January 2017 - Section C.

25

Administrative Science Quarterly, 52, 387-412.

Sorensen, J.B., & Fassiotto, M.A. (2011). Organizations as fonts of entrepreneurship. Organization Science, 22(5), 1322-1331.

Stevenson, H.H., Roberts, M.J. & Grousbeck, H.I. (1989) Business Ventures and the Entrepreneur (Homewood, IL, Richard D Irwin Publishing).

Time Magazine, 1960, Two lives of Nevil Shute Jan 25, p.96.

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THE STAFFS' ADOPTION INTENTION OF KNOWLEDGE MANAGEMENT SYSTEM IN GREEN HOSPITAL— THE THEORY OF TECHNOLOGY ACCEPTANCE MODEL APPLIED

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Abstract

Knowledge management system is a kind of tool to create, select, store, and spread, and it can, largely, enhance knowledge creation, storage, and sharing and even the effectiveness of re-creation. And, this study has based a certain green hospital in northern Taiwan as an illustration, making use of the technology acceptance model (TAM) by Davis, Bagozzi and Warshaw (1989) to investigate whichever factors should be able to affect the intention of hospital staff using knowledge management system of the institute. And it is found from the results that the intention and behavior staff of the target green hospital to adopt the knowledge management system can testify the technology acceptance model offered by Davis and others. In addition, this study has also discussed the relationship and influence among variables in this work,

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and put forth the norms that it has observed from its investigation processes rendered in the hope that it can provide related authorities with some ideas and opinions.

Introduction

Successful corporate has to unceasingly create novel knowledge and strengthen the management and sharing of information system in order to maintain the competitiveness of corporate itself. However, knowledge accumulation is hard to be quantified and stored, so that when staff with professional knowledge and work experience leave the corporate, such experience and knowledge will, as well, be gone, resulting in both tangible and intangible loss of the corporate. In order to continuously strengthen knowledge creation, storage, and corporate competitiveness, corporate will carry out effective knowledge management (KM), and encourage its staff to build up and share knowledge and experience of work, reckoned to be of an important task (Yeh, 2004).

In the past, each department of the hospital had resorted to their own way of management to deal with information, resulting in information of every department hard to be consistent, and when it come across time of staff shift or business take-over knowledge loss would easily happen. Therefore, planning, collection, and integration of knowledge management system within medical system has become ever more important in order to help effective management and pass-on of knowledge so as to enhance work performance as well as ensure the quality of medical care service (Wang & Fan, 2003). Furthermore, the assessment of every level of hospital is conducted

mainly for objectives as to build up such quality medical service environment centered on patient, assist hospital to discover their defect, instruct and facilitate improvement of hospital quality, and upgrade teaching and research level. To cope with the random check and inquiry of assessment committee-member in time of assessment regarding hospital business, staff of every hospital department has to spend a lot of paper information sending and organizing it all in the conference room. In advance, the staff also have to spend great deal of manpower and time to renew, organize, and classify such information by year; as viewed, the process of assessment is not only time consuming, but lacks efficiency and wastes much resource. Hence, to meet criteria of green hospital of Health Promotion Administration, Ministry of Health and Welfare (2010), a certain regional teaching hospital in northern Taiwan had, in 2015, introduced knowledge management system (KMS), in the hope that it can, through knowledge management system, intensify utility efficiency with regard to the respective eight categories as energy efficiency, green building, replacement energy, transportation means, foods, waste, water, and education of environmental protection. As such, this study has referred to the technology acceptance model (TAM) by Davis, Bagozzi, and Warshaw (1989) to investigate whichever factors will affect the intention of hospital staff of green hospital in their adoption of knowledge management system.

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Literature Review

Green Hospital

The Health Promotion Administration has quoted the definition of " Green and Healthy Hospitals" by Health Care Without Harm (HCWH) in pertaining to "Global Green and Healthy Hospitals Agenda" as hospitals that can continuously lower the impact to environment enhance the health of general public, for it understands the relationship between human health and environment, and realizes such objectives through management, policy, and operation. On the other hand, HCWH also proposes green hospitals should achieve the following ten objectives, including green leadership, management of chemical materials, waste management, energy reduction, water conservation, transportation management, food control, drug control, green building, and procurement management.

Knowledge management system

According to the definition of knowledge management (KM) by O'Dell and Grayson, they consider KM is to pass it onto those or members within the organization who need the knowledge at the right time so as to help them to select and obtain the needed knowledge, and it is such continuous processes that employ the right measures to enhance organization performance can have included steps as creation, confirmation, collection, classified storage, sharing and storing, and utilizing and bettering to elimination of knowledge. As for Alavi and Leidner (2001), they believe the greatest difference between KM and KMS is that the former focuses on knowledge itself, as for the latter focuses on the tools and measures so that knowledge is to be created, selected, stored, and proliferated. In view of it, if more

brief and concise way is used to elaborate on the difference and similarity between KM and KMS, we can say that both are of a way of management and tool grounded on knowledge, only that KM is more concentrated on the body of knowledge and benefits it bring to users, while KMS is more focused on how it helps users to explore knowledge and make use of it with faster, more diversified, and greater in-depth ways.

Technology acceptance model (TAM)

The fundamental assumption of technology acceptable model (TAM) is to look into whichever factors that affect mankind to accept innovative technology or information technology product and technology. Within the structure of TAM, it can best illustrate the usefulness and easiness of use with perception from other theory, and these variables have focused on the fact if the usefulness and easiness of use that information technology product brought to individuals or organizations make them to use these new products or the technology (Davis, Bagozzi & Warshaw, 1989).

Davis and others (1989) consider that as long as users believe such innovative product or technology is highly compatible and easy for one to learn they would then find the innovative product or technology useful to them or the organization. It is why that the assumption as easiness of use for perception cognition can affect the usefulness of perception. Besides, Ajzen (1991) reckons opinion, emotion, preference, conception of value, and experience of individuals towards event as attitude in the broader sense. Thus, even though Davis has separated the usefulness and easiness of use with perception out from the scope of broader sense, he has, as well, reckoned these two variables as subjective factors that affect attitude.

Third, since Davis (1989) and others trust the usefulness of perception is given with the capability that can directly impact on the intention of adoption, while skipping the attitude of adoption, they have, within TAM structure, highlighted the route of impact regarding the usefulness of perception on the intention of adoption. At the end, Davis (1989) and others believe that human behavior would not only be affected by external environment, even innovative product and technology are oftentimes related to social background and policy, so that external variables are blended into TAM structure.

Research Design

Research structure

This study has taken reference with the assumption of TAM as it considers the usefulness and easiness of adoption for perception among hospital staff affect the attitude of adoption among green hospital staff towards knowledge management system, and such attitude should affect the intention of adoption; at the end, it has directly impacted on the behavior of adoption. Second, based on the assumption of Davis and others this study also supposes the usefulness of perception can directly impact on the intention of adoption; since the target green hospital has, in 2015, started using knowledge management system, it would, therefore, inquire the adoption behavior of green hospital staff for knowledge management system. Third, this study has modified the external factors mentioned by Davis and others (1989) into the functionality of KMS, and the primary purpose of which is to explore if the functionality of green hospital KMS affects the usefulness and easiness of adoption for perception, as indicated in the structure chart of figure Target hospital and interviewee

Under the principle with respect to privacy not involving the target hospital, the target green hospital chosen by this study has, for a long period of time, devoted itself into green energy and environmental protection, and energy saving and carbon reduction. In addition, in the "Green Brand Survey" held by the magazine of Digital Times this target hospital has been honored with the first prize in the category of medical service nationwide, and also pocketed the first prize in the category of benchmark corporate for green procurement, national quality award, and green brand. On the questionnaire released, this study has, first, applied and attached its questionnaire and briefed on its investigation. With endorsement from the hospital, trained interviewer commissioned then interview the staff. Before the visit, the interviewer would, at the start, inquire the staff's intention of interview, and explain to them the content of the questionnaire. And this study has obtained 202 responses from the hospital staff, while the duration of questionnaire done is found from November 1, 2015 to December 30, 2015.

Variables as operational definition and question

The questionnaire is found into six parts as KMS functionality, perception as being useful, easiness of adoption for perception, attitude, intention of adoption, behavior of adoption. As for the opinion scale from the interviewee, this study has resorted to the Likert Scale measuring from 1 to 5 to indicate the views of the interviewee (score 5 for strongly agree, score 4 for agree, score 3 for neither agree nor disagree, score 2 for disagree, and score 1 for strongly disagree). (See Table 1. at the end of this article.)

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System functionality: it is mainly to appreciate if KMS functions can accommodate to the needed of hospital staff, including system stability, immediacy, document management capability, and the quality of searching engine and others.

Perception as easy to adopt: TAM considers that "perception easy to adopt" refers to the extent that individuals can make use of the system without paying physical or mental effort (Davis, 1989). Green hospital staff can quickly learn to use the KMS, and easily obtain the work information and knowledge to facilitate work efficiency, thus enhancing their intention of adoption.

Perception as useful: TAM points out that "perception as useful" refers to the extent as users consider a certain information system can enhance their work efficiency (Davis, 1989). For instance, green hospital staff believes, with the introduction of the knowledge system, can achieve their objectives as helping their mutual communication between their information and knowledge, enhancing work performance, and saving energy and reducing carbon emission. Attitude of adoption: attitude is of the positive and negative comment as well as evaluation by an individual with regard to a certain event, and this study likes to appreciate the attitude of green hospital staff if they deliberate that KMS can enhance work performance, communication, and save energy and reduce carbon emission.

Intention of adoption: it would investigate the intention of adoption and willingness to recommend such knowledge management by the green hospital staff. Behavior of adoption: to appreciate the behavior of adoption by the green hospital staff for the knowledge management system, this study should inquire the interviewee that how many days in the past one week have they used the KMS?

Research Result

Model of linear structure equation

To examine if the research structure as proposed in the study and opinions of the green hospital interviewees are compatible, this study has organized those important test items and threshold values from the equation model of the linear structure as follows. It is found that all the results of the test items have well exceeded the threshold values, while the test items are also found within the scope of general, fair, and good, telling that the model of this study and opinions of the interviewees are quite consistent. As such, it has not only met the assumption of TAM, but also realistically demonstrated the intention of green hospital staff to adopt the KMS.

Based on the results of equation model with the linear structure, functionality will positively affect perception as useful and easiness of adoption; perception as easy for adoption will positively affect perception as being useful. Besides, perception as useful and as easy for adoption will positively affect intention of adoption, and the perception as easy for adoption can positively affect the intention of adoption. In addition, the attitude of adoption and perception as useful will positively affect the intention of adoption, whilst the intention of adoption will positively affect the behavior of adoption. (See Table 2 & Figure1. at the end of this article.)

Conclusion

"The staff's adoption intention structure of knowledge management system in green hospital" as put forth in this study has been testified through linear model and the results have met the

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anticipation of TAM by Davis and others (1989). Aside from proving true the model by Davis and others, it is also found applicable to the explication those green hospital staff of Taiwan with regard to their intention to adopt the KMS, further demonstrating the relationship of impact among each of the variables through its theoretical model. Within the research structure, the functionality of the KMS can, prominently and positively, affect the perception as being useful and easy for adoption by the staff towards KMS. In other words, KMS of the hospital is endowed with features as highly stable, given with fast transmission speed, meeting past habits of adoption, and provided with strong database and functions so that users find the system is helpful to them and simple to use.

In reflection of TAM assumption by Davis and others, for technology users they will first find the technology easy to use before they should consider such technology as useful to them. Same applies to this model, interviewee would first consider the hospital KMS is helpful for them to share and discuss information with co-workers, with interface easy to use, easiness for editing, and easiness to set up personal information file before they reckon such KMS can enhance their performance and achieve the objectives of green hospital in saving energy and reducing carbon emission, creation of knowledge, obtaining advanced experience, and enhancing integral performance of the hospital. Since theses interviewees find with positive perception in pertaining to the KMS with perception of being useful and easy to use, it would, as a matter of course, affect their attitude to the KMS.

Among those questions on attitude conducted in this study, they have focused on the KMS with respect to objectives as to enhance work performance,

learn about new knowledge in fast speed, strengthen communication efficiency among each department, lower resource waste on every item, and save energy and reduce carbon. The reasons that these questions are designed are mainly to accommodate to the criteria of green building and saving energy and reducing carbon in terms of hardware; as for the software and mentality as well as behavior of hospital staff, they would have to be strengthen constantly, heading towards the objective of energy saving and carbon reduction with sustainability. Through the help of KMS, the hospital staffs are able to, with the electric power, water resource, waste, drug, and amount of resource use, achieve the objective of resource use from the source as it simplifies the waste of various kinds of papers and frequency of tendering conference.

It is found that the more positive the attitude regarding the cognition as being useful, the frequency of adoption and intention by hospital staff would turn higher. Based on the statistics of this study, the staffs of this interview have used the KMS for 3.5 days in a week as an average, which is to use the KMS in every two days. Though it has not yet come to the extent of using the KMS on daily basis, the hospital staffs have, nearly every day, used the KMS to record their daily work items and knowledge, after excluding those staffs who have less frequently used the KMS (for instances, like registration counter, and nurse). As learned, if the functionality of KMS in the green hospital is powerful enough, with handy interface and easiness of use, the staffs would then feel that it is helpful to their work. For their attitude, intention, and frequency of adoption towards the KMS would then turn higher.

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Aside from the aforementioned findings, this study has found, with thorough discussion of hospital staff, from the introduction process of KMS that the hospital president and head of every department hospital staff possess rather detailed understanding with regard to the structure, purpose, and items of green hospital, aside from its staffs who know the spirit and essence of green hospital most well. Hence, these executives consider that the KMS can continuously help the staff to manage on their own, achieving the objective of total quality management (TQM). In such a way, it can not only lower the amount of usage for every kind of resource and waste from the source, but also share the knowledge and experience among each of the departments. As a result, it can have strengthened the connection efficiency of every department, which is of the identification among all of the hospital staffs regarding the introducing of KMS into the green hospital. When the KMS was first introduced, the hospital has commissioned the development company of KMS to instruct the seedling members selected from every department, and when they were trained they would return to their departments and deliver diverse occasions of KMS instruction for adoption. What is worthy of mentioned is that since the hospital has noticed since the time and business of hospital doctors it has resorted to individual instruction to doctors to use the KMS so that they can, within a certain span of time (about two months), select the time span they learn, and choose instruction by special personnel or attend teaching videos from the teaching information archive of KMS. Of such well-designed course for introduction, it has largely enhance the acceptance of staffs from every department for the KMS, so that the trend of learning KMS among hospital staffs has, within two months a time, is formulated in the hospital, greatly strengthening how innovative technology to be observed and experimented (Rogers, 1995). Furthermore, since the staffs universally believe that the KMS is, indeed, helpful to their work performance, and it is not at all troublesome to use as it is more or less the same as oneself using computer, for it can work even more faster (relative advantage and compatibility of innovative technology), it has then resulted in the high level of acceptance among staff in the green hospital for such innovation when the KMS was introduced. With such a finding, it is likely that we can offer it as a useful opinion and idea for those institutes in the agenda of development processes as they like to turn themselves into green hospitals.

Reference

Wang, M. & Fan, C.P. (2003). A Kind of Model Framework on Knowledge Management System Based for Knowledge Atlas, Journal of Industrial Engineering and Management, Vol. 6, 10-14.

Health Promotion Administration, Health and Welfare Ministry, Executive Yuan (2010). Promotion Experience Sharing Manual of Green Hospitals. Taipei: Health and Welfare Ministry.

Wu, M. L. (2008). SPSS Operation and Statistics Analysis Practice of Application Questionnaire. Taipei: Wu-Nan.

Yeh, N. C. (2004). Knowledge Management. Taipei: Chuan-Hwa.

Ajzen, I. (1988). Attitudes, Personality and Behavior. Chicago: The Dorsey Press.

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Ajzen, I. (1991). The Theory of Planned Behavior, Organizational Behavior and Human Decision Processes, Vol. 50, 179-211.

Alavi, M. & Leidner, D. E. (2001). Review: Knowledge Management and Knowledge Management Systems: Conceptual Foundations and Research Issues, MIS Quarterly, Vol.25, No 1, 107-136.

Davis, F. D. Bagozzi, R. P. & Warshaw, P. R. (1989). User Acceptance of Computer Technology: A Comparison of two Theorical Models, Management Science, Vol.35, No 8, 982-1003.

O´Dell, C. & Grayson, C. J. (1998). If Only We Knew What We Know. New York, NY: TheFree Press.

Rogers, E.M. (1995). Diffusion of innovations (4th edition). New York: The Free Press.

Table 1. Questionnaire and Questions

Aspect	Question
Functionality	I consider the hospital KMS stable, and not likely to fail.
	I consider transmission speed of the hospital KMS meets my expectation.
	I consider the function of the hospital KMS meet my habit of adoption.
	I consider the information database of the hospital KMS can quickly find the information I need.
	I consider the function of the hospital KMS powerful.
Easiness	I can easily share information with my co-workers in KMS.
	I consider the interface design of the KMS easy to use.
	I can easily edit information in the KMS.
	I can easily discuss information with my co-workers in the KMS.
	I can easily set up my personal information file in the hospital KMS.
Usefulness	I consider the hospital KMS can enhance my work performance.
	I consider the hospital KMS can achieve the hospital objective of saving energy and carbon reduction.
	I consider the hospital KMS can constantly create knowledge with value.
	I consider the hospital KMS can help obtain advanced and previous experience and knowledge.
	I consider the hospital KMS can help enhance the integral operation performance of the hospital.
Attitude of adoption	I consider the KMS can enhance the work performance of the staff.
	I consider the KMS can help the staff to learn about new knowledge in the shortest span of time.
	I consider the KMS can facilitate communication efficiency among each department.
	I consider the KMS can lower resource waste in terms of every category in the green hospital.
	I consider the KMS can, indeed, be a very good tool to save energy and reduce carbon emission.

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Aspect	Question
Intention of adoption	I am most willing to use the hospital KMS.
	I am most happy to use the hospital KMS.
	I am most willing to continue using the hospital KMS.
	I am most happy to suggest my co-workers to use the hospital KMS.
Behavior	Within the past one week, I have, for a few days, used the KMS.

Table 2. Summary Table of Threshold Value Model with Linear Structural Equation

Pattern Fitness	Threshold Value	The Research Model Fitness	Assessment
Absolute Fitness Index			
Likelihood-Ratio χ2	p ☐ .05	72.31***	Fair
GFI	☐ .90	.821	General
AGFI	☐ .90	.902	Good
SRMR	☐ .05	.032	Good
RMSEA	☐ .08	.081	Fair
RMR	☐ .05	.053	Fair
Value-Added Fitness Index			
NFI	☐ .90	.903	Good
NNFI	☐ .90	.901	Good
RFI	☐ .90	.872	Fair
IFI	☐ .90	.910	Good
CFI	☐ .90	.931	Good
Simple And Efficient Fitness Index			
PGFI	☐ .50	.612	Good
PNFI	☐ .50	.422	Fair
PCFI	☐ .50	.592	Good
Likelihood-Ratio χ2/df	☐ 3	3.21	General
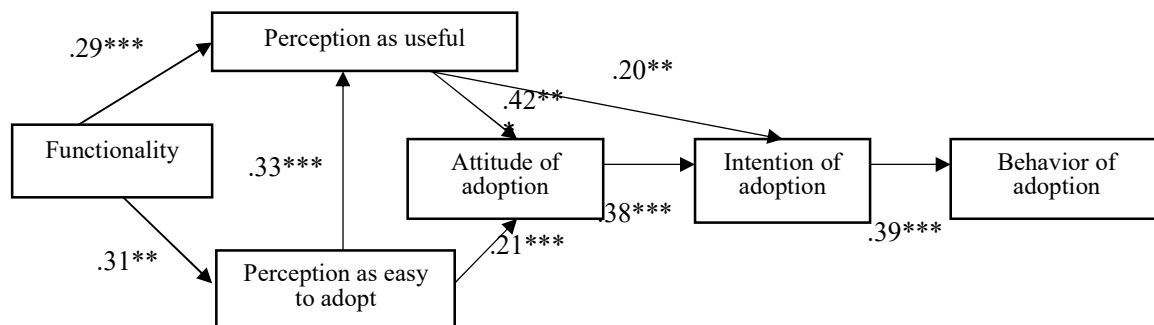
Figure 1. Intention Factors That Affect Green Hospital Staff to Adopt Knowledge Management System

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SERVICE SATISFACTION OF CONSTRUCTION PERSONNEL–A CASE STUDY OF SCHOOL CONSTRUCTION PROJECTS

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Abstract

Success in construction projects entails a wide range of tasks, and the perceived performance of individuals and teams involved in the project have a major impact on the project owner's overall satisfaction. Conventional assessments of construction project performance focus on hardware aspects including costs, scheduling, and etc., and tend to neglect software aspects, such as management and personnel, and assessments which focus on project owner satisfaction with personnel service performance are highly unusual. This work establishes a model for evaluating client satisfaction with construction personnel service for school reconstruction projects. Factor analysis was used to extract satisfaction evaluation items based on survey data collected from school construction practitioners. A 3-aspect framework with 21 personnel service satisfaction evaluation items (PSSEI) was constructed. The three aspects include professional service provided by the construction team (9 PSSEIs), professional service provided by the design and supervision team (8 PSSEIs), and service manner of the project underwriter (4 PSSEIs). Evaluation results of PSS at 45 schools indicate that the three PSSEIs need to be improved to include administration ability of architect, personnel communication of the funding organization and architect's understanding of site conditions.

Keywords: Service Satisfaction, Construction Personnel, School Reconstruction Project

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Introduction

Client satisfaction is a crucial measure of project success, but satisfaction with an otherwise successful project can be critically compromised by perceived shortcomings in just one of many performance aspects (Austin and Peters, 1985). This has resulted in satisfaction evaluation (SE) emerging as a crucial measure of business success, with increasing attention focused on satisfaction evaluation research. Satisfaction evolution has been applied to many industrial domains, including construction, where performance on various project tasks can significantly impact client perception of overall project quality. In general, the planning/design phase has the greatest impact on overall project success. Service attitudes and performance of construction personnel can be seen as the ultimate measure of construction entity service. Customer satisfaction investigation allows enterprises to identify and understand customer demands, and to formulate services that specifically target those demands, thus satisfying customer expectations. Evaluation of construction performance typically is approached from the hardware perspective (e.g., costs, scheduling, materials, equipment, and construction methods, etc.) rather than from the perspective of software inputs (such as management and personnel). The present study seeks to address this deficiency.

Satisfaction evaluations have been extensively studied (Oliver, 1981; Bolton and Drew, 1991; Kujala and Ahola, 2005; Sweis, et al., 2011), with some maintaining that satisfaction is an integrated and general concept, and can be evaluated on the basis of overall satisfaction (Day, 1977), while others hold that satisfaction is best assessed by the summing of discrete items (Rozenes, 2011). SE has been previously applied to the construction industry, with SE models constructed to assess the satisfaction of project owners, homebuyers, and homeowners in private construction projects. Other studies have focused on planning, design, contract awarding, construction, inspection, acceptance, and cost and duration (Sanchez and Robert, 2010). Fink (2014) studied the link between customer focus (CF) competence and project performance, finding that a higher team CF rating and a higher average team CF compliance (i.e., actual vs. desired CF level) is correlated to increased adherence to internal and overall budgets, deadlines and quality standards. Simple and multiple regression models were used to show that only the positive effects of team average CF compliance on examined project goals are validated. However, the surmised positive effects of the team average CF actual assessment were not validated for specified project objectives.

Paz et al. (2016) designed multinomial profit models to investigate relations between customer opinions and government expenditures on transportation projects, and found reduced customer satisfaction with highway traffic safety in Nevada, with residents in the state's northwestern region relatively more likely to support additional construction spending to reduce overall project duration, while those in the southern region more likely to support additional expenditures to reduce congestion. Amos-Abanyie et al. (2014) employed a combined multiple regression and Pearson correlation analysis to find a significant positive association between the design and management skills of architects and the project owner's level of satisfaction, with design ability shown to be the more significant factor in determining client satisfaction. This provides a basis for continuous professional

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training for architects. Their study shows 39% of project owner satisfaction is related to the architect's design skill, as opposed to 20% for the management skill. Pearson Correlation Analysis also indicates that, for architects, seven design and management competencies are strongly associated with client satisfaction.

Research Methodology and Data Collection

The present study investigates personnel service satisfaction (PSS) through a review of the relevant literature, interviews with domain experts, and a questionnaire distributed to school reconstruction project related personnel. Factor Analysis (FA) was used to extract and cluster the primary assessment criteria. A range of statistical analytical techniques were employed to construct the assessment model. Satisfaction is herein defined as "a customer's subjective feeling of appreciation for products purchased or services used." Construct reliability and internal consistency was assessed using Cronbach's α, and content validity was used to ensure appropriate sample size and distribution (Nunnally, 1978). The communality of construct validity was assessed using FA with SPSS to extract the key assessment items associated with design satisfaction. Principal Component Analysis (PCA) was utilized to obtain common factors in the questionnaire. Varimax was used to obtain key factors via Orthogonal Rotation (OR) based on the following criteria (Hair, et al 1998): (1) eigenvalues of aspects exceed 1.0; (2) factor loading exceeds 0.5 and exhibits a 0.3 difference for all aspects; and, (3) Cronbach's α exceeds 0.5. Varimax also formulates an easily interpreted factor structure with mutually independent factors providing non-overlapping information.

We identified PSS assessment items for reconstruction projects along with PSSEIs for school reconstruction projects. These lists were reviewed by experts with experience in school construction, (i.e., architects, contractors, construction personnel and funding organization managers). A survey instrument was designed to collect background information on various school reconstruction projects and to assess PSS. Each of the 21 items in Sec. 2 represents a single PSSEI as shown in Table 1. Responses were measured using a 5-point Likert scale ranging from 1 ("extremely unimportant") to 5 ("extremely important"). Out of 293 questionnaires sent out, we collected 145 valid replies, a highly acceptable response rate for such surveys in Taiwan. Referring to Table 1, the overall average of item importance is 3.63/5.00. The weights of all EIs exceed 3.0, and the lowest EI is 3.27. Thus, all EIs carry a certain degree of importance. Among the 21 EIs, the top three in descending order of importance are negotiation ability of the architect (3.86), architect's understanding of site conditions (3.85), and architect's professional ability (3.82). From the project owner's perspective, the results indicate that architect's professional ability and service attitude are more important than the others. The three least important are construction ability of sub-contractor (3.27), service attitude of sub-contractor (3.32), and management ability of site personnel (3.37).

Building the PSS Evaluation Table

Factor analysis identifies clusters of associated variables, making it useful for condensing a range of disparate cases or respondents into an easily comprehensible matrix (Chen & Chen, 2012). This approach first assesses the strength of associations among variables according to the correlation

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Table 1. Survey Summary of PSSEIs

PSSEI		Means	S.D.	Rank
PSSEI1	Audit ability of funding organization	3.77	0.78	6
PSSEI2	Personnel communication of funding organization	3.80	0.78	4
PSSEI3	Attitude of funding organization	3.80	0.87	4
PSSEI4	Overall satisfaction of funding organization	3.82	0.74	3
PSSEI5	Architect's professional ability	3.86	0.77	1
PSSEI6	Negotiation ability of architect	3.73	0.88	9
PSSEI7	Service attitude of architect	3.85	0.84	2
PSSEI8	Architect's understanding of site conditions	3.62	0.91	12
PSSEI9	Administration ability of architect	3.72	0.82	10
PSSEI10	Service attitude of supervision	3.74	0.84	8
PSSEI11	Professional ability of supervision	3.71	0.78	11
PSSEI12	Overall service satisfaction of architect	3.75	0.78	7
PSSEI13	Construction ability of sub-contractor	3.59	0.81	13
PSSEI14	Professional ability of site manager	3.52	0.82	14
PSSEI15	Negotiation ability of site manager	3.45	0.88	18
PSSEI16	Management ability of site manager	3.51	0.88	15
PSSEI17	Professional ability of site personnel	3.47	0.82	16
PSSEI18	Service attitude of site personnel	3.47	0.75	16
PSSEI19	Management ability of site personnel	3.37	0.75	19
PSSEI20	Service attitude of sub-contractor	3.32	0.82	20
PSSEI21	Professional ability of sub-contractor	3.27	0.86	21
Averaged EIs		3.63		

coefficient for each variable pair. SPSS analysis results show the 21 PSSEIs share common factors. The population correlation matrix is not an identity matrix (the Bartlett test of sphericity is 2729.088 and the associated significance level is 0.000). In addition, the value of the Kaiser-Meyer-Olkin (KMO) measure of sampling accuracy (0.935) significantly exceeds 0.5, and is thus highly acceptable. The test results show that sample data collected for the study is suitable for FA. Shown in Table 2, a framework of three PSSEAs with eigenvalues of >1 were obtained. Each PSSEI has a strong impact on only a single cluster,

with loading exceeding 0.5. Loadings and the item interpretations obtained were generally consistent. In addition, the three clusters explained up to 71.198% of the variance in accumulated interpretation and were thus used to construct the framework for assessing the various model aspects.

A two-stage questionnaire measured the relative weightings of the various aspects, and the Analytic Hierarchy Process (AHP) assessed their relative importance based on mutual comparison of preferences identified by respondents. These mutual comparisons of relative weights range from

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extremely significant (5:1) to extremely in-significant (1:5). A total of 100 respondents to the first stage questionnaire were asked to complete the second stage questionnaire, and 71 completed responses were received. A homogeneity of fit assessment found 22 responses had CR values ≤ 0.1 and were thus were considered valid (Saaty & Vargas, 2001). A total of 22 complete responses passed the consistency test and were thus considered valid and served as the basis for computing the associated aspect weights.

Shown in Table 3, the relative weights of the three aspects are 0.262 (professional service provided by the construction team), 0.192 (professional service provided by the design and supervision team) and 0.546 (service manner of the project underwriter). Furthermore, the relative weights of items beneath aspects were calculated using the Simple Additive Weighting Method based on 148 valid stage-one questionnaires. We conclude that, when evaluating the PSS for school reconstruction, the key concerns of school Directors of General Services (DsGS) was service manner of the project under-writer in terms of PSSEA. A PSS evalua-tion Table (Table 3) was formulated based on a Likert 5-point scale from 1 ("unsatis-factory") to 5 ("satisfactory") for each fac-tor. The PSS score is the summation of each PPSEI score. Evaluating the PSS of School Reconstruction

The proposed evaluation table was used to assess the PSS of 45 randomly se-lected primary schools in central Taiwan. The DsGS for each school was asked to as-sess the PSS of continuing or recently fin-ished school construction projects. The three top-scoring schools are 3.92, 3.91, and 3.86, while the lowest-scoring schools are

3.35, 3.45, and 3.51, respectively. It is found that although accounting for user feedback in school facility construction or repair projects can enhance user conven-ience and construction quality, user and manager requirements were frequently ne-glected in school building reconstruction. Shown in Table 4, professional service pro-vided by the construction team clearly has the highest PSS among the three PSSEAs. However, overall satisfaction is fair (most of PPSEI scores are between 3 and 4). The worst three PSSEIs performances include administration ability of architect, personnel communication of funding organization, and architect's understanding of site condi-tions, mainly because the project duration was set by supervising managers while on-site personnel lack sufficient expertise in required construction methods, thus limiting the effectiveness of communication and negatively impacting service quality. There-fore, these three items require conscientious improvement to enhance satisfaction for personnel performance in school construc-tion projects.

Conclusions

This study established a framework for evaluating the PSS of primary school con-struction projects. The PSS evaluation model consists of three aspects (profes-sional service of construction team, profes-sional service of design and supervision team, and service manner of funding organization) and 21 PSSEIs. Of the three PSSEAs, the DsGS concerned with service manner of funding organization was found to be the most important when evaluating the PSS of school reconstruction. In de-scending order, the three most important

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Table 2. Factor Analysis of PSSEIs

PSSEA / PSSEI	PSSEA1	PSSEA2	PSSEA3
PSSEI17	0.791	0.167	0.248
PSSEI21	0.788	0.311	0.076
PSSEI15	0.782	0.145	0.241
PSSEI18	0.777	0.237	0.186
PSSEI20	0.773	0.285	0.033
PSSEI14	0.770	0.167	0.308
PSSEI16	0.760	0.285	0.291
PSSEI19	0.717	0.218	0.133
PSSEI13	0.712	0.267	0.330
PSSEI8	0.197	0.854	0.232
PSSEI7	0.182	0.843	0.190
PSSEI6	0.215	0.798	0.293
PSSEI12	0.282	0.758	0.140
PSSEI5	0.172	0.745	0.320
PSSEI9	0.295	0.737	0.177
PSSEI11	0.377	0.689	0.258
PSSEI10	0.370	0.630	0.333
PSSEI3	0.182	0.353	0.792
PSSEI2	0.258	0.215	0.784
PSSEI1	0.322	0.295	0.746
PSSEI4	0.271	0.281	0.741
Eigenvalues	6.165	5.515	3.983
% of variance	28.021	25.071	18.106
Cumulative % of variance	28.021	53.092	71.198

Table 3. PSS Evaluation Table

PPSEA	PPSEI	Weight of PPSEI (1)	IOS (2) 1	2	3	4	5	PSSEI score (3)=(1)*(2)
Professional service provided by the construction team (0.262)	Construction ability of sub-contractor	0.030	□	□	□	□	□	
	Professional ability of site personnel	0.030	□	□	□	□	□	
	Negotiation ability of site manager	0.029	□	□	□	□	□	
	Management ability of site manager	0.030	□	□	□	□	□	
	Professional ability of site manager	0.029	□	□	□	□	□	
	Service attitude of site personnel	0.029	□	□	□	□	□	
	Management ability of site personnel	0.028	□	□	□	□	□	
	Service attitude of sub-contractor	0.028	□	□	□	□	□	
	Professional ability of sub-contractor	0.028	□	□	□	□	□	
Professional	Professional ability of architect	0.025	□	□	□	□	□	

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			1	2	3	4	5	
service provided by the design and supervision team (0.192)	Negotiation ability of architect	0.024	☐	☐	☐	☐	☐	
	Service attitude of architect	0.025	☐	☐	☐	☐	☐	
	Architect's understanding of site conditions	0.023	☐	☐	☐	☐	☐	
	Administration ability of architect	0.024	☐	☐	☐	☐	☐	
	Service attitude of supervision	0.024	☐	☐	☐	☐	☐	
	Professional ability of supervision	0.024	☐	☐	☐	☐	☐	
	Overall service satisfaction of architect	0.024	☐	☐	☐	☐	☐	
Service manner of the project underwriter (0.546)	Audit ability of funding organization	0.135	☐	☐	☐	☐	☐	
	Personnel communication of funding organization	0.137	☐	☐	☐	☐	☐	
	Attitude of funding organization	0.136	☐	☐	☐	☐	☐	
	Overall satisfaction of funding organization	0.137	☐	☐	☐	☐	☐	

Note: 1 – very unsatisfactory, 2 –unsatisfactory, 3 – fair, 4 –satisfactory, 5 – very satisfactory.

Table 4. Evaluation Summary of School PSS

PPSEA	PSSEI	Means	S.D.	Ranking within PSEA	Overall	Overall Average
PPSEA1	17	4.222	0.560	1	1	5.56
	21	3.822	0.422	3	3	
	4	3.82	0.740	5	5	
	15	3.644	0.570	9	12	
	18	3.778	0.420	6	6	
	20	3.711	0.458	7	9	
	14	3.711	0.458	7	9	
	16	3.844	0.367	2	2	
	19	3.822	0.387	3	3	
PPSEA2	13	3.711	0.548	3	9	13.5
	8	3.311	0.514	7	19	
	7	3.533	0.548	4	14	
	6	3.489	0.506	5	15	
	12	3.756	0.435	2	8	
	5	3.378	0.576	6	17	
	9	3.244	0.570	8	20	
	11	3.778	0.517	1	6	
PPSEA3	10	3.600	0.580	1	13	16.5
	3	3.378	0.490	3	18	
	2	3.244	0.570	4	20	
	1	3.489	0.549	2	15	

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PSSEIs were negotiation ability of architect, architect's understanding of site conditions, and professional ability of the architect. Construction ability of sub-contractor was the least important PSSEI, followed by service attitude of sub-contractor. An evaluation of project-owner satisfaction with personnel service at 45 schools identified three PSSEIs in need of improvement including administration ability of architect, personnel communication of funding organization, and architect's understanding of site conditions. The biggest difference between individual PSSEI and overall satisfaction was found in service attitude of sub-contractor, professional ability of site manager, and architect's understanding of site conditions, mainly because sub-contractors only follow the orders from the contractor, supervisor or architect and usually ignore orders from DsGS.

The proposed model was used to assess the PSS of school construction projects with results that can serve as a reference for improving performance quality on future projects for both private-sector contractors and public-sector project owners. The proposed framework, concepts, methodology, and analytical tools can serve as the basis for constructing similar models for assessing other key school construction factors. However, the model requires additional development and standardization. In addition, ways must be found to further improve items with low PSS scores. Finally, to improve satisfaction measurements, future work should consider the application of information technology.

References

Amos-Abanyie, S., Ayebeng Botchway, E. & Kwofie, T. E. (2014). The relationship between level of architect's professional competencies and client satisfaction level, Engineering Management Research, Vol. 3, No. 2, 10–19.

Austin, N. & Peters, T.J. (1995). A passion for excellence, Warner Books, New York, NY.

Bolton, R.N. & Drew, J.H. (1991). A multistage model of customer's assessment of service quality and value, Journal of Consumer Research, Vol. 17, 365–384.

Chen, W.T., Chen, T.T., Liu, S.S. & Lu, C.S. (2012). Analyzing relationships among success variables of construction partnering using structural equation modeling: A case study of Taiwan's construction industry, Journal of Civil Engineering and Management, Vol. 18, No. 6, 783–794.

Day, R.L. (1977). Extending the concept of consumer satisfaction, Advances in Consumer Research, Vol. 4, 149–154.

Fink, L. (2014). The effect of customer focus competence on construction project performance, Procedia–Social and Behavioral Sciences, Vol. 119, 427–436.

Hair, J.F., Anderson, R.E., Tatham, R.L. & Black, W.C. (1998). Multivariate

The International Journal of Organizational Innovation Vol 9 Num 1 January 2017 - Section C.

43

Data Analysis (5th ed.), NJ: Prentice-Halls.

Kujala, J. & Ahola, T. (2005). The value of customer satisfaction surveys for project-based organizations: symbolic, technical, or none, International Journal of Project Management, Vol. 23, No. 5, 404–409.

Nunnally, J.C. (1978). Psychometric Theory, New York: McGraw-Hill.

Oliver, R.L. (1981). Measurement and evaluation of satisfaction in retail setting, Journal of Retailing, Vol. 57, No. 1, 25–48.

Paz, A., De la Fuente Mella, H., Singh, A., Conover, R. & Monteiro, H., (2016). Highway expenditures and associated customer satisfaction: A case study, Mathematical Problems in Engineering, 1–9

Rozenes, S. (2011). The impact of project management methodologies on project performance, International Journal of Information Technology Project Management, Vol. 2, No. 2. 64–73.

Saaty, T.L. & Vargas, L.G. (2001). Models, methods, concepts and applications of the analytic hierarchy process, Kluwer Academic Publishers, New York, NY.

Sanchez, H. & Robert, B. (2010). A matrix for monitoring the strategic performance of project portfolios, International Journal of Project Organisation and Management, Vol. 2, No. 2, 135–153.

Sweis, R., Sweis, G., Attar, G. & Hammad, A.A. (2011). The relationship between information technology adoption and job satisfaction in the Jordanian construction industry, International Journal of Information Technology Project Management, Vol. 2, No. 2, 32–52.

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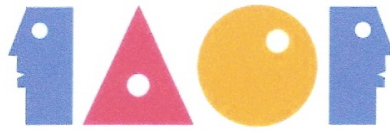
THE IMPLEMENTATION OF GREEN HOTEL MANAGEMENT STANDARD IN MAJAPAHIT HOTEL INDONESIA

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Abstract

The hospitality industry is among the biggest energy users, mainly because a hotel requires the availability of a large amount of energy in carrying out its operational activities. The need for such a large amount of energy is used to operate the facility system of the hotel, i.e. air conditioning system, lighting, elevators, etc. The main purpose of this research is to analyze the priority of activities at the Majapahit Hotel Surabaya as an effort to achieve the Green Hotel Management standard.

The method used in this research is qualitative method with a descriptive case study. The types of data that will be used are primary and secondary data. The Analytical Hierarchy Process method is complemented with Expert Choice 11 in order to obtain the weigh values of each criterion and also to determine the priority of efforts to achieve green hotel predicate in reference to the Green Hotel Award (GHA) Indicators including; energy conservation, minimum energy performance, commissioning and re-commissioning, lighting, operational and maintenance, renewable energy source and the building envelope. Academic and managerial implications will be explained further in the final part of this research.

Keywords: Hotel, electricity efficiency, Green Hotel Management, Analytical Hierarchy Process

Introduction

Global warming has long been an international concern where all scientists unanimously agree that the earth's temperature keeps increasing. Therefore, human continuity of existence may be disturbed and threatened. The advancement of the world's economic wheel indirectly increases the consumption of energy resources such as petroleum/ crude oil or coal as well as other energy resources. Based on the data from the Ministry of Energy and

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Mineral Resources of Indonesia, in the year of 2010 (in the Energy Efficiency and Conservation Clearing House Indonesia) there are four main sectors of energy users in Indonesia, which are the industrial sector as the biggest consumer with 44.2%, followed by the transportation sector with 40.6%, coming third is the households sector with 11.4$ and lastly the commercial sector with 3.7% of energy use.

Within the industrial sector, the operational activities of hotel industry require the largest amounts of energy. In average, 30% of the operational expenses is used for purchasing energy component (Elyza and friends. 2005) to operate hotel's facilities system i.e. air conditioning system, lighting, elevators and other facilities which generally consumes up to 70% from the total energy consumption in a hotel building (Shiming and Burnett, 2002). The energy availability is an important factor in maintaining customer's satisfaction and trust in the hospitality industry where the production output is directly perceived by customers. Therefore, the Indonesian government through the Ministry of Tourism and Creative Economy creates a form of national award called as the Green Hotel Awards (GHA) in order to raise the awareness of the people in hospitality industry towards the environment and also to create a sustainable tourism industry.

The aims of this research are:
1. to determine the electricity usage profile of Majapahit Hotel is in compliance with the government regulations;
2. to determine the criteria and sub-criteria in achieving the green hotel status and;

3. to see the results of the weighting of criteria and sub-criteria in AHP method.

Research Methodology

This research uses qualitative method with a descriptive case study. The type of data used in this study is primary and secondary data in which the primary data is in the form of explanation by the internal parties of the hotel while the complementary secondary data is from literature study. The application of Analytical Hierarchy Process (AHP) method with the use of Expert Choice 11 software is done in order to acquire the values for each criterion and determining the priority in the effort to achieve green hotel status based on the GHA indicators.

Data collection methods include: Preliminary study by understanding the trend in hospitality industry.

1. Literature study by reading relevant literature.

2. Field study in the form of observation to Majapahit Hotel Surabaya with the following activities:
   a. Interviews
   b. Observations
   c. Documenting
   d. Visual Material
   e. Online Data Research

Literature Review

The General Concept of Green Hotel

The hospitality Industry is an industry that consumes energy and water with the biggest intensity as it is categorized as a tourism industry (Boh-

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danpwicz, 2005). It is mainly because hotel is a service industry providing comfort for customers, such as the laundry facility, lighting, cooling, cleaning, ventilation and other supporting facilities. Based on that background, coupled with the fact that the energy used here is a non-renewable energy, the government issued a regulation restricting the use of existing natural resources in order to create sustainable living.

Essentially, the green hotel concept also aims to save energy, reduce pollution and reduce operational costs that, in long run, can indirectly benefit the entire community. Several points to consider in the implementation of green hotel are (H. Shen and L. Zeng, 2010).

A hotel must understand well and comply the philosophy and definition of green hotel well. The active role in understanding the rule is not only intended for the hotel management but also the consumers of the services, so that the implementation of green hotels can be done continuously and mutually in an ongoing basis and produces a significant result.
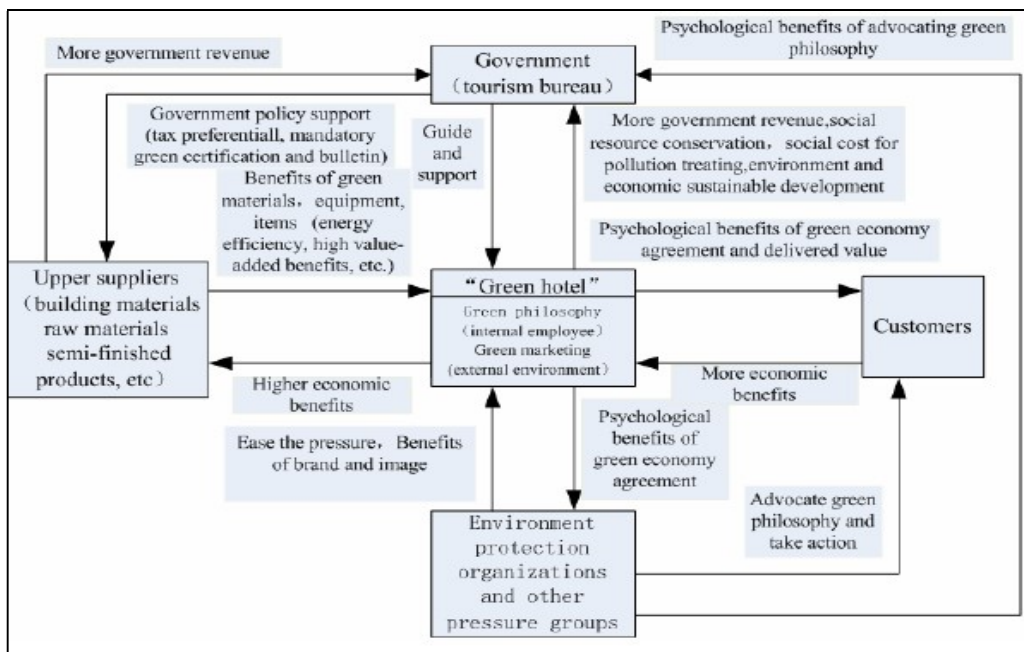
Figure 1. Equilibrium Theory in Green Hotel
Source: H.Shen dan L.Zheng (2010)

Hospitality industry, including hotel, is within the service sector which means that the output produced will be directly perceived by consumers. The Green Hotel Management practice can only run smoothly and stably when the stakeholder's interests are fulfilled. The stakeholders include hotels, customers, government, employees, suppliers, as well as environmental protection organizations.

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The main products of hospitality industry are rooms. In this context, the green hotel governs the selection of building materials or the materials for furniture or accessories which will be placed in the hotel rooms. This should be in accordance with energy saving and pollution-free concepts.

Environmental conservation is the fourth principle within the green hotel standard which can be associated with the protection and preservation efforts to create harmonious condition, such as water and electricity saving measures.

The Implementation Concept of the Green Hotels in Indonesia

The birth of the green hotel concept in Indonesia began with the birth of ASEAN Green Hotel Standard, which was a consensus between starred hotels in Southeast Asia done in 2007 to concurrently implement the Go Green concept in their hospitality business unit. Environmentally friendly principle became the main assessment aspect. Indonesia has also participated in the ASEAN Green Hotel Award which is held biannually.

The Indonesian government has shown their support through the Ministry of Tourism and Creative Economy by giving an award to hoteliers in Indonesia in the form of the Green Hotel Awards (GHA) beginning in 2011. This is a national award addressed to four and five-star hotels. In 2013 the GHA was held in October in Surabaya. The winner of the National Green Hotel Awards in 2013 will become the Indonesian representative in the similar awards in international level which is

the ASEAN Green Hotel Awards to be held in 2014.

The assessment criteria for the Indonesia Green Hotel Awards referring to the Green Hotel Awards Assessment Guidebook released in 2011 by the Ministry of Tourism and Creative Economy in collaboration with the Green Building Council Indonesia, Ministry of Energy and Resources Materials, and the Association of Indonesian Hotels and Restaurants, and also referring to Alexander and Kennedy (2002) are as follows.

Land or site, i.e. everything which includes:
- Eco-friendly site management
- The landscaping area
- Local nursery garden for the exterior
- Pedestrian facilities
- Proximity to public facilities

Energy efficiency, i.e. everything which includes:
- Electric Energy Consumption Savings
- Energy Saving Campaign
- The Intensity of Energy Consumption
- Energy Monitoring
- Energy saving implementation through the building envelope

Water efficiency, i.e. everything which includes:
- Controlling the rain water runoff
- Water usage savings
- Implementation of sub-meter
- Implementation of the plumbing facilities inspections
- Source of drinking water

Material and other raw materials (reuse, reduce and recycle) including the pur-

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chase of environmentally friendly materials, i.e. includes:

- •Renewable material
- •Reused material
- •Recycle material
- •Product and supporting material procurement
- •Locally produced material

The quality of air in a room/Indoor air quality, i.e. everything which includes:

- •No smoking campaign
- •Mechanical ventilation system
- •Source of pollutant
- •CO_2 monitoring
- •Employee comfort level

Management of the surrounding environment.

- •Management Team for Environmental Concern
- •Solid waste
- •Liquid waste
- •Air emissions
- •Hotel and tenant cooperation

Energy Auditing Concept

The energy audit definition refers to Shahroudi and Kambiz (2011) and comply with certification of SNI 03-6196-2000 regarding energy auditing for building which is an activity to indentify the types and sizes of energy used in operational parts of a building, as well as identifying possible of energy saving that could be made. An energy audit is a key process of energy management in improving efficiency. The followings are the classification stages of energy audit.

Energy Survey or Walk Through Audit

The first step of the energy survey process is meant to determine the energy usage or energy consumption pattern from operational system in the facilities of a building. In conducting the energy survey, some of the things that must be done is to do an interview with the competent authorities as well as figuring out the energy usage in a given period.

Preliminary Energy Audit

The main concern of this stage is to gather the energy data on the building's facilities by utilizing the historical data that has been provided, including the electricity cost and occupancy rate of the building. That historical data is used for identifying the Energy Consumption Index (Indeks Konsumsi Energi or IKE) used on the building's facilities. The resulting IKE value will eventually serve as a benchmark of how much the potential efficiency that has been made based on the IKE Standards specified by the government. The value of electricity IKE standards for Indonesia, based on the report released in 1992 from the study by ASEANUSAID in 1987 is as follows:

IKE for office complexes (commercial): 240 kWH/m2 per year

IKE for department stores   : 330 kWH/m2 per year

IKE for hotels/ apartments: 350 kWH/m2 per year

IKE for hospitals   : 380 kWH/m2 per year

IKE calculations on a building can be calculated using the following formula:

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$$IKE = \frac{\text{Total Kwh}}{(\text{Occ Rate x Area Room}) + (\text{Area Non Room})}$$

The Concept of Energy Efficiency

A corporation does its activities by combining the resources they have in possession (input) to produce a commodities or services (output) which will be sold to the consumers. According to Haksever et al (2000) there are 3 types of efficiency, which are:

Technical Efficiency, a state of improvement on either input or output without compromising neither the input nor output

Allocative Efficiency describes the proper combination of inputs to produce an economic entity at a minimum cost and requires a price data.

Scale Efficiency, related to the productivity scale of the facility. Increasing returns to scale takes place when the average output (output per unit input) rises due to increasing input, while decreasing return to scale takes place when the average output drops because the increasing input. Meanwhile constant return scale takes place when the average output is in proportion with the output level.

Result and Analysis

Electricity Usage Profile in Majapahit Hotel Surabaya

The IKE value in Majapahit Hotel can be calculated using the electricity usage data, occupancy rate data as well as the size of the area including the room area and non-room area at the 2014 period. The IKE calculation for Majapahit Hotel is as follow:

$$IKE = \frac{\text{Total Kwh}}{(\text{Occ Rate x Area Room}) + (\text{Area Non Room})}$$

$$= \frac{4.283.240}{(0,5017 \times 8.615) + 8000}$$
$$= 347, 60 \text{ Kwh/m2}$$

According to IKE calculation for Majapahit Hotel compared to the national standard, the Majapahit Hotel Surabaya has met the requirement for national IKE where the government regulation for hotel building sets the figure of around 350 kWH/m2 while the calculation at Majapahit Hotel shows the IKE value of 347,60k WH/m2. This means that the Majapa-

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hit Hotel electricity usage is 2,4 kWH/m2 below the government regulation and thus can be stated to be efficient.

Methods of Decision Making Process in the Organization

The Majapahit Hotel has been included in the criteria of hotels in Indonesia which have a value of IKE in accordance with the government's regulation. IKE values must be maintained optimally so that it remains within the government standard. The Majapahit Hotel management is trying to prioritize quite a lot of different things at their hotel in reference to the energy conservation efforts.

The researcher has done a field observation by identifying the efforts from the management in order to prioritize the green hotel activities. All of these efforts come down to the decision making by the Majapahit Hotel management. Some of the methods of approach to identify the decision making pattern are as follow.

Multi Criteria Decision Making (MCDM)

According to Saaty and Thomas (2008) the decision making process is the selection of an alternative from multiple alternatives which will produce the best choice from several options. The criteria used are measurement, regulation and standard in order to facilitate the decision making. The parameters of MCDM concept include Analytical Hierarchy Process (AHP), Analytic Network Process (ANP), Electree, Promethee, Goal Programming and Scoring Model

Analytical Hierarchy Process (AHP)

Analytical Hierarchy Process (AHP) is a part of the MCDM method in which AHP is used as tools in weighing the criteria and sub criteria. Due to its multi-criteria characteristic, AHP is widely used in formulating priorities (Munadi and Susila, 2007). By utilizing the AHP method, the hotel management is expected to make a quick decision about which of the criteria should be made as the company's priority in the effort of achieving the Green Hotel Management standard. In addition, another advantage of AHP method is that the subjective decision making process is formed in a hierarchical structure, and the resulting decision shows an accurate and consistent decision making.

Determining the Main Criteria and Sub criteria for AHP

The following is main criteria and sub criteria for AHP method which has been adjusted to the field condition based on the assessment indicator in the Green Hotel Award Indonesia compiled by the Indonesian Ministry of Tourism and Creative Economy.

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Table 1. Criteria and Sub criteria Based on the GHA Indicator

No	Criteria	Explanation	Sub criteria
1	Energy Conservation	Energy conservation is one of the policy measures on the energy related to the utilization of energy sources without compromising customers' convenience in using the hotel facilities.	The hotel provides a letter containing a statement of commitment from the management in the implementation of energy conservation. The hotel has to have a team that ensures the conservation of energy usage on a regular basis. The existence of reward and punishment in the implementation of energy conservation. Shows the consumption of electrical energy within 12 months Owns an evaluation of State Power Company (PLN) payments rate as part of energy efficiency. The use of the latest technology (such as Green Button, etc.). Using energy efficient appliances (eco-label indicator) Having an educational energy saving campaign for the employees Having an educational energy saving campaign for the customers.
2	Minimum Energy Performance	Minimum energy performance indicates the level of energy use.	Showing the IKE (Energy Consumption Intensity) score for 12 months which should be within the standard of 350kWh/m2 per year Showing the IKE value for other energy source.
3	Commissioning and Re-commissioning	Commissioning and re-commissioning is an act of evaluation of the system that was designed and then installed, to find out whether it is in accordance with the initial objective or not.	Evaluation with the main target is the MVAC (Mechanical-Ventilation and Air Conditioning) equipment. Commissioning/ Evaluation is done continuously with maximum of 3 year time.
4	Lighting Performance	The lighting performance is focused on the performance of light source saving so that the electricity usage can be reduced.	Performance designation of the team based on the energy conservation of the lighting system. Energy conservation by using a natural lighting system.
5	Energy Moni-	The energy monitoring and super-	The presence of over sighting mechanism

	toring and Supervision	vision is associated with supervision of the energy efficiency implementation.	including air-conditioning, light and socket, and other loading systems (elevators, emergency stairs, corridors). The existence of implementation monitoring with Building Automation System (BAS) such as: light sensor, control card for lighting and AC.
6	Maintenance and Operational	Maintenance of the energy efficiency implementation as part of efforts on achieving the operational green hotel and the maintenance of the equipment and system supporting the hotel facilities for the realization of an environmentally friendly hotel.	Provides an operational and maintenance guide for the whole AC system (Chiller, Air Handling Unit and Cooling Tower) for the employees. Provides guide books in the context of socializing the energy saving feature for the customers (dimmer). Provides periodic maintenance for the transportation system inside the building (based on reports) ex: elevator. Provides periodic maintenance for the clean and dirty water transportation (pump). Provides periodic maintenance for the backup power generator (if available).
7	Renewable Energy Sources	Renewable Energy Sources is relevant with the usage of the alternative energy sources such as water, geothermal energy, solar power, wind power and the use of biomass.	Using a renewable energy sources and other alternative such as water, geothermal, solar and biomass for the building's site.
8	Sheathing of Buildings	Sheathing of buildings is one of the method for conserving the energy, the sheathing is expected to reduce the energy load of a building	The hotel implements energy conservation through the use of sheathing of buildings inside the framework in order to reduce the burden of air conditioning.

Source: Green Hotel Award Indicator composed by Indonesian Ministry of Tourism and Creative Economy

Research findings on Efforts Priority of the Green Hotel Applications in Majapahit Hotel Surabaya

The weighing process and consistency test results from the main criteria.

From the AHP calculation with the help of Expert Choice 11, the weighing result for the 8 (eight) criteria priority is as follows.
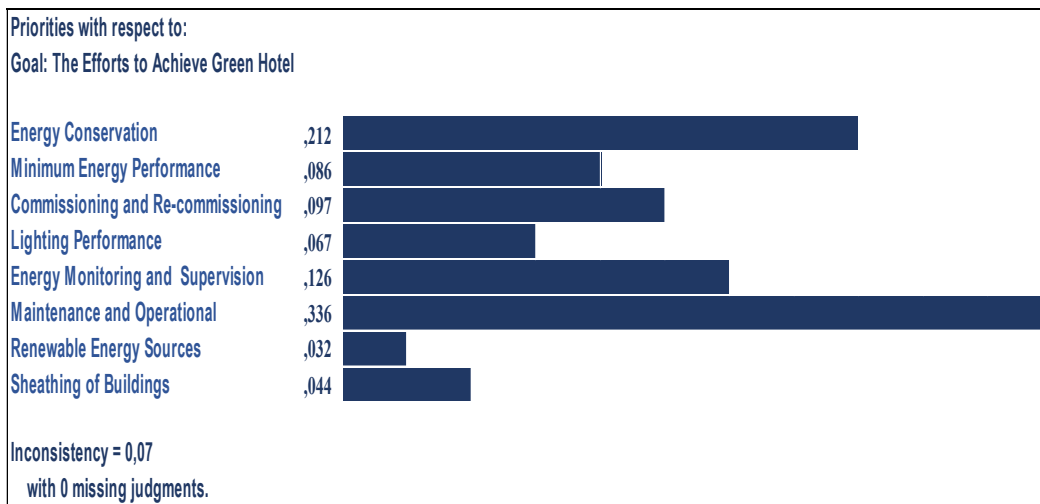
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Figure 2:. Priorities and Consistency from the Main Criteria
Source: Questionnaire Data processed with Expert Choice 11

Based on the calculation using the Expert Choice 11 program, the weighing for each criterion in an effort to achieve the green hotel status according to the indicator in Green Hotel Awards (GHA) can be seen in the figure above. This calculation is expected to help the Majapahit Hotel management to act in accordance with the criteria that has been prioritized in order to achieve the green hotel standard. The criteria of 'Maintenance and Operational' with a weight value of 0,336 which is the highest value of all criteria. The observation in the Majapahit Hotel shows that the green hotel implementation can be done accurately when the hotel condition is ideal when the Maintenance and Operational sectors work properly.

This criterion has 5 (five) sub criteria, which are:

• 'Provides periodic maintenance for the backup power generator', the weight value for this sub criterion is 0,437 which is the highest value within this criterion.

• 'Provides periodic maintenance for the clean and dirty water transportation', the weight value for this sub criterion is 0,258

• 'Provides an operational and maintenance guide for the whole AC system (Chiller, Air Handling Unit and Cooling Tower)', the weight value for this sub criterion is 0,157.

• 'Provides guide books in the context of socializing the energy saving feature for the customer', the weight value for this sub criterion is 0,098.

• 'Provides periodical maintenance for the transportation system inside the building (based on reports ex: elevator)." the weight value for this sub criterion is 0,050 which is the lowest value within this criterion.

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Figure 3: Weighting result for sub criteria within the
Maintenance and Operational criterion
Source: Questionnaire Data processed with Expert Choice 11

The criteria of 'Energy Conservation' with a weight value of 0,212. The energy conservation effort in Majapahit Hotel is carried out by doing an educational conservation energy campaign for the employees and customers without compromising customers' convenience. This criterion has 9 (nine) sub criteria, which are:

- 'Having an educational energy saving campaign for the employee' the weight value of this sub criterion is 0,231 which is the highest value within this criterion.
- 'Having an educational energy saving campaign for the customer' the weight value of this sub criterion is 0,171.
- 'Using energy efficient appliances (with an eco-label indicator)' the weight value of this sub criterion is 0,117.
- 'The hotel has to have a team that ensures the conservation of energy usage on a regular basis' the weight value of this sub criterion is 0,102.
- 'The existence of reward and punishment in the implementation of energy conservation' the weight value of this sub criterion is 0.092.
- 'The use of the latest technology (such as Green Button, etc.)' the weight value of this sub criterion is 0,090.
- 'Showing the electrical energy consumption for 12 months.' the weight value of this sub criterion is 0,081.
- 'Owns an evaluation of State Power Company (PLN) payment rate' the weight value of this sub criterion is 0,079.
- 'The hotel provides a letter containing a statement of commitment from the management in the implementation of energy conservation' the weight value of this sub criterion is 0,036 which is the lowest within this criterion.
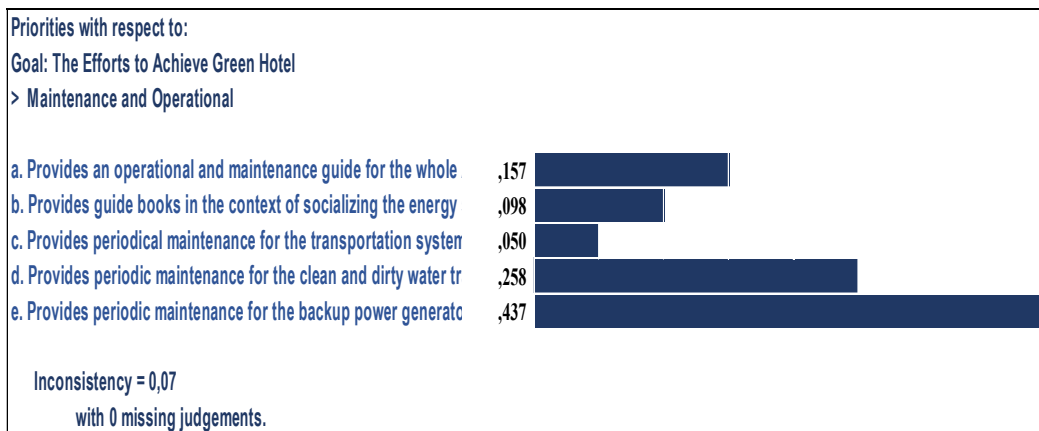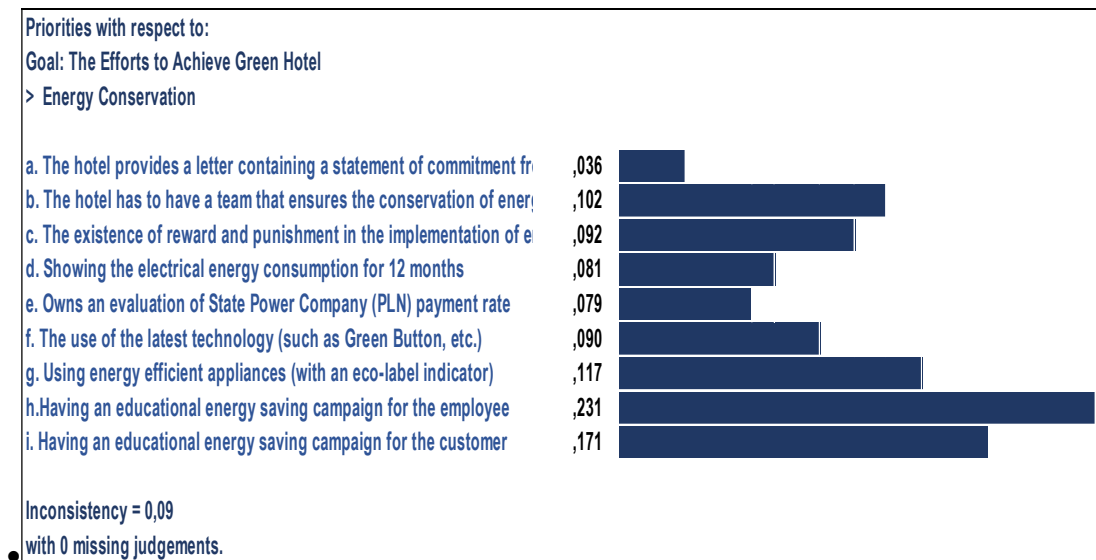
Figure 4: Weighting result for the sub criteria within
the Energy Conservation criterion
Source: Questionnaire Data processed with Expert Choice 11

The criteria of 'Energy Monitoring and Supervision' with a weight value of 0,126.

Majapahit Hotel has done an energy monitoring and supervision for the usage of hotel facilities such as elevators and other supporting facilities. The periodic monitoring is supported with the use of equipment based on BAS (Building Automation System) that facilitates technicians in conducting the supervision systematically.

This criterion has 2 (two) sub criteria, which are:

- 'Monitoring mechanism for air-conditioning, light and socket, and other loading systems (elevators, emergency stairs, and corridors)' the weight value of this sub criterion is 0,750 which is the highest value.
- 'Monitoring implementation using the Building Automation System (BAS) such as light sensor, control card for lighting and AC' the weight value of this sub criterion is 0,250.

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Priorities with respect to:

Goal: The Efforts to Achieve Green Hotel

> Energy Monitoring and Supervision

|	
a. Monitoring mechanism for air-conditioning, light and socket, and	,750
b. Monitoring implementation using the Building Automation System	,250

Inconsistency = 0,

with 0 missing judgements.
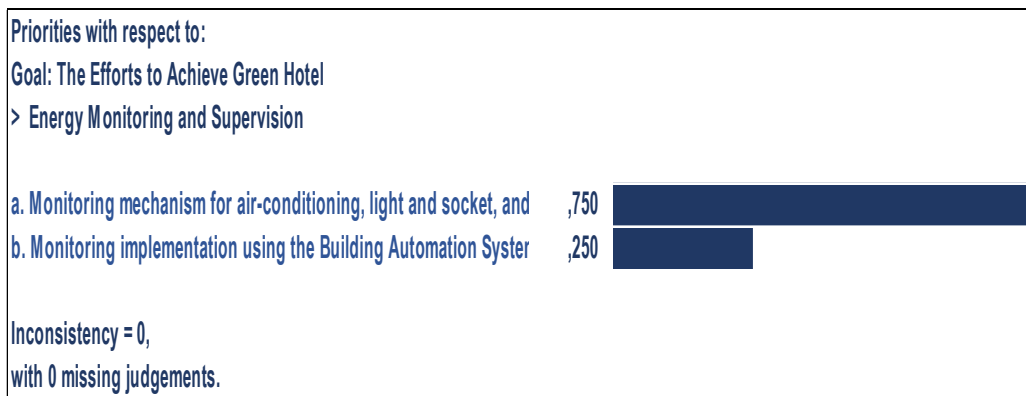
Figure 5: Weighing result for the sub criteria within the
Energy Monitoring and Supervision criterion
Source: Questionnaire Data processed with Expert Choice 11

The criteria of 'Commissioning and Re-commissioning' with a weigh value of 0,097.

Commissioning and re-commissioning is a periodic evaluation for the equipment performance such as MVAC, for example the chiller machine, if there is any discrepancy in the function and performance then a re-commissioning will be needed. This criterion has 2 (two) sub criteria, which are:

- 'Conducting a commissioning or evaluation periodically for the maximum of three years' the weight value of this sub crite-rion is 0,667, which is the highest score.
- 'Conducting an evaluation with the goal of improving the main MVAC (Mechanical Ventilation and Air Conditioning) equipment' the weight value of this sub criterion is 0,333.

The criteria of 'Minimum Energy Performance' with a weight value of 0,086.

The observation at Majapahit Hotel shows that this criterion sits in the fifth place and is caused by the fact that there has not been any penalty given by the government when the electrical usage of a hotel exceeds the standard of 350 Kwh/m2.

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Figure 6: Weighing result for the sub criteria within the 'Commissioning and Re-commissioning' criterion
Source: Questionnaire Data processed with Expert Choice 11

This criterion has 2 (two) sub criteria which are:
- 'Showing the IKE (Energy Consumption Intensity) scores for 12 months which should be within the standard of 350 kwh/m2 per year', the weight value of this sub criterion is 0,750, which is the highest score.
- 'Showing the IKE score for other energy', the weight value of this sub criterion is 0,250, which is the lowest score.

Figure 7: Weighing result for the sub criteria within the 'Minimum Energy Performance' criterion
Source: Questionnaire Data processed with Expert Choice 11

The criteria of 'Lighting Performance' with a weight value of 0,067. Lighting performance is focused on the performance of lighting conservation, in order to reduce the electricity usage.

This criterion has 2 (two) sub criteria which are:
- Performance designation of the team based on the energy conservation of the lighting system' the weight value of this

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sub criterion is 0,857 which is the highest value.
- 'Energy conservation by using a natural lighting system' the

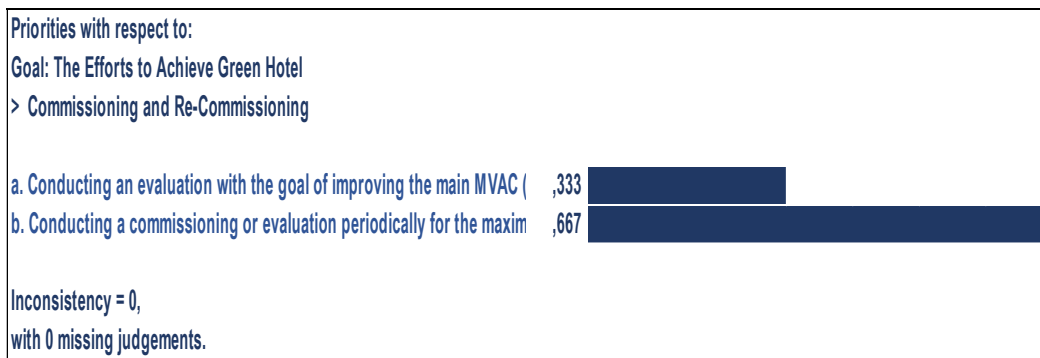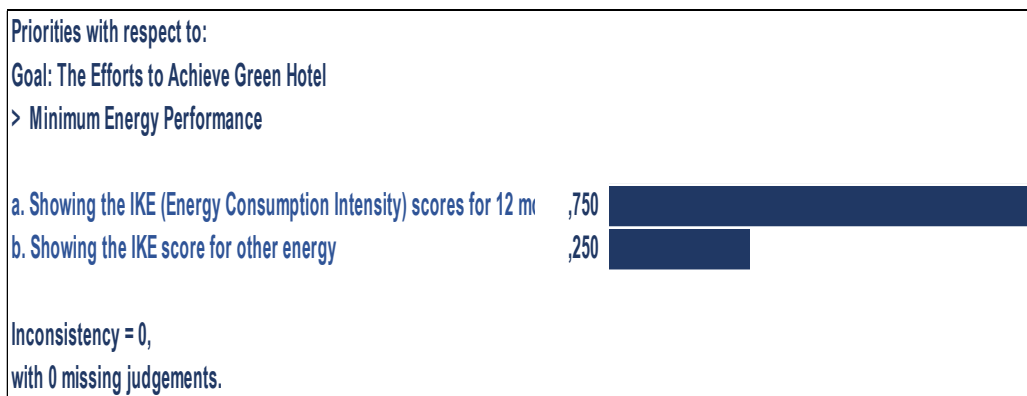weight value of this sub criterion is 0,143 which is the lowest value.
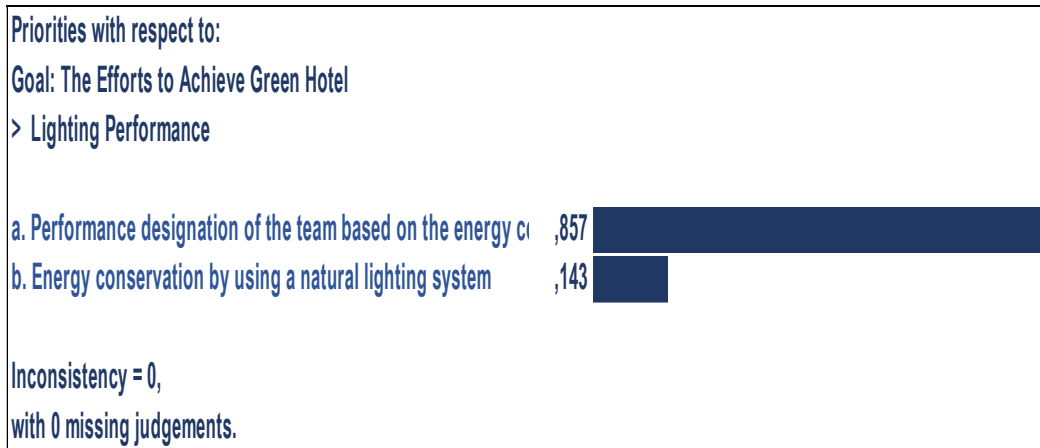
Figure 8: Weighing result for the sub criteria within the 'Lighting Performance' criterion
Source: Questionnaire Data processed with Expert Choice 11

The criteria of 'Sheathing of Buildings' with a weight value of 0,044

The Majapahit Hotel is planning to renovate the building envelope. From the material selection process, there are two possibilities of sheathing material that can be used, the first material is glass and the second choice is bricks. Glass is considered as a sheathing material due to its hot nature to spread the heat. While the bricks came into consideration due to its ability to absorb heat because of its cold nature. This criterion is not a main priority as it will not be an easy task to modify an existing building structure.

The criteria of 'Renewable Energy Sources' with a weight value of 0,032, which is the lowest value of all the criteria.

The renewable energy sources is a criterion with the lowest priority due to its complicated implementation, especially when the application for these alternative resources such as geothermal energy, solar energy, wind, and up to biomass, requires the addition of building infrastructure. The hotel management finds it difficult in actualizing the idea due to the financial ability.

Conclusion

The IKE standards score for Majapahit Hotel Surabaya is 347,60 Kwh/m2, which means that Majapahit Hotel is within the category for hotels with a good energy efficiency, in accordance with the the government's standard.

According to the data, the researcher is doing an observation on various efforts that has been done by

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the management of Majapahit Hotel in order to be included in that level of category, and below are some of the main priority activities of the Hotel Majapahit management.

'Maintenance and Operational' is their main activity with a weight value of 0,336. This effort is supported with sub-activities such as 'Provides periodic maintenance for the backup power generator' which has the highest sub criterion weight value for this criterion of 0,347.

The activity of 'Energy Conservation' has a weight value of 0,212, and it is supported by the sub activity of 'Having an educational energy saving campaign for the employee' which has the highest sub criterion weight value for this criterion of 0,231.

The activity of 'Energy Monitoring and Supervision' which has a weight value of 0,126 is supported by the sub activity of 'Monitoring mechanism for air-conditioning, light and socket, and other loading systems (elevators, emergency stairs, and corridors)' which has the highest sub criterion weight value for this criterion of 0,750.

The activity of 'Commissioning and Re-commissioning' with a weight value of 0,097 is supported by the sub activity of 'Conducting a commissioning or evaluation periodically for the maximum of three years' which has the highest sub criterion weight value for this criterion of 0,667.

The activity of 'Minimum Energy Performance' with a weight value of 0,086 is supported by sub activity of 'Showing the IKE (Energy Consumption Intensity) scores for 12 months which should be within the standard of 350 kwh/m2 per year' which has the highest sub criterion weight value for this criterion of 0,750.

The activity of 'Lighting Performance' has a weight value of 0,067 and it is supported by sub activity 'Performance designation of the team based on the energy conservation of the lighting system' which has the highest sub criterion weight value for this criterion of 0,857.

The activity of 'Building Envelope' with a weight value of 0,044 is not considered as priority because there will be too many complications in trying to modify an existing building structure.

The activity of 'Renewable Energy Sources' with the lowest weight value of 0,032 is also not considered as priority because the application of this criterion is too complicated and expensive.

Suggestions

There are few things that should be optimized for the better application of the Green Hotel Management later in the future:

• The government should give strict sanctions for hotels in Indonesia which have a value of IKE above the energy conservation threshold. The reward and punishment concept needs to be implemented so that it can motivate other hotels in following the steps that have been taken by Majapahit Hotel to earn a good IKE score.

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- The coverage of Green Hotel Award Indonesia should be broadened so that it will not only affect the starred hotels but also the non-starred/budget hotels throughout Indonesia. Cooperation with national and local media is also needed so that the message of this activity can be conveyed to the public with ease.
- The Government is suggested to give their utmost support to the Majapahit Hotel management in order to participate in the ASEAN Green Hotel Award. When conducting observations, the researchers get the impression that Majapahit Hotel was not receiving enough support from the Government as they were supposed to. Should that be really the case then it is very unfortunate for them as by participating on the awards, Majapahit Hotel will gain new insight and experience that can be shared with other hotels in Indonesia so that in the future more and more hotels from Indonesia can participate in the awards.
- The researchers suggest another research related to the Green Hotel management to be conducted. However, this new research has to have much broader samples from starred hotels to budget hotels. The result of this further study is expected to reflect the condition of the application of Green Hotel management throughout Indonesia.

Reference

Alexander and Kennedy 2002. Green Hotels: Opportunity and Resources for Success. Portland: Zero Waste Organization.

Apriyanto, Hari dan Udisubakti Ciptomulyono. 2011. Audit Energi dan Analisis Pemilihan Alternatif Manajemen Energi Hotel dengan Pendekatan Metode MCDM-PROMETHEE. Studi Kasus: Surabaya Plaza Hotel. Institut Teknologi Sepuluh November.

Bohdanowicz, P. 2005. European hoteliers environmental attitudes: Greening the business. Cornell Hotel and Restaurant Quartely. SAGE Publications.

Elyza, Rizka. 2005. Buku Panduan Efisiensi Energi di Hotel. Erlangga.

Haksever, Cengiz, B. Render., R.S. Russell and R.G Murdick. 2000. Service Management and Operations. New Jersey: Prentice Hall.

Munadi and Susila. 2007. Penggunaan Analythical Hierarchy Process untuk penyusunan prioritas penelitian. Jurnal Informatika Pertanian, vol 16 no.2.

Saaty, Thomas L. 2008. Decision making With The Analytic Hierarchy Process, Intenational Journal Service Science, Vol.1 no 1.

The International Journal of Organizational Innovation Vol 9 Num 1 January 2017 - Section C.

61

Shiming D, Burnett J. 2002. Energy Use and Management in hotels in hongkong. International Journal of Hospitality Management.

Shahroudi, Kambiz. 2011. Measurement of the Efficiency Hotel Using DEA Method (Case Study : in Gilan Province Hotels). Journal of Basic and Applied Scientific Research.

Shen, Huayu dan Lingjie Zheng. 2010. Environmental Management and Suitainable Development in The Hotel Industry : A Case Study From China. International Journal Environmental and Suistainable Development, vol 9 no.8.

The Committee of Indonesia Green Hotel Award. 2011. Buku Panduan Penilaian Green Hotel Awards. Indonesia Ministry of Tourims and Culture.

The Energy Audit Committee. 2000. Prosedur Audit Energi pada Bangunan Gedung. The Indonesian Standardization Organization.

The International Journal of Organizational Innovation Vol 9 Num 1 January 2017 - Section C.

62
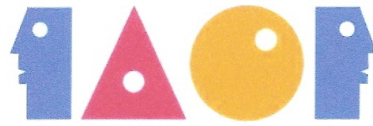
ORGANIZATIONAL INNOVATION INTO PROCESS REENGINEER-ING: A CASE STUDY OF A PRACTICAL TRAINING HOTEL

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Abstract

The paper aims to explore how innovation could be applying into process reengineering in organization of high school. Organizational innovation usually includes change within some complex processes. Those of processes are also throughout organization different functions such as R&D, purchasing, manufacturing, assembling, quality, delivering, financial and marketing. The managers or leaders have to control those processes what they need, or what they do not need. That is about an organization how to applying the concept of innovation and reengineering into the organizational management. The paper is using a real case of practical training hotel which belongs to an Industrial & Commercial Vocational High School in Taiwan. Through a qualitative approach of participant observation, we find the results are organizational innovation should consider about the people (workers or employee) how to manage process actively, as well as using suitable information technology (IT) within management of process. And then make people, process, and information technology work together under applying innovation.

Keywords: Case study, Hotel, Innovation, Organization, Process reengineering

Introduction

The practical training hotel is subordinated in an institute. Which is not all of schools are within a subordinated institute, especially in high school of Taiwan. The practical training hotel subordinates in high school that means the organizational management has to consider educational and industrial proc-

esses at the same time. For example, the booking process is beginning from the information of web site, tourist according to the information and booking processes to book a room by email or telephone. And then tourist remits money to the account of bank of practical training hotel. After the remittance, the room thus booked and confirmed by tourist and manager of front desk, we

called that is a complete process of reservation. But, how about the cash flow after the money was remitted by tourist? In the most of practical training hotel is not working by an individual organizational framework. They usually work with the school's organizational framework. The cash flow is beginning practical training hotel, which is style of hospitality industry, but cash and financial management is conducted by accounting department, which is style of school. Two of styles are throughout whole organizational functions with each other, from tourist to manager of front desk, leader of practical training hotel, and then to accounting department, finally reported by accounting department to a school principal.

This is one of traditional problems in managing process. The problem of management process is designed for organizational requirements. Usually, organizational requirements are created by different departments or operating units, and even some of specific projects as well. However, most of managing processes are not working by alone department or company. They are working by different organization functions. And these functions are R&D, purchasing, manufacturing, assembling, quality, delivering, financial or marketing. The organization functions make the process not works alone but multiple connections. To implement a customer relationship management (CRM) model explains how multiple connections are important when organization works with people, process, and technology (Chen, 2003).

To make process more effectiveness and efficiency, it usually relates to a process how to design or radical change by people and technology when

organization needed, therefore, a well-known approach of process redesigned and innovation thus called business process reengineering (BPR) (O'Neill, 1999). However, an innovation of process is not working alone but also working with specific goals, actions, teams, and results in organization (O'Sullivan, 2009).

The paper aims to explore how innovation could be applying into process reengineering in organization of high school. The major reason is the problem of innovation process is designed or radical change for organizational requirements. However, what is the organizational requirement for the practical training hotel? And the practical training hotel how to applying innovation into process reengineering? Therefore, the innovation process is becoming an important issue to explore for academic and industry.

Innovation and organizational innovation

What is innovation? A clearly definition of innovation has discussed by O'Sullivan (2009) which is the process of making changes to something established by introducing something new that adds value to customers and contributions to the knowledge store of the organization. This perspective explains what an important role plays within organizational process. The process is a critical thinking of how organization to make something change to be more value-added and knowledge to customers. A more extended definition of innovation by Anderson (2014) is completely shown below.

Creativity and innovation at work are the process, outcomes, and products

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of attempts to develop and introduce new and improved ways of doing things. The creativity stage of this process refers to idea generation, and innovation refers to the subsequent stage of implementing ideas toward better procedures, practices, or products. Creativity and innovation can occur at the level of the individual, work team, organization, or at more than one of these levels combined but will invariably result in identifiable benefits at one or more of these levels of analysis.

The creativity and innovation in any organization are vital to its successful performance (Anderson, 2014). That means the process will affect an organizational innovation and managing performances. In (Amabile, 1988) provides a model of creativity and innovation in organizations, which including four criteria in the model for organizational innovation, it represents process management how important for organizational innovation. The four criteria as below:

- The entire process of individual creativity should be considered as a crucial element in the process of organizational innovation;
- There should be an attempt to incorporate all aspects of organizations that influence innovation;
- The model should show the major phases in the organizational innovation process; and
- The model should describe the influence of organizational factors on individual creativity.

However, organizational innovation is not only applying to business, but also applying to school in recent years. In (Hsiao, 2010) describes what school organizational innovation is. There are seven facets of school organizational

innovation: leadership innovation, administration innovation, student guidance and activity innovation, curriculum and instruction innovation, teacher professional development innovation, resource application innovation, and campus construction innovation. Those facets of school organizational innovation are also applying as validation of assessment indicators for universities and institutes of technology (Chen, 2010).

An organisational management of technological and vocational schools on innovative performance has been discussed by Chou (2010). In their research results that shown innovative management, performance orientation, professional orientation and innovative orientation are important factors affecting innovative climate. In innovative climate, innovation leadership and work autonomy have a significant influence on innovative performance. In innovative management, interpersonal orientation, performance orientation and innovative orientation are important characteristics that affect innovative performance.

In Chang's (2011) analysis of hierarchical regression revealed that there is a partial moderator effect for the support for innovation and organizational learning in the relationship between transformational leadership and organizational innovation. The results indicated that a better innovative effect occurs when school principals used the strategies of transformational leadership. Given limited resources and time, the principals, in addition to using the transformational leadership, could also promote organizational learning and support for innovation side-by-side.

In short, the literature reviewing works are explained what reasons are

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organization innovation is working with people, process, and technology. And especially, organization innovation is not working alone but also working with specific goals, actions, teams, and results in organization (O'Sullivan, 2009). Following session will propose a framework to explore how to applying innovation into process reengineering.

Applying innovation into process reengineering

In principle, organizational innovation is an incorporating process as ideas toward better procedures, practices, or products. And those of procedures, practices, or products are the results of organizational innovation. Therefore, they could be formulated as an operational system. That means organizational innovation could be looked as managing process. Figure 1 is a proposed framework for exploring how to applying innovation into process reengineering.

Figure 1. A framework of applying innovation into process reengineering

Organizational innovation is created by organizational requirements. And the organizational requirements are sometime consider about management change or performance's improvement. Business process reengineering (BPR) is said to be a new approach for the process management that brings radical change (improvement) in organizational performance (Chen, 2010). Therefore, we use this concept into our design framework of applying innovation into process reengineering. There are three phases designed into the framework for applying innovation into process reengi

neering, which are phases of input, system, and output.

The first phase: input.

According to (Chen, 2003) proposed perspective that organizational works within people, process, and technology. That is the essential elements for working a normal organization. The organizational framework is building by different managing requirements. Those of different managing requirements are designed to different functions. And the functions are team work under a com-

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mon goal. And this goal is collecting all of efforts from different team members. Although, each team member working by individual action or thinking. However, their individual action is working by an incorporating objective by team leader, or manager of department. That is meaningful integration for an organizational operation. And this operation is complex by process. Each process works through whole organizational functions. The process is important but is easy ignored as well. Therefore, the process reengineering is necessary scanned before organization want to change or applying innovation.

The second phase: system operation.

According to O'Sullivan (2009) proposed perspective that innovation of process is not working alone but also working with specific goals, actions, teams, and results in organization. Therefore, we have to thinking an organizational operation is constructing by the specific goals, actions, teams, and results. The specific goals usually underpinned a vision of company or institution; sometime we extended to an organization. Goal is able to segmented different plans. And different plans are also can divided to different strategic actions, under those of different actions; each team member should be working together, and toward the common final position. The system operation is thinking about how an organization can work together.

The third phase: output.

According to Hsiao (2010), Chen (2010), Chou (2010), and Chang (2011) proposed perspectives that school organizational innovation is contenting seven facets of school organizational innova-

tion: leadership innovation, administration innovation, student guidance and activity innovation, curriculum and instruction innovation, teacher professional development innovation, resource application innovation, and campus construction innovation. Therefore, the proposed framework is considered to use this point as the evaluation of applying innovation into process reengineering.

A Case Study - Practical Training Hotel

In this section is to answer two questions which we ask previous contents. The first question is what the organizational requirement for the practical training hotel is. And how is the practical training hotel applying innovation into process reengineering. Therefore, the innovation process is can be explored for academic and industry.

Data Collection

The case study is a way to explore the context of why and how (Yin, 2003), therefore, the practical training hotel is used to as a case to discuss and understand how innovation applying into process reengineering in organizational of Industrial & Commercial Vocational High School. In the paper is using observation approach for data collection. The participant - observation method is used for understanding what happen in the educational events (Bassey, 1999). In the other hand, the paper also uses approach of face-to-face interview to collect more detailed evidences. This way is enhanced when different perspectives exist.

The Industrial & Commercial Vocational High School is located at south of Taiwan, it is traditional high school. Their school belongs to public high school, and they also have well reputa-

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tion in Ping-Tung County. They constructs their distinguishing features in different kinds of teaching and learning methods, especially, they doing their efforts on enhancing students' practical skills, knowledge, attitudes. The school has built a practical training hotel for training students' practical experiences, and also provides recommendation services for tourists who travel to well-known destination of Kenting town, where is at tourist resort in Ping-Tung County. Therefore, the practical training hotel is called Kenting culture resort for tourists or travel industry.

Data Analysis

The framework of applying innovation into process reengineering is using to analyse what happen in the case.

There are three phases such as following descriptions.

The first phase: input.

This phase is to scan people, process, and technology how work together in the practical training hotel. In part of participant observation, the practical training hotel belongs to the organizational framework of high school, they are not independent department. That means all of staffs have to follow the rules management as an employee who work as industrial style. They also use computer as recording tool to collect, store, and use some of information when they need.

The operation process is cross from industrial style to system of school administration. In this part is more different then the industry. Which is about a decision-making model, we call flexibility. Because in the system of school ad-

ministration is always according to the regulations and announced information such as price of room. However, in different seasons such as low and peak reason, the price of room is flexible. The industrial style is usually according to the situation of low reason or period to change the price. That is related to the production's rate for hotel. If the manager cannot flexible to change the price when low period coming, the room is still not sale, the room will become one kind of inventory.

In the practical training hotel, many managing processes are cross into different functions in system of school administration. Those processes are including purchasing, marketing, and accounting. There all are under the system of school administration. The managing process is originally beginning on practical training hotel, and then work completed at the specific department. Some of process is work by computer, but some of work without computer. Their management information system is not fully completed integrated. For example, all of booking process is part of using computer in the booking process. The booking process is not directly automatic from web site to front desk. This is not about the electronic commerce (EC), but for process management.

The second phase: system operation.

After scanning people, process, and technology, next, the approach of face-to-face interview is to collect more detailed evidences. The interviewee is a woman who has prepared some of industrial experiences in a famous hotel in Taichung. She returned Ping-Tung is the reason that here is her hometown. Her responsibility is to make sure each customer can serve and arrange to a

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suitable room. Her working is arranged to middle shift from 4 pm to 12 pm. This period is cover busy and low busy term. Most of customer asked that the price is can cheaper than normal term or not. Because we coming later and will over a night just few hours. She said if she answers yes, which will be different announced price. The accounting department will not be accepted the changed price, due to the regulations of accounting management. Therefore, she has to trade off how to do is batter for customer and accounting regulations. Accounting process is original beginning from customers booking a room. The customers make sure with staff of front desk. The staff according to the booking information to arrange a suitable room for customers, and then checks the price and records this transaction into computer. Weekly and monthly, all of transactions will collect together to accounting department, and then finally reported to principle.

The third phase: output.

After the interview, we brief to draw the booking process as Table 1. The booking process looks simply, but actually not. It is a long and complex process. The original process is across organizational functions which including practical training hotel, counsellor office, accounting department, and finally stopped by principle. The original process is really inflexible. The reason is accounting department has to according to the announced price to make sure how many rooms have been sale.

Therefore, an idea for renewing process is considered to give authorization.

Table 1. The booking process across practical training hotel and system of school administration

process	practical training hotel	counsellor office	accounting department	principle
find the information on web site	■			
customers make sure with staff of front desk	■			
front desk reply ok or not	■			
customer remits the money	■			
hotel receives the remittance	■		■	
front desk reports to counsellor office		■	■	
leader reports to accounting department			■	
accounting department makes sure the number is correct or not	if incorrect	return		
accounting department reports to principle				■

Original process if incorrect ⟷
Renewed process to give authorization ⟵┈┈▸

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That means staff can make the decision directly due to authorization if customers come in the low period of time. This change affects the deciding and booking process. The change is more catch up with customers need. And approach organizational innovation within process reengineering.

Conclusions

The paper has explored what is the organizational requirement for the practical training hotel. Through a really case has found the answer is to catch up with customers' need, even they are an Industrial & Commercial Vocational High School. Because, practical training hotel within half industrial style, therefore, they also have to approach the customers need.

The practical training hotel is to applying innovation into process reengineering. This is given when staff can make the decision directly due to authorization if customers come in the low period of time. That means organizational change affects the process reengineering.

Therefore, the paper finds the results are organizational innovation should consider about the people (workers or employee) how to manage process actively, as well as using suitable information technology (IT) within management of process. And then make people, process, and information technology work together under applying innovation.

References

Anderson, N., Potočnik, K. and Zhou, J. (2014). Innovation and creativity in organizations: a state-of-the-science review, prospective commentary, and guiding framework, Journal of Management, 40, 5, 1297-1333.

Amabile, T. M. (1988). A model of creativity and innovation in organizations, Research in Organizational Behavior, 10, 123-167.

Bassey, M. (1999). Case study research in educational settings. buckingham: Open University Press.

Chang, J.C., Hsiao, H.C., and Tu, Y.L. (2011). Besides using transformational leadership, what should schools do to achieve innovation? The Asia Pacific Educational Researcher, 20, 1, 48-60.

Chen, S.C., Hsiao, H.C, Shen, C.H., Chou, C.M., and Chang, J.C. (2010). Validation of school organisational innovation assessment indicators for universities and institutes of technology, World Transactions on Engineering and Technology Education. 8, 2, 225-230.

Chen, I. J. and Popovich, K. (2003). Understanding customer relationship management (CRM) people, process and technology, Business Process Management Journal, 9, 5, 672-688.

Chou, C.M., Shen, C.H., Hsiao, H.C., and Chen, S.C. (2010). The influence of innovative organisational management of technological and vocational schools on innovative performance - using organisational innovative climate as the mediator variable, World Transactions on Engineering and Technology Education, 8, 2, 237-242.

70

The International Journal of Organizational Innovation Vol 9 Num 1 January 2017 - Section C.

Habib, M.N., and Shah, A. (2013). Business process reengineering: literure review of approaches and applications, Proceedings of 3rd Asia-Pacific Business Research Conference, 978-1.

Hsiao, H.C., Chen, S.C., Chang, J.C., Shen C.H., and Chou, C.M. (2010). School organizational innovation indicators for technical institutes and universities, Contemporary Issues in Education Research, 3, 7, 43-50.

O'Neill, P. and Sohal, A.S. (1999). Business process reengineering: a review of recent literature, Technovation, 19, 571–581.

O'Sullivan, D. and Dooley, L. (2009). Applying innovation. Sage Publications, London.

Yin, R.K. (2003). Case study research: design and methods, 3rd edition, Sage Publications, Newbury Park, CA.

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IPO COMPANY STOCK VALUATION ANALYSIS
2000 – 2014

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Abstract

The valuation of the stock price by the company that doing an IPO is required, although the stock price at the time of the IPO is ultimately determined by agreement between the company and the underwriters. The objectives of this study were analyzing the fair prices of stock companies doing IPOs in 2000 - 2014 with a PER valuation method and to analyze differences in fair prices of stock based on valuation by the stock price at the time of IPO and then to analyze whether differences in prices that occurred because of differences underwriter. Research conducted on 240 companies which doing an IPO in 2000-2014 and to valuing the fair price of stock with PER method used ratio that describes the ratio between the stock price and net profit in a year that has been produced by the company. The results showed that 65% of the stock price at the time of the IPO lower compared with fair price of stock based on valuation. The difference between the stock price at the time of the IPO with fair price of stock is significantly. Each underwriter will produce different levels of price differences.

Key word : Valuation, Price Difference, Underwriter

(Editor's Note: The text of this article is formatted in a single column for easier reading of the complex formulas it contains.)

Introduction

The funding of companies divided into two groups: internal financing and external financing. Research conducted by Singh and Hamid (1992) in Singh (1995) states that companies in developing countries prefer external funding by issuing shares rather than debt to finance the company.

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The Company will conduct an IPO will appoint securities firms that serve as underwriters, supporting professional and supporting institutions. Supporting professional and supporting institutions function to help prepare various documents of emissions for the purposes of the IPO, one of which is to make the financial statements. The financial statements, management companies can find out the fair stock price of his company. Kim and Ritter (1999) has assessed the stock price or valuation, and has resulted in the conclusion that the Price-Earnings (P/E) is the best method of stock valuation. However, stock prices are reasonable calculation results may not necessarily be used as the IPO price since the IPO price is a price agreement between the underwriter with the company issuing the stocks. The Decree of (SK) Bapepam No. Kep 01 / PM / 1988 Article 11 states that underwriter participate in determining stock prices in the primary market. Ritter (1987) suggests it is important for underwriters set the right price while Baron and Holmstrom (1980) argued that the conflict of interest between the underwriter and the company's lead underwriter sets a price below the price should be.

One of the phenomena that occur on the IPO pricing is the IPO lower than the fair stock price in accordance with the company's value (positive price difference). Baron (1982) considers the Underwriters have more information about the capital market, while the issuer is a party that does not have a capital market information. Underwriters use the information possessed to make optimal IPO price deal for him, ie prices and minimize risks when the stocks are not sold out. Due to lack of information the issuer, then the issuer receives such a cheap price for a stock offering.

Research assessment fair stock price at the time of the IPO conducted by RJ (2013) on the separation PT Waskita Karya (Persero) Tbk is an IPO on December 19, 2012. Based on Relative Valuation method Price Earning Ratio (PER) resulted in fair value of stock of Rp. 488 per share, while the stock price at the time of the IPO is Rp. 380. Thus, the objectives of this study were: (1). Analyzing the fair prices of stock companies doing IPOs in 2000 - 2014 with a PER valuation method; (2) to analyze differences in fair prices of stock based on valuation by the stock price at the time of IPO, and (3) to analyze whether differences in prices that occurred because of differences underwriter.

Literature Review

Process Public Offering (Go Public)

Public Offering is offering an activity offering or other securities undertaken by the Prospective Listed Company to sell stocks or securities to the public by the system regulated by the Capital Market Law and the Implementation Regulations. In the public offering, Prospective Listed Company should conduct internal preparation and documents in accordance with the requirements of the Public Offering, as well as meet the requirements set by the OJK.

Stock Price Valuation

Valuation stock is the process of determining what a reasonable price of stock that is produced. Investors should know how reasonable price or intrinsic value of a

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stock before deciding to invest in the stock. In assessing the fair price of stocks there are a variety of approaches, including the approach to Price Earning Ratio (PER). According to Damodaran (2012):

Po = EPS1 x Price Earning Ratio
Where : EPS1 = Earning Per Share following year using formula :

$$EPS_1 = EPS_0(1 + g)$$

And growth:

g = (1 – Payout Ratio) x ROE
Where : ROE = Return On Equity

Payout Ratio = Dividend Ratio

Firth (2008) conducted a study assessment IPO stock price with a sample of companies that did an IPO in 1992-2002 in China. The results showed that the stock assessment by using price-earnings multiples could significantly explain the strength in the creation and delivery of information about the quality of the company when determining the IPO price. It occurs when the China Securities and Regulatory Commission in 1999 issued guidelines in approving a request to do an IPO. Berkman (2000) using the method of valuation on a price earning a new sample of 45 companies listed on the New Zealand Stock Exchange and the results showed that the price earnings has an accuracy of about 70% in assessing stock prices. Temporary Rajib and Sahoo (2013) examined the P / E of 120 companies that did an IPO in India during the period 2002-2007. Having regard to comparable companies from the same industry, the result obtained is that the characteristics of income and return on net assets provide the most efficient results are used to evaluate the IPO price. Valuations tend to be more accurate, ie 77.5%.

Asymmetric Information

Asymmetric information is a condition in which the information is owned by the management of a company is not the same as the information held by the investor. Discussion asymmetric information initiated by Akerlof (1970), which states that in a market where there is asymmetric information, the average value of a commodity tends to go down, even for goods that are classified as good quality. Sellers who do not intend either going to cheat buyers by giving the impression that the goods it sells good, this case raises the Adverse Selection. Thus, many buyers avoid scams refuse to execute transactions in a market like this, or refuse to spend big money in the transaction. As a result, sellers are really selling good stuff becomes not sell because it's rated by the buyer, and ultimately the market will be filled by poor quality goods.

According to Myers and Majluf (1984), there is asymmetric information between managers and investors, managers have more complete information about the condition of the company compared with investors and research. Dierkens (1991) show that asymmetric information is a significant variable in the issuance of stocks.

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Some literature explaining the occurrence of underpricing due to their asymmetric information. Model Rock (1986) suggests the presence of asymmetric information between investors who have information and investors who do not have the information. While Beatty (1989) and Beatty and Ritter (1986) asymmetric information can occur between the issuer and the underwriter, or among investors. Model Baron (1982) considers the underwriters have more information about the capital market, while the company is a party that does not have a capital market information. Underwriters use the information possessed to make optimal IPO price deal for him, ie prices and minimize risks when the stocks are not sold out. Because companies have less information, the company received a low price for a stock offering. The greater the uncertainty about the reasonableness of the company stock price, the greater the demand for the services of an underwriter in pricing.

Compensation for the information provided underwriter is to allow the underwriters to offer the initial price of the stocks below the equilibrium price. Thus, the greater the uncertainty the greater the risks faced by the underwriters, it will cause the higher-level undervalued.

Research Methods

The method used is quantitative descriptive and comparative methods. The population used is a listed company on the Stock Exchange which did an IPO process from 2000 to the year with a number of companies as many as 284 companies. Samples were taken by using purposive were 240 companies that meet the criteria of data availability. The data used in this research is secondary data including data of a public company listed on the Stock Exchange by the end of 2014, the IPO date information, the prospectus and the closing price on the first day of secondary market (Bursa). Data obtained from various sources such as the Indonesia Stock Exchange (IDX), Indonesia Capital Market Electronic Library (Icamel), Indonesia Market Quotation (IMQ).

Fair Price of Stock

To make valuation the stock price is reasonable with PER method used ratio that describes the ratio between the stock price and net profit in a year that has been produced by the company.

$$PER = \frac{Stock\ Price}{Earning\ Per\ Share}$$

Procedure to valuation a fair price of stock :

Return on Equity (ROE) is a ratio that describes the company's ability to generate profits by using the capital.

$$ROE = \frac{Net\ Income}{Equity}$$

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Dividend per Share (DPS) is a ratio that illustrates the company's ability to make payments of dividends for each share.

$$DPS = \frac{Dividend}{Number\ of\ Share}$$

Dividend Payout Ratio (DPR) is a ratio that illustrates the profit gained for per share to be paid in the form of dividends.

$$DPR = \frac{Gross\ Dividend\ per\ Share}{Earning\ per\ Se}$$

Earning Growth Rate (g) is a profit level growing.

$$g = ROE \times (1 - DPR)$$

Estimate Dividend per Share (DPS1) is a ratio that illustrates the company's ability to make payments of dividends that will be coming to each share.

$$DPS_1 = DPS \times (1 + g)$$

f.   Estimate Earning per Share (EPS1) is a ratio that describes how large the gains or profits will come obtained shareholders per share to the profit growth rate of profit

$$EPS_1 = EPS \times (1 + g)$$

Discount Rate (k)

$$k = \frac{DPS_1}{P_{IPO}} + g$$

Estimate Price Earning Ratio (PER)

$$Estimate\ PER = \frac{DPS_1/EPS_1}{k - g}$$

Fair Price = Intrinsic Value
        = EPS1 x Estimate PER

Data Analysis Method

Data analysis was performed using independent sample t-test between fair stock price with the stock price at the time of the IPO. The hypothesis of this study is
Ho: $\mu 1 = \mu 2$, there was no difference in the price of x1 to x2
Ha: $\mu 1 \neq \mu 2$, there is a price difference x1 with x2

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Statistics test :

$$t = \frac{(\bar{x}_1 - \bar{x}_2)}{\sqrt{\dfrac{s_1^2}{n_1} + \dfrac{s_2^2}{n_2}}}$$

Test criteria: Reject Ho if t > t table at error level α or if the level of sig <0.05. Then proceed with the χ2 test to test whether the difference in prices occurred on the difference underwriter with the hypothesis:

Ho: No difference underwriter which difference of price

Ha: There is a difference underwriter which difference of price

Statistics test:

$$\chi^2 = \sum_{i=1}^{b} \sum_{j=1}^{k} \frac{(O_{ij} - E_{ij})^2}{E_{ij}}$$

Where: Oij = data of observation
        Eij = data of expectations

Test criteria: Reject Ho if χ2 > χ2 table at error level α error or if the level of sig < 0.05.

Results And Discussion

Results of the fair stock price valuation using the PER in the company which doing an IPO in 2000 -2014 as shown in Table 1. From the calculation of PER1 as a whole, the result that 65% of stock pricing at the time of the IPO at a price lower than the fair stock valuation results (positive difference price).

Many studies have shown that the valuation stock price at the time of the IPO tends to be lower in comparison with the fair stock price valuation as Paramitha (2013) who conducted a study of 54 companies that did IPOs during the years 2008-2012 by the method of Real Options found that 47 companies experienced undervalued. As well as on research Atmaji and Sabirin (2016), which assesses the price of stocks. East Java Regional Development Bank, Tbk. The results showed that the stock price at the time of the IPO undervalued. While studies Seesar (2012) and Lesmana and Sun (2013) who conducted research on stock valuation PT. Garuda Indonesia, Tbk. Results of both studies showed that the price of IPO stocks overpriced.

Differences in the stock price at the time of the IPO at a fair stock price valuation results as in Table 2. Based on Table 2 of the 240 companies that did IPOs of the year 2000-2014, the difference fair stock price valuation results with the stock price at the time of the IPO range of Rp. -1004 - Rp. 11,600 with an average of Rp. USD 351 and

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Table 1. IPO Price and Fair Price

No	Code	Underwirter	g	IPO Price	PER1	Fair Price
1	PNBS	Evergreen	0.07	100	14.39	114
2	ASMI	Kresna Graha Sekurindo	0.16	270	17.38	363
3	BINA	Buana Capital	0.07	240	30.87	274
4	TALF	Uobkayhian Securities	0.14	395	11.56	509
5	BALI	RBH OSK Securities Indonesia	0.15	400	6.32	528
6	WTON	Bahana Securities	0.23	590	20.09	894
7	MDIA	Ciptadana Securities	0.05	1,380	120.59	1,515
8	LRNA	Valbury Asia Securities	0.04	900	26.19	981
9	DAJK	Valbury Asia Securities	0.10	470	28.11	568
10	LINK	Ciptadana Securities	0.13	1,600	15.18	2,041
11	CINT	Jasa Utama Capital	0.17	330	6.44	452
12	MGNA	Panin Sekuritas	0.04	105	8.60	114
13	BPII	Danareksa Sekuritas	0.12	500	8.05	630
14	DNAR	Andalan Artha Advisindo Sekuritas	0.02	110	25.73	115
15	TARA	Sinarmas Sekuritas	0.00	106	155.14	107
16	BIRD	Credit Suisse Securities Indonesia	0.04	6,500	54.08	7,088
17	IMPC	Ciptadana Securities	0.17	3,800	10.43	5,219
18	AGRS	Indo Premier Securities	0.02	110	29.74	115
19	IBFN	BNI Securities	0.06	288	26.99	321
20	GOLL	CIMB Securities Indonesia	0.00	288	256.05	290

Source : IDX

standard deviation. 1162. Further testing to see the difference between fair stock prices valuation by the stock price at the time of the IPO. The results show a significance level of 0.000 which is smaller than the error rate $\alpha = 0.05$ means that there are significant differences between the fair stock prices valuation by the stock price at the time of the IPO. The average difference of 351 and a positive value means that the average fair stock price valuation result is greater in comparison with the stock price at the time of the IPO. It shows the positive price difference at the time of pricing the IPO.

Research fair stock price valuation at the time of the IPO conducted by Riyanto (2013) on the separation PT Waskita Karya (Persero) Tbk is an IPO on December 19, 2012. Based on Relative Valuation PER method produce a fair value of stocks at Rp. 488 per share, while the stock price at the time of the IPO is Rp. 380. That happens positive price difference. Positive price difference also occurs in research Wet (2015) which suggests the occurrence of a positive difference in the company's IPO price of Tencent Holdings Limited (Tencent), internet and telecommunications company China conducted an IPO on June 16, 2004. The results show that Tencent did positive price difference for policy IPO allotment and as a signal of quality companies.

Table 2. Difference fair price and IPO price

	N	Minimum	Maximum	Mean	Std. Deviation
Fair price – IPO price	240	-1004	11600	350.73	1162.431
Valid N (listwise)	240				

Source : IDX

Furthermore, the analysis will be done to analyze whether the price difference that occurs because of differences underwriter. Underwriters are grouped into 14 rankings. The first rank is the underwriter with the best reputation for the underwriters underwrite the most during the period of the study, namely the years 2000 - 2014.

While the latest rankings is the underwriter who only ever be one underwriter during the period of the study. From the calculation of the valuation in Table 2, data collection first, underwriters set the IPO stock price equal to the fair price valuation (Non), second, underwriters set the IPO stock price below the fair price valuation results (positive price difference) and third, underwriter which sets the stock price above the fair price valuation (positive price difference). Table 3 shows each underwriter based on its ranking in produce pricing at the time of the IPO.

Then testing distinction of ranking on the underwriter to produce the price difference. The test results can be seen in the following Table 4. Table 4 indicates a significance level of 0.004 which is smaller than the error rate α = 0:05. the conclusions that Ho is rejected, which means there is a difference in the yield difference underwriter price. Each underwriter is different in generating price difference. Prices were in charge at the time of the IPO is the price agreement between the company and the underwriters. Model Baron (1982) considers the underwriters have more information about the capital market, while the issuer is a party that does not have a capital market information. Underwriters use the information possessed to make optimal IPO price deal for him, ie prices and minimize risks when the stocks are not sold out. Due to lack of information the issuer, then the issuer receives such a cheap price for a stock offering.

The theory of asymmetric information Beatty (1989) and Beatty and Ritter (1986) suggest that asymmetric information can occur between the issuer and the underwriter. Balfas (2006) says that an experienced underwriter construed as a guarantee that stock prices will rise and the investor will obtain capital gains (profits obtained by investors from the difference between the purchase price and the selling price of a stock). Chua (2013) suggests that it happened because the underwriter wants to maintain its reputation in the eyes of investors that the company is guaranteed at the time of the IPO will benefit investors.

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Table 3. Underwriter and Price Difference

		Price Difference			Total
		No n	Posi-tive	Nega-tive	
Ranking Under-writer	1	2	23	0	25
	2	0	17	0	17
	3	0	15	1	16
	4	0	13	0	13
	5	3	9	0	12
	6	1	10	0	11
	7	0	16	2	18
	8	0	15	1	16
	9	0	4	2	6
	10	0	25	0	25
	11	0	14	2	16
	12	0	13	0	13
	13	0	32	2	34
	14	1	16	1	18
Total		7	222	11	240

Source : IDX

Table 4. Test hypothesis Underwriter and Price difference

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	48.781a	26	.004
Likelihood Ratio	38.892	26	.050
Linear-by-Linear Association	.535	1	.465
N of Valid Cases	240		

a. 28 cells (66.7%) have expected count less than 5. The minimum expected count is .18.
Source : IDX

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Conclusion

Based on research, the assessment stock price by using the Price Earning Ratio (PER) produce a reasonable stock price assessment results 65% higher compared with the stock price set at the time of the IPO. Based on the test results, a significant difference occurs. Each underwriter will produce different levels of price difference. Underwriter role in determining the price of the IPO. One side, the underwriters want to be selected by the company that will conduct an IPO as an underwriter while the other side wants to give a guarantee to the investors to buy stocks that are guaranteed.

Suggestions

The financial statements contained in the prospectus that can be used by investors as one of the considerations in making investment decisions. It is not only the reputation of the underwriter should companies consider to have when going to an IPO, but the auditor's reputation as a body that ensures the financial statements must also be taken into account. So in subsequent research, it is advisable to take into account the auditor's reputation.

Bibliography

Akerlof GA. 1970, The Market for "Lemons": Quality Uncertainty and the Market Mechanism. The Quarterly Journal of Economics, Vol 84. No 3:488-500.

Atmaji RAS, Sabirin MT. 2016. Analisis Fundamental Dalam Valuasi Saham Perdana Pt Bank Pembangunan Daerah Jawa Timur Tbk. Jurnal Ilmiah Fakultas Ekonomi dan BisnisUniversitas Brawijaya. Vol 1. No 2.

Balfas, Hamud M., Hukum Pasar Modal Indonesia, Jakarta: Tatanusa, 2006

Baron DP. 1982. A Model of the Demand for Investment Banking Advising and Distribution Services for New Issues. The Journal of Finance. Vol 37. No 4:955-976.

Baron, Holmstrom B. 1980. The Investment Banking Contract For New Issues Under Asymmetric Information: Delegation and the Incentive Problem. Journal of Finance. Vol 35. No 11:15-38.

Beatty RP, Ritter J. 1986. Investment Banking, Reputation, and The Under pricing of Initial Public Offerings. Journal of Financial Economics. Vol 15: 213-232.

Beatty RP. 1989. Auditor Reputation and The Pricing of IPO. The Accounting Review. Vol LXIV No 4: 693-707.

Berkman H, Bradbury ME, Ferguson J. 2000. The Accuracy of Price-Earnings and Discounted Cash Flow Methods of IPO Equity Valuation. Journal of International Financial Management and Accounting Vol 11. No 2:71-83.

Carter RB, Manaster S. 1990. Initial Public Offerings And Underwriter Reputation. Journal of Finance. Vol XLV. NO 4:1045-1067.

Chua A. 2013. Market Conditions,Underwriter Reputation And First Day Return of IPO's. Journal of Financial Markets.

Damodaran A. 2012. Investment Valuation 3th edition. John Wiley & Sons, Inc. New Jersey.

Dierkens N. Information Asymmetry and Equity Issues. The Journal of Financial and Quantitative Analysis, Vol 26. No 2:1-48.

Firth M. 2008. Valuing IPOs Using Price-Earnings Multiples Disclosed by IPO Firms in an Emerging Capital Market. Review of Pacific Basin Financial Markets and Policies. Vol 11. No 3:429–463.

Kim M, Ritter JR.1999. Valuing IPOs. Journal of Financial Economics. Vol 53 No 3:409-437.

Lesmana T, Sun Y. 2013. Penilaian Bisnis Dan Estimasi Nilai Intrinsik Pt. Garuda Indonesia (Persero) Tbk Saat Ipo Februari 2011. Jurnal Binus Business Review, 04 (01). ISSN 2087-1228.

Myers SC, Majluf N S. 1984. Corporate Financing And Investment Decisions When Firms Have Information That Investors Do Not Have. Journal of Financial Economics. Vol 13: 187-221.

Paramitha AL, Hartoyo S, Maulana AN. (2014). The Valuation Of Initial Share Price using The Free Cash Flow to Firm Methode and The Real Option Method in Indonesia Stock Xchange. Jurnal Manajemen dan Kewirausahaan, Vol 16. No 1:9-16.

Ritter JR.. 1987. The Costs Of Going Public. Journal of Financial Economics. Vol 19:260-781.

Riyanto E. 2013. Evaluasi Harga Wajar Saham PT Waskita Karya Pada Saat Penawaran Umum Perdana Tahun 2012. Tesis. Fakultas Ekonomika dan Bisnis Universitas Gadjah Mada Yogyakarta.

Rock KF. 1986. Why New Issues Are Underpriced. Journal of Financial Economics, Vol 15. No 15:. 187-212.

Sahoo S, Rajib P. 2013. Valuing IPOs Using P/E Multiple: An Empirical Investigation. Decision: The journal of Indian Institute of Management. 40(1–2):27–46.

Seesar YA. 2012. Performance Analysis, Competitiveness and Initial Public Offering's Stock Valuation of Garuda Indonesia Tbk, Thesis, Institut Pertanian Bogor.

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Singh A, Hamid J. (1992). Corporate Financial Structures in Devetoping Countries. IFC Technical Paper 1. Washington DC.

Singh A. 1995. Corporate Financial Patterns In Industrialising Economies: A Comparative International Study. IFC Technical Paper 2. World Bank. Washington DC, (ISBN 0-8213-3231-7).

Wet DD. 2015. Tencent Holdings Limited: An IPO Case Study. Thesis. University Of Cape Town. South Africa

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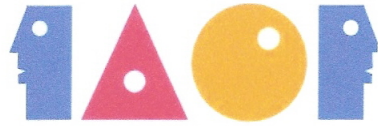
A STUDY OF SERVICE QUALITY IN HOT-SPRING HOTELS FOR SENIORS

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Abstract

Health is the most concerned about the needs of seniors. Therefore, spa tourism with relieving stress is the most attractive leisure option for seniors. This study takes the hot spring hotels at Guanziling hot spring tourist area as the objects, and uses the analytic hierarchy process to analyze the dimensions of service quality attributes. The study results found that among the five major dimensions of service quality, the weight of "empathy" dimension is the highest. In particular, in the set of weights on the index entry, the weights of initiative care, transportation services, and catering service are at the top. It means that these three indicators showing "empathy" dimension is especially important.

Keywords: hot springs; seniors leisure hotels; Delphi method; service quality

Research Motivations and Purposes

Hot spring resources not only provide diversification for domestic tourism, but are also a selling point of many recreational areas and leisure hotels. In Challenge 2008 National Development Plan issued by Executive Yuan, "hot spring hotel recreation" was considered to be an important sightseeing field. The Tourism Bureau also made 1999 the Year of Hot Springs of Taiwan's Sightseeing, and in 2003, the bureau issued the Law of Hot Springs, attempting to promote hot springs as an emerging sightseeing industry in Taiwan (Feng-Chuan Pan, Mao-Chou Hsu, and Ying-Shen Chen, 2008). The Guanziling hot springs located at Baihe Town, Tainan County are famous throughout Taiwan, as the mud springs there are especially

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unique. The Sichong River hot springs, Beitou Hot Springs, Yangmingshan Hot Springs, and Guanziling Hot Springs are considered to be the four main hot springs of Taiwan. In 2004, a music festival was held at the Guanziling hot springs. The festival's theme was "hot springs, fine food, music, and tourism". It not only promoted sightseeing at the Guanziling hot springs, but also increased the number of hot spring hotels. As hot springs are associated with concepts such as regimen,, health, relaxation, and folk medicine, and due to the promotion of related reports on hot springs and the ideas of fashion and beauty, tourists are now flocking to visit hot springs.

The completeness of medical facilities and improvements in the public health and quality of the environment in Taiwan has promoted an increase in the average life span of citizens. As a consequence, the number of seniors is increasing fast. Compared with 1993, the population of seniors reached 7.1%, and Taiwan officially entered a period of aging society. Data from the Ministry of Health and Welfare for 2013 show that the population of seniors over the age of 65 had reached 2.64 million, accounting for 11.3% of the total population, with the population proportion of seniors still increasing. These seniors, who were born in the age of the "baby boomers", are not only richer than seniors of previous generations, but also pay more attention to their physical health, and are better at using their free time for leisure activities. Hung and Tsai (2003) pointed out that seniors had more free time to dispose of their money on tourism. Iso-Ahola (1991) also pointed out in his research report that leisure tourism could improve the physical health

of seniors, and reduce their senses of crisis in later life. Considering that seniors have time and money, as well as a requirement for hot spring recreation, it is important for people in this industry to find ways to provide good levels of service quality for these customers.

This study reviewed the literature on the leisure tourism of seniors. One study concluded the tourism motivations of the seniors of Taiwan, and explored factors that influenced their tourism motivations (Jang & Wu, 2006). Jang and Han (2009) conducted a survey on seniors, and discovered that seniors who were born during the "baby boomers" spent more money on leisure tourism than seniors who were born earlier. There is also a study that investigated seniors in Netherlands, which found that they spent more money on tourism than younger people, and preferred short trips (van den Berg & Arentze, & Timmermans, 2011).

Taiwanese scholars have also carried out similar studies on seniors. For example, a study by Ching-Hua Ho (2010) discovered that as their age increased, seniors began to demonstrate aging problems which not only brought inconvenience to their daily life, but also increased the occurrence of unexpected incidents. Studies on the differences in services provided by wellness hotels and facilities required showed that, for seniors, patience of the service staff, the size and eye-catching signs in the hotels, a barrier-free design, and safety of the bathrooms were considered important (Ching-Hua Ho, 2010; Ping Yu and Jih-Jen Liou, 2011). Improving the service quality of hotels and maintaining good water quality of the hot springs could enable tourists to have the best leisure experience (Shao-

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Chi Chang, 2010; Mei-Lun Liu, 2011). Studies on hot spring hotels and customer satisfaction showed that the concept of a hot spring for healthcare has been long accepted and favored by seniors (Chia-Ho Lu, 2005; Ju-Ying Lai, 2009). However, there are few scholars who have conducted studies and constructed indices on the service quality of hot spring hotels for seniors.

Therefore, the research purposes of this study are as follows.

1. Use the analytic hierarchy process to calculate the weights of previously mentioned indices of service quality of hot spring hotels for seniors, and sort the weights.

2. The study results will provide references for hot spring hotel operators to examine and improve the service quality of spas provided to seniors.

Literature Review

This study aims to take hot spring hotel operators from the Guanziling hot spring tourist area as the research scope and objects, and revise the dimensions of service quality at the Guanziling hot spring hotels using the Modified Delphi Method and the Analytic Hierarchy Process. The literature review looks at the three aspects of the Guanziling hot spring hotels, seniors, and the service quality of hot spring hotels.

Guanziling Hot Spring Hotels

The Guanziling hot springs are located at the top of the Chentoushan fault, which lies to the northeast of Baihe Town, and are famous in Taiwan. According to the provisions of the

Tourist Hotel Management published by the Tourism Bureau, Ministry of Transportation and Communications, tourist hotels can be divided into international tourist hotels and ordinary tourist hotels. Both types of hotel need to be licensed as international tourist hotels and have special labels issued by the Tourism Bureau, Ministry of Transportation and Communications.

Currently, there is no clear legal definition on the type of hot spring hotels. They are classified as hot spring Hot spring utilization business by the Law of Hot Springs. Some studies have considered hot spring hotels as a kind of resort hotel. The main business scope of these hotels is providing "service for individuals", and the products they provide can be divided into tangible products (indoor and outdoor landscapes, guest room facilities, and catering space) and intangible products (the kind reception of service staff and relaxing atmosphere).

As hot spring hotels feature hot springs, their services are even richer (Ting-Chuan Cheng, 2011). A study by Hsin-Ya Sung (2004) pointed out that hot spring hotels are places that provide hot spring spas, lodging, catering, entertainment, and social contact for customers. Yi-Ying Ting (2008) believed that hot spring hotels were based on hot springs, and provided hot spring facilities and vocational services. Mann-Lih Huang (2008) proposed that hot spring hotels provided hot spring facilities, as well as other services provided by ordinary leisure hotels. To summarize, for hot spring hotels, in addition to tangible products, such as hot spring bath, customers also consider leisure space and service quality to be important. As a consequence, the

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operators of hot spring hotels need to make long-term investment into the spring water quality of the hot springs and service standards in order to improve their competitive advantages.

Seniors

People's living standards and social welfare improve as the economy of Taiwan develops. In addition, the strategy of national health insurance has been introduced, and the medical care system has become more complete. Consequently, the population structure has been changed, with the population of seniors experiencing an increasing tendency. According to statistical data from the United Nations, by 2050, the world's population of seniors may reach 2 billion. In 2012, the population of seniors in Taiwan was about 2.55 million, accounting for 10.98% of the total population (Department of Household Registration Affairs, Ministry of the interior, 2012). According to predictions by the Council for Economic Planning and Development of the Executive Yuan of Taiwan, by 2056, the population proportion of seniors above the age of 65 will reach as high as 38%. An aging population promotes an increasing tendency in consumption age, thus shaping a new consumption pattern.

According to statistical data from the Tourism Bureau, with respect to domestic tourism, the number of tourists above the age of 50 has continued to increase in recent years, and in 2010, the number accounted for 28.4% of the total number of tourists (Ping Yu and Chia-Lin Hsiao, 2012). For those who are retired, they were once busy with work and with their family when they were young, and now, they finally can reward themselves.

According to an investigation by magazine Global Views (2014), tourism is the most popular activity for seniors after their retirement. In terms of domestic tourists, the proportion of tourists over 60 years old increased from 11% in 2008 to 14% in 2012. In the future tourist market, seniors will account for the majority, and their motivations for tourism will be health benefits and relaxation. Compared to the tourists of other age groups, seniors have comparatively high incomes and more travel experience. A study by Ching-Hua Ho (2010) suggested that apart from diversified healthcare facilities, the demands are for professional healthcare staff, nutritious food, and a comfortable and relaxing atmosphere. Hotels should also provide related software and hardware facilities and attentive service for seniors. In addition, as the visual sense and the other senses of hearing, smell, and touch of seniors get worse as they age, their capacity for action will decrease.

Consequently, hotel designs should include sufficient lighting in public places, dining halls, staircases, and aisles to avoid accidents.

To summarize, seniors should be the trend of future development, and the aging population has become an important member of modern society. Hot spring hotels should consider seniors first when developing their customer services, and provide high-quality hot spring spas. There are very few studies on the construction of service quality indices to provide seniors at hot spring hotels. Therefore, this study expects that through the study

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results, hot spring operators will be able to understand seniors' requirements in hot spring spas, and thus develop a new customer group.

Service Quality of Hot Spring Hotels

In the age of the service industry, in order to succeed in competition, different industries must pay attention to the standards of the services they provide. Therefore, service quality has become very important. Levitt (1972) was the first to define quality of service. He believed that service quality meant that service results could meet the set standards. Sasser et al. (1978) argued that service quality should be defined from the three dimensions of material, facilities, and personnel, and that service quality was involved in more than one best result. It also included the manner in which the service was offered. In addition, according to Gronroos' (1984) ideas on service quality, the customers' satisfaction with services is determined by the difference between the actual perceived services and the expected standard.

In other words, service quality is subjectively perceived quality, and is determined by customers' subjective rather than objective assessment. Lovelock (1996) proposed that service quality was the experience a customer gains from the consumption process. Lee-Ing Tong and An-Hwa Hu (1996) explained that service quality could provide services that customers were satisfied with from the perspective of the customer. Chorng-Shyong Ong (1998, 2000) proposed that service quality was the overall quality levels of consumption services assessed by customers' subjective judgments.

The PZB model of service quality was proposed by Parasuraman, Zeithaml and Berry in 1985. According to PZB model, customers generally measure service quality and different services from ten dimensions. In 1998, these three scholars considered a questionnaire that contained 22 items of service quality, and simplified the 10 determinants of service quality into five, including tangibles, reliability, responsiveness, assurance, and empathy. It was named the SERVQUAL Scale.

Lau et al. (2005) used a modified SERVQUAL model to assess the service quality of four and five-star international hotel in Malaysia. Tsang and Qu (2000) studied international tourists' perceptions of service quality at hotels in China's hotel industry. Wei-Jaw Deng and Yu-Ling Hung (2006) confirmed the characteristic of principle-reduction of positioning differences in the service quality of hotels. Wei-Jaw Deng and Hsin-Fang Wu (2003) used the SERVQUAL model to study the service quality of hot spring hotels in Beitou. Yuan-Che Hsiao and Kuo-Chien Chang (2003) used the SERVQUAL model and quality function deployment to study the service quality of hot spring hotels in Wulai.

According to the above literature review, this scale has been adopted by many studies on service quality. Therefore, this study referred to Yi-Yin Lin's (2006) evaluation model of service quality at hot spring hotels, and adopted its dimensions. There are a total of five dimensions. The first dimension is "tangibles". Tangibles refer to relative physical facilities, hardware equipment, and staff appearance at hot spring hotels. The second dimension is

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Table 1. Indices of Service Quality of Hot Spring Hotels

Dimension	Indices
1. Tangibles (tangible facilities, hardware equipment, and appearance of staff)	1.1 Comfort of the guest rooms and overall design of the hotel. 1.2 Geographic environment and location of the hotel. 1.3 Spa space and other facilities (spa and other massage therapies, sauna, and gym). 1.4 Size of the parking lot. 1.5 Consumption level. 1.6 Service staff who are neatly dressed and groomed.
2. Reliability (maintaining consistent standards)	2.1 Cleanliness of the spa environment. 2.2 Safety of the spa (hot springs that have passed all safety examinations, and have a legal registration license). 2.3 Word of mouth of the hot spring hotel. 2.4 Cleanliness of the overall environment. 2.5 Uniqueness of the water quality of the hot spring. 2.6 Privacy of the lodging and the spa.
3. Responsiveness (whether service staff can respond to customers' requirements and questions immediately and actively)	3.1 Whether service staff are polite and kind to customers. 3.2 Service staff can respond to customers' requirements immediately. 3.3 Service staff are capable of resolving customers' problems immediately.
4. Assurance (knowledge, politeness, and abilities of service staff)	4.1 Whether service staff can provide the correct information to the customers. 4.2 The service staff explains the regulations and knowledge of the spa to customers. 4.3 Whether the service staff has professional first-aid capabilities.
5. Empathy (care about the customers and provide personalized care)	5.1 Booking was convenient (online booking and telephone booking). 5.2 Transportation service (whether road signs are clear, and shuttle buses are provided). 5.3 Accessibility design 5.4 Provide tourist information (provide introduction information or maps). 5.5 Provide a catering service (provide vegetarian meals or healthy and regimen meals). 5.6 Whether the service staff can speak Taiwanese. 5.7 Take the initiative to care for customers.

"reliability" which refers to the consistent and accurate standards of service quality at hot spring hotels. Taking hot spring hotels for example, seniors value the hygiene and safety of the spa space and hot spring spas that have regimen and other functions. The third dimension is "responsiveness".

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This is concerned with whether the service staff of hot spring hotels can respond to seniors' requirements and questions immediately and actively. Therefore, the professional training of service staff is a must. The fourth dimension is "assurance". This refers to whether the knowledge, politeness and abilities of the service staff at hot spring hotels can be enough to earn trust and confidence from the customers.

As the service targets are seniors, if the hot spring hotels can train their staff well, they should make seniors feel at ease. The fifth dimension is "empathy". This means that hot spring hotels care about their customers, and provide personalized care for them. As hot springs are generally located in mountainous areas, transportation can be inconvenient. It is considered important to build accessible space for seniors. In addition, indoor lighting, air conditioning, and the safety of bathrooms are also important factors (Fang-Hua Chen, 2008; Kuo-Hsi Ting, 2003; Ching-Hua Ho, 2010; Ping Yu and Jih-Jen Liou, 2011). As a consequence, this study has developed the following standards of service quality.

Research Methods

(See Figure 1. at the end of this article for a diagram of the research framework.)

Modified Delphi Method

The Modified Delphi Method is modified from the traditional Delphi Method. The traditional Delphi Method is a group communication process. During this process, each member is able to fully express their views on a specific topic, and receive equal attention. This response advice and communication method integrates the expertise and advice of experts, scholars, and interest groups to highlight and seek agreement on policies and demands (Hill & Fowles, 1975; Linstone & Turoff, 1975; Stewart, 1987). The traditional Delphi Method adopted anonymous group participation. On the one hand, it can preserve the advantages of the collective decision-making of experts and brainstorming. On the other hand, it can avoid interference in discussed topics that may arise during face-to-face communication with experts (Rowe & Wright, 1999). Consequently, this study adopted the Modified Delphi Method proposed by Murry and Hammons (1995), used a large amount of reviewed literature and in-depth expert interviews to replace an open questionnaire investigation, and developed a structured questionnaire for investigation. Experts invited by this study mainly came from the industry (Guanziling hot spring hotel operators) and the academic field.

Analytic Hierarchy Process (AHP)

The Analytic Hierarchy Process (AHP) can systemize complex problems, and compose those problems into different hierarchies of sub-problems for independent analysis. Using quantified judgment, this method finds veins and can conduct a comprehensive assessment to provide sufficient information for decision makers to choose proper schemes, meanwhile reducing the risk of incorrect decision-making (Junn-Yuan Teng and Gwo-Hshiung Tzeng, 1989a). In multi-goal or multi-criteria decision-making fields, AHP is

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a simple and practical method (Gwo-Hshiung Tzeng, 1989b).

Solving problems through AHP can generally be divided into the following steps.

(1) Problem description

When adopting AHP, the system of the problem must be analyzed in as much detail as possible. It must also include elements that may bring the problem into consideration, confirm the main goal for solving the problem, whilst paying attention to mutual and independent relationships among these elements.

(2) Establish the hierarchical relationships

When solving complex problems, the problems can be decomposed by a hierarchical structure. Considering the assumption that humans are not able to compare more than seven things simultaneously, each hierarchy should have no more than seven elements at best. With this condition, a reasonable comparison can be conducted, and the consistency can be guaranteed (Junn-Yuan Teng and Gwo-Hshiung Tzeng, 1989a; Satty, 1980).

(3) Questionnaire design and investigation

With respect to the design of each standard, the questionnaire adopts pair-wise comparison, and from level 1 to 9, asks decision makers and experts from different fields to fill in the questionnaire. According to the results of the questionnaire, a pair-wise comparison matrix is then established for each hierarchy. When adopting the method of AHP, the number of experts should not be too large. Five to fifteen experts is a comparatively proper choice (Lun-Hao

Lin and How-Gao Hsu, 2012). The research objects of this study mainly came from the hotel industry (operators of Guanziling hot spring hotels) and the academic field.

(4) Calculation of the weights of the elements of each hierarchy

A. Establish pair-wise comparison matrix A.

Compare two elements to obtain a pair-wise comparison matrix A. Compare the importance of two elements of the hierarchy. The measuring scale is divided into five levels, equally important, slightly important, rather important, extremely important, and absolutely important, and their measuring values are 1, 3, 5, 7 and 9, respectively. Between them, are the measuring values of 2, 4, 6, and 8. A measure on the left indicates that the element in the left column is more important than the one on the right. Conversely, a measure on the right indicates that the element in the right column is more important than the one on the left. Based on data obtained from the questionnaire, judgment matrices were established and the relative weights of each hierarchy calculated together with the assessment standards to construct the weight system for the "service quality indices of hot spring hotels".

B. Calculate eigenvalues and eigenvectors.

Pairwise comparison matrix A is multiplied by eigenvector W to obtain a new eigenvector W1. Every vector value of W1 is divided by the corresponding vector value of the original vector W. Finally, the arithmetic average value of the obtained number is calculated to get the maximum eigenvalue λ max.

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C. Consistence test.

Consistency verification must be conducted on the assessed results to verify whether the pair-wise comparison matrix constructed from the answers of the experts is a consistent matrix, thereby confirming the reasonableness of the decision makers' assessment process.

According to Saaty's (1980) suggestion, consistency index (C.I.) and consistency ratio (C.R.) are used to verify the pair-wise comparison matrix.

$$C.I. = \frac{(\lambda_{max} - n)}{n - 1}$$

$$C.R. = \frac{C.I.}{R.I.}$$

The value of C.I. is obtained from the pair-wise comparison matrix. R.I. is the random index which is shown in Table 2.

Table 2. Values of Random Indices

N	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
R.I.	0	0	0.58	0.90	1.12	1.24	1.32	1.41	1.45	1.49	1.51	1.48	1.56	1.57	1.59

Data source: Saaty, T. L. (1980), The Analytic Hierarchy Process-Planning, Priority Setting, Resource Allocation, McGraw-Hill, New York.

Saaty suggested that the value of C.R. should be within 0.1 so that the consistency could be guaranteed as when the C.R. value was larger than 0.1, it meant that experts or decision makers were not rational enough when they were conducting the pair-wise comparison, which would cause inconsistency. In that case, the hierarchy-structured questionnaire should be revised and the experts asked to re-think and re-complete the questionnaire, or software used to conduct automatic corrections to meet the requirements of consistency.

Calculation of overall hierarchical weight

The eigenvector of each hierarchy is multiplied by the eigenvector of the corresponding eigenvector of the upper hierarchy to obtain the overall weight value of each hierarchy (comprehensive eigenvector) which is the preferential values of the schemes of the bottom hierarchy. Decision makers are allowed to understand the sequence of the assessed results before making decisions (Yih-Feng Chang, Lei Chang, Chih-Hung Lin, and Chi-Yu Chou, 2013).

Research Results

After data collection, this study conducted reliability and validity verification, calculated the weights of the indices, and conducted a related analysis and comparison. In order to calculate the weights of each index and conduct consistence test, this study adopted the AHP to implement a professional assessment, and examined and revised the consistency of the advice of the experts. Finally, this study

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obtained the relative weights of advantaged assessment standards, and expected that the study results could provide some references on service for operators of hot spring hotels.

Service Quality of Hot Spring Hotels

In order to obtain the weight values of the indices of service quality and conduct consistence test, through the pair-wise comparison of the measuring items, this study compared the relative weights of every dimension, and conducted a questionnaire investigation of the pair-wise comparison. In the framework of the hierarchical indices, the first level is the goal level, which is the ultimate goal of the service quality of hot spring hotels. The second level is the objective level, which is divided into five assessment dimensions, including tangibles, reliability, responsiveness, assurance, and empathy. The third level is the sub-indices of each assessment dimension, i.e. specific items of the questionnaire.

After copies of the questionnaire were recovered, this study used software Yaahp 10.2 to conduct a group decision-making analysis. This study then integrated the pair-wise comparison matrices obtained from the experts and scholars by geometrical average calculation, and conducted consistency verification. If the consistency ratio is larger than 0.1, it might violate the transitive law. In which case, the study would ask the experts to re-think the importance between the indices of the standards. If it was not possible to get in touch with all the experts, this study would use software to conduct automatic correction using a minimal change algorithm. This study calculated the weight values of all indices in

the questionnaire, and the results are shown in Table 3.

According to the weight analysis, among the five dimensions of service quality, the weight value of the dimension of "empathy" was the highest, reaching 35.60%. It clearly shows that the experts believe that for hot spring hotel consumption, the most important determinant is whether the hotel can provide empathetic care to its customers. With respect to the weights of the indices of this dimension, initiative care, transportation service, and catering service have the highest weight values, which mean that for the dimension of "empathy", these three indices are especially important. Secondly, the weight value of the "reliability" dimension also reaches 27.42%, indicating that this dimension also receives attention from experts. In other words, it is important for hotel operators to provide a safe and trust worthy environment to customers. With respect to the weights of the indices of this dimension, environment cleanliness, security checks, and public praise of the hotel have the highest weight values, which mean that these three indices are the most important in the dimension of "reliability".

The weight value of the "tangibles" dimension is the smallest, only taking up 8.86%. It means that specific facilities are less important. With respect to the weights of this index group, consumption level, neatness of the service staff's clothing, and the size of the parking lot have the lowest weight

Table 3. Analysis of the Relative Weights of the Service Quality Indices

Dimension	Dimension Weight	C.R.	Index	Group Weight	Relative Weight	Weight Ranking	C.R.
Tangibles	0.0886	0.02	1 Comfort of the guest rooms and overall design of the hotel.	0.2294	0.0203	19	0.02
			2 Geographic environment and location of the hotel.	0.2589	0.0229	18	
			3 Spa space and other facilities (spa and other massage therapies, sauna, and gym).	0.1840	0.0163	22	
			4 Size of the parking lot.	0.0606	0.0054	25	
			5 Consumption level.	0.1667	0.0148	23	
			6 Service staff who are neatly dressed and groomed.	0.1003	0.0089	24	
Reliability	0.2742		1 Cleanliness of the spa environment.	0.2993	0.0821	2	0.04
			2 Safety of the spa (hot springs that have passed all safety examinations, and have a legal registration license).	0.1805	0.0495	8	
			3 Word of mouth of the hot spring hotel.	0.1608	0.0441	10	
			4 Cleanliness of the overall environment.	0.1358	0.0372	12	
			5 Uniqueness of the water quality of the hot spring.	0.0973	0.0267	16	
			6 Privacy of the accommodation lodging and the spa.	0.1262	0.0346	14	
Responsiveness	0.1606		1 Whether service staff are polite and kind to customers.	0.2128	0.0342	15	0.02
			2 Service staff can respond to customers' requirements immediately.	0.3652	0.0587	5	
			3 Service staff are capable of resolving customers' problems immediately.	0.4220	0.0678	4	
Assurance	0.1205		1 Whether service staff can provide the correct information to the customers.	0.4610	0.0556	7	0.04
			2 The service staff explain the regulations and knowledge of the spa to customers.	0.1667	0.0201	20	
			3 Whether the service staff have professional first-aid capabilities.	0.3723	0.0449	9	

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Empathy	0.3560	1 Booking was convenient (online booking and telephone booking).	0.0477	0.0170	21	0.02
		2 Transportation service (whether road signs are clear, and shuttle buses are provided).	0.2049	0.0730	3	
		3 Accessibility design.	0.1011	0.0360	13	
		4 Provide tourist information (provide introduction information or maps).	0.0748	0.0266	17	
		5 Provide a catering service (provide vegetarian meals or healthy and regimen meals).	0.1599	0.0569	6	
		6 Whether the service staff can speak Taiwanese.	0.1112	0.0396	11	
		7 Take the initiative to care for customers.	0.3003	0.1069	1	

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values, which means that they are the least important.

Conclusions and Suggestions

Conclusions

(1) Health is the most prominent demand of seniors. Consequently, hot spring tourism that is beneficial for health and relaxing is the most attractive choice for seniors' leisure activities. For hot spring operators, providing good levels of service quality to seniors should bring great business opportunities to the hotels.

(2) This study has ranked the weights of the service quality indices of hot spring hotels through the experts' and scholars' interviews about Guanziling hot spring hotels. It discovered that the weight of the dimension of "empathy" was the highest, reaching 35.60%. It clearly shows that experts believe that

when seniors are staying at a hot spring hotel, the most important determinant is whether the hotel can provide empathetic care to its customers. In particular, with respect to the weights of the indices of this dimension, the initiative care, transportation service, and catering service (providing vegetarian meals and healthy and regimen meals) have the highest weight values, which means that for the dimension of "empathy", these three indices are especially important.

Research Suggestions

This study took the related operators of hot spring hotels as the research objects. Subsequent studies could interview seniors who check in at the hot spring hotels in order to understand their requirements, and see if they are consistent with the service quality believed by operators, with the aim of improving the service quality.

References

Chang, Yih-Feng; Chang, Li-Rong Chang; Lin, Jhin-Hong; Chou, Chi-Yu;. (2013). 16. Yih-Feng Chang, Li-Rong Chang, Jhin-Hong Lin and Chi-Yu Chou (2013). Construction and analysis on the indexes of operational strategies in Sichongxi hot spring. Chia-Nan Annual Bulletin, 39, pp 444-454.

Chang, Shao-Chi. (2010). The research of the Kano two-dimensional quality key element and the relation of customer's value in the Kuan-Zih-Ling hot spring scenic spot. Graduate Institute of Travel and Tourism Manage

ment, National Kaohsiung University of Hospitality and Tourism.

Chang, Wan-Chen. (2012). Application Of Delphi method and AHP to discuss the critical successful factors in MICE industry. Graduate Institute of Sustainable Tourism and Recreation Management, National Taichung University of Education. Taichung.

Chen, Fang-Hua. (2008). A study of preference of business guests toward hotel's facility and service-a case of economic style hotels in Kaohsiung. National Kaohsiung University of Applied Sciences.

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The International Journal of Organizational Innovation Vol 9 Num 1 January 2017 - Section C.

Cheng, Ting-Chuan. (2011). Research on Management Quality Evaluating of Guanzailing Hot-Spring Hotel. Institute of Hot Spring Industry, Chia Nan University of Pharmacy and Science.

Chien, Tzu-Yu . (2010). A study of leisure farm owners' recognition and intention to make barrier-free travel for the elderly. Development of Restaurant, Hotel and Institutional Management, College of Human Ecology, Fu-Jen University.

Chorng-Shyong Ong. (1998). A study of the influence of expected service and service performance on service quality evaluation. NTU Management Review, 9(1), pp. 153-176.

Chorng-Shyong Ong. (2000). A Comparative Study for Evaluation Approaches of Service Quality. Sun Yat-Sen Management Review, 8(1), pp. 105-122.

Deng, Junn-Yuan; Tzeng, Gwo-Hshiung;. (1989). The Analytic Hierarchy Process: Concepts, Techniques and Applications (I). Journal of the Chinese Statistical Association, 27(6), pp. 13707-13724.

Deng, Junn-Yuan; Tzeng, Gwo-Hshiung;. (1989). The Analytic Hierarchy Process: Concepts, Techniques and Applications (II). Journal of the Chinese Statistical Association, 27(7), pp. 13767-13786.

Deng, Wei-Jaw; Hung, Yu-Ling;. (2006). Determining Position Gap Reduction General Attributes of Hotel Service Quality. Journal of INNO Research & Development, 2(1), pp. 116-126.

Deng, Wei-Jaw; Lee, Yu-Cheng;. (2007). Applying Kano Model and IPA to Identify Critical Service Quality Attributes for Hot Springs Hotel in Peitou, Journal of Quality, 14(1), pp. 99-113. Journal of Quality, 14(1), pp. 99-113.

Deng, Wei-Jaw; Wu, Hsin-Fang;. (2003). A Study on the Service Quality and Critical Improvement of Hot Spring Hotel Industry in Beitou. 2003 Academic Conference on Business Management, (pp. 281-285).

Ho, Ching-Hua. (2010). Gender and age variations on demand of services and facilities for wellness hotels among older adults. Journal of Tourism and Leisure Studies, 16(3), pp. 189-210.

Hsiao, Luke; Chang, Kuo-Chien;. (2003). The study on service quality of hot spring tourism & leisure industries – a case of hot spring resort in Wu-Lai hot spring district. Tourism Management Research, 3(1), pp. 97-118.

Hsu, Jui-Liang; Xue, Ke-Qiao;. (2010). A study of the key success factors of hot spring tourism area. Journal of Sport Health and Leisure, 18, pp. 107-122.

Hsu, Meei-Ruey. (2010). A modified Delphi study to identify chefs' green competencies. Journal of

97

Tourism and Leisure Studies, 16(1), pp. 67-88.

Huang, Mann-Lih. (2008). The study on the image of upscale hot spring hotels in Urai area, Taipei: the cases of spring park Urai SPA & Resort, Pause Landis Hotels & Resorts, and La Villa Hotels & Resorts. Executive Master of Business Administration, Providence University.

Lai, Ju-Ying. (2009). The study of service quality, satisfaction and revisiting intention of hot spring area lodging tourists-case study of guanziling hot spring hotel. Institute of Hot Spring Industry, Chia Nan University of Pharmacy.

Lin, Lun-Hao; Hsu, How-Gao;. (2012). Using AHP and modified Delphi method to evaluate of insurance education internship professional competence indicators for higher technological and vocational institutions. Insurance Issues and Practices, 11(2), pp. 258.

Lin, Yi-Yin. (2006). A service quality measurement architecture for hot spring hotels. Chung Hua University of Technology Management.

Liu, Mei-Lun. (2011). The relationships among service quality, perceived value, customer satisfaction and revisit intention: a case study of hot-spring hotels in Sz-Chung-Shi area. Department of Tourism Management, National Kaohsiung University of Applied Sciences.

Lu, Chia-Ho. (2005). A study on the association between hot springs

service quality and customer satisfaction (Unpublished Master Dissertation). Kaohsiung City: National Kaohsiung First University of Marketing and Distribution Management.

Pan, Feng-Chuan; Hsu, Mao-Chou; Chen, Ying-Shen;. (2008). The study of consumption value and perceived value of the mature-age customer hot-spring. Journal of Leisure and Tourism Industry Research, 4 (1), pp. 26-39. Journal of Leisure and Tourism Industry Research, 4(1), pp. 26-39.

Peng, Xing-Zhu. (2014). Opportunity of elderly industry. Retrieved from Global Views Monthly, No. 338.

Sung, Hsin-Ya. (2004). The study on the relationship between service quality and customers' post-purchase behavioral intentions of hot spring hotels in Xinbeitou, Taipei (Unpublished Master dissertation). Taipei City: National Taiwan Normal University.

Ting, Kuo-Hsi. (2003). A study of the factors that influence the hotel service quality (Master's thesis). Taichung City: Department of Leisure, Recreation and Tourism Management Chaoyang University of Technology.

Ting, Yi-Ying. (2008). The influence of employee cognition of environmental threat on effect of job stress and turnover tendency-a case study of hot-spring hotels in north Taiwan (Unpublished master's thesis). Yunlin County, Taiwai(R.O.C.): National Yunlin

98

University of Science and Technology.

Tong, Lee-Ing; Hu, An-Hwa;. (1996). Development of a satisfaction model. Chiao Da Mangement Review, 16(1), pp. 55-74.

Wu, Cheng-Shiung ; Lin, Chin-Tsai; Lee, Chuan. (2009). The applications of delphi method & ANP method on building B&Bs' marketing strategy evaluation mode. The 11th Leisure, Recreation, and Tourism Research Symposium and International Forum. National Chi Nan University.

Yu, Ping; Hsiao, Chia-Lin. (2012). Wellness learning travel interests and perceived importance of lodging related services for older adults. Journal of Tourism and Leisure Studies, 18(2), pp. 111-134.

Yu, Ping; Liou, Jih-Jen. (2010). An exploration of the perceived importance of hotel facilities and activity participating interests of wellness travel among the elders-an example from Kaohsiung city. Journal of Outdoor Recreation Study, 24(3), pp. 49-78.

Websites

Bureau of Tourism, Ministry of Transportation and Communications (Guanziling Hot Spring). Retrieved from http://taiwan.net.tw/m1.aspx?sNO=0011644

Bureau of Tourism, Ministry of Transportation and Communications (TaiwanStay). Retrieved from http://taiwanstay.net.tw/NewsAnnoun?position=1

Department of household registration. Retrieved from http://www.ris.gov.tw

Ministry of Health and Welfare (Health Statistics). Retrieved from http://www.mohw.gov.tw/cht/DOS/Statistic.aspx?f_list_no=312&fod_list_no=4695

National Development Council (Elderly Person Population Projections). Retrieved from http://www.ndc.gov.tw/m1.aspx?sNo=0061369#.VIUtNtKUeSo

Figure 1. Research Framework

Where the framework shows:

1. Tangibles
1.1 Comfort of the guest rooms and entirety design of the hotel.
1.2 Geographic environment and location of the hotel.
1.3 Spa space and other facilities (spa and other massage therapies, sauna, and gym).
1.4 Size of the parking lot.
1.5 Consumption level.
1.6 Service staff who are neatly dressed and groomed.

2. Reliability
2.1 Cleanliness of the spa environment.
2.2 Safety of the spa (hot springs that have passed all safety examinations, and have a legal registration license).
2.3 Word of mouth of the hot spring hotel.
2.4 Cleanliness of the entirely environment.
2.5 Uniqueness of the water quality of the hot spring.
2.6 Privacy of the a lodging and the spa.

3. Responsibility
3.1 Whether service staff are polite and kind to customers.
3.2 Service staff can respond to customers' requirements immediately.
3.3 Service staff are capable of resolving customers' problems immediately.

4. Assurance
4.1 Whether service staff can provide the correct information to the customers.
4.2 The service staff explain the regulations and knowledge of the spa to customers.
4.3 Whether the service staff have professional first-aid capabilities.

5. Empathy
5.1 Booking was convenient (online booking and telephone booking).
5.2 Transportation service (whether road signs are clear, and shuttle buses are provided).
5.3 Accessibility design
5.4 Provide tourist information (provide introduction information or maps).
5.5 Provide a catering service (provide vegetarian meals or healthy and regimen meals).
5.6 Whether the service staff can speak Taiwanese.
5.7 Take the initiative to care for customers.

Assessment of Service Quality of Hot Spring Hotels

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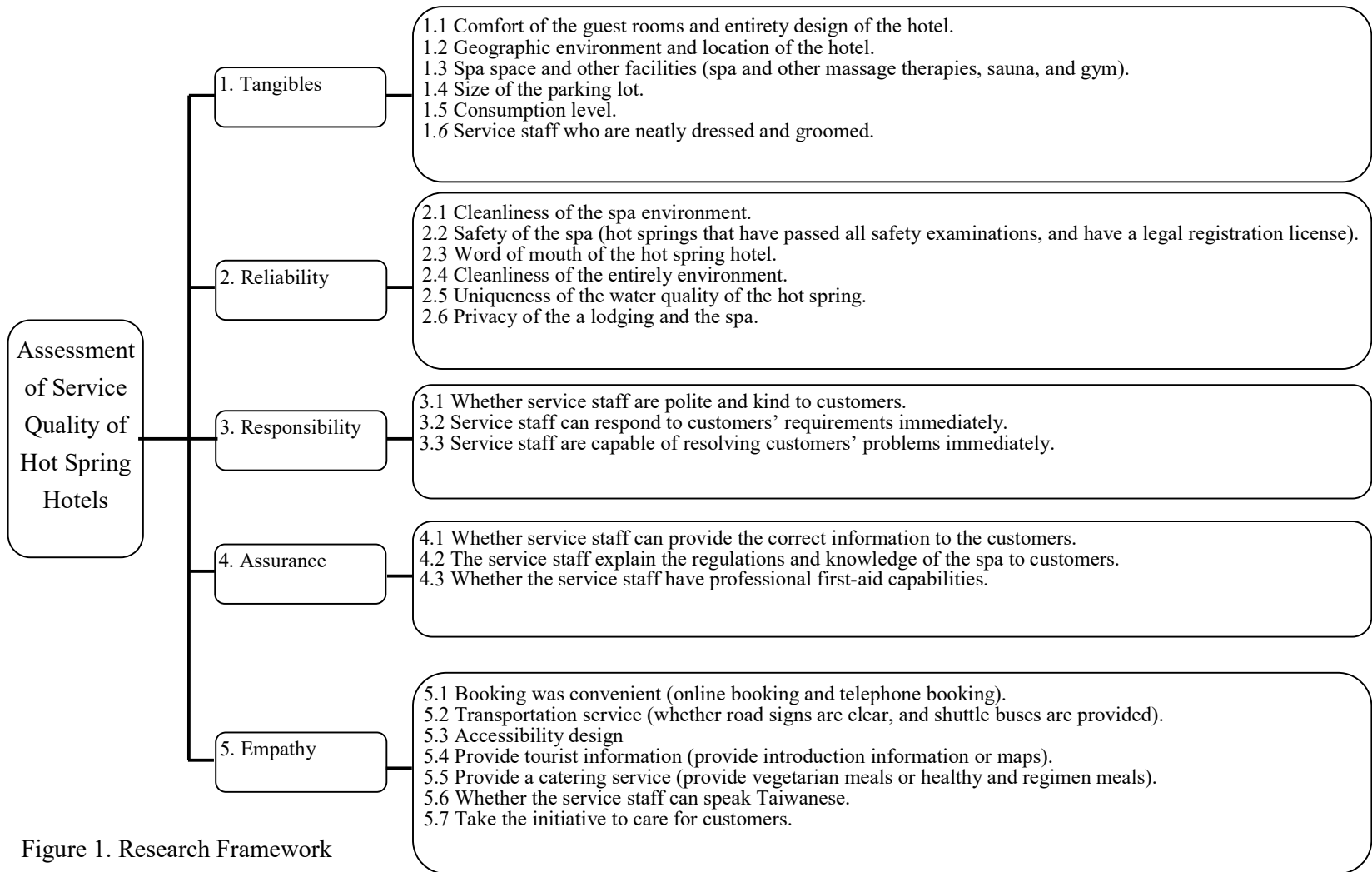
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SHARE REPURCHASE, CASH DIVIDEND
AND FUTURE PROFITABILITY

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Abstract

Due to the effect caused by financial crisis and global economic slowdown, many companies choose to repurchase stock shares and pay cash dividends to attract investors. Therefore, we adopt regression analysis approach to investigate whether share repurchase and cash dividend are associated with firm's future profitability in this study. The empirical results show that share repurchase presented a negative but not significant association with the firm's future earnings; in contrast, cash dividends have significant positive impact on the firm's future profitability. In addition, the implementation of share repurchase, if over-bought, has no positive impact on the profitability of the firm. However, low share repurchase has an impact on the firm's future earnings. It means that the firm's future profitability information content of share repurchase only exists when the share repurchase is in a moderate amount. Meanwhile, cash dividends convey the message of profitability, which echo with information content theory, and have an impact on the company's future earnings.

JEL: G35

KEYWORDS: Share Repurchase, Cash Dividend, Future Earnings,
    Future Profitability

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Introduction

Due to the influence of financial crisis and global economic slowdown, the market price and trading volume of many listed companies in Taiwan were generally affected by the stock market downturn and worldwide recession. Back to year 2000, to save the stock market and investor confidence, Taiwanese government followed the implementation of share repurchase of foreign countries, and released "the regulation of listed and OTC companies to buy back shares of the company" in Article 28 of the Securities Exchange Act in August 7, 2000. This regulation allows listed and OTC companies to buy back their shares outstanding. The research data show that there are 511 listed companies which have ever bought back their stock shares and the total number of applying for share repurchase is 2,363 as of December 31, 2012. The companies applying for buying back their shares account for a percentage of 59.56% of the number of listed companies (Market Observation Post System for Taipei Exchange, MOPS). When firms implement share repurchase, thus reducing their shares outstanding, investor confidence may be boosted. Meanwhile, the firm's stock prices may rise sharply.

In addition, investors may change their investment preferences from time to time, but many of them are more willing to invest in firms paying cash dividends. Observing the willingness of paying cash dividends and its tendency in the United States, from 1926 to 1999, the payment of cash dividends of listed companies reached a peak in 1978. The companies paying cash

dividends generally do so due to its higher profitability, market book value, and faster growth rate of assets. Meanwhile, investors may thus believe that this firm will be likely to have a profit. Tu (2008) showed that when firms increase dividends, the increase is not only associated with profit changes, but also brings value to investors because of the firm's share price increase. Therefore, this study aims to explore how share repurchases and cash dividends are associated with the firm's future earnings. And the rest of this paper is organized as following. After the Introduction, we review some outstanding research related to our topic and propose our hypotheses in Literature Review. The model specifications and data selection are then illustrated in the Methodology section. In the next section, we analyze our findings from the empirical results. Finally, we make some concluded remarks.

Literature

Share repurchase is known as a program by which a company buys back its shares for several reasons. Some of the reasons that drive a firm to conduct this program are such as undervaluation, agency theory, dividend substitution, capital restructuring, management compensation incentives and firms' reputation (Andriosopoulos and Lasfer, 2015). Also, Huang and Thakor (2013) indicated that a popular explanation is the information asymmetry/signaling hypothesis. Meanwhile, some strong empirical evidence support the signaling role of repurchases in the context of self-tender offer repurchases.

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In addition, when a firm chooses to implement share repurchase in the market, the company management is to release a signal that firm will have a good anticipation of the firm's future growth opportunities. Especially, when spending more funds to repurchase their own stocks in the market, the firm mangers release the signal that the company owner is more confident in the firm growth in the future, thus leading to the increase of company's future stock price. Empirical research (Chuang, 2007) showed that when the company managers repurchase their stocks, the stock prices have positive abnormal returns in the short run. This drives the investors to infer that the value of the firm is currently undervalued and the company has a good future prospect in earnings. In other words, share repurchase not only reduces the number of shares outstanding, but also increases earnings per share thus avoiding dilution of earnings.

On the other hand, regarding the dividend policies, empirical studies suggest a similar association between dividend payout and future earnings. By using the free cash flow theory, Kallapur, concluded that all of earning response coefficients depend positively on dividend payout ratios as the determinants. Additionally, dividend changes are also widely considered as the signals for future earnings. For instance, Bhattacharya (1979) and Miller and Rock (1985) suggested that companies pay dividends to signal favorable information to the stock market. In addition, Liu and Chen (2015), by using a simultaneous equation analysis, found that managers change dividends to signal previous earnings changes and cater to the shareholder clienteles.

DeAngelo et al. (1996) and Leftwich and Zmijewski (1994) illustrated that the changes in firms' dividends have different levels of information content, where manager's motivation may depend on each firm's special circumstance. Easterbrook (1984) proposed that paying dividends may relieve agency problems between a firm's managers and shareholders by reducing funds available to managers. Tu (2008) showed that when firms increase dividends, the effect is not only related to profit changes, but also brings value to investors due to the increase in the firm's stock prices. Chuang (2007) demonstrated that the common characteristics of firms paying cash dividends are generally large-scale business, with low growth rate, and more capable of paying dividends. By paying dividends, companies can reduce the impact of lacking potential investment projects with positive cash flow; meanwhile, the decision of decreasing cash dividends may affect the investor confidence for the firm's future profits.

Though there have been a lot of research related to the relationship between share repurchases, dividend payouts and future earnings, there are not many studies that examine the evolving association between these factors. As of our knowledge, one of the very few outstanding studies is Skinner's (2008). Its results showed that firms that only pay dividends have gradually vanished and repurchases are increasingly used to replace regular dividends, even for firms that continue to pay dividends. In addition, they concluded that the fundamental key factor that determines the overall level of repurchases is earnings, while some others factors may help explaining the timing

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of repurchases. Finally, they found a trend that repurchases had become a dominant form of payout.

In order to offer more contribution to the knowledge of relationship between share repurchases, cash dividend and earnings, we conduct this research paper by using Taiwanese market as our sample. Accordingly, this study proposes the following hypotheses:

Hypothesis 1: Share repurchases have a significant positive association with the firm's future profitability.

Hypothesis 2: Cash dividends have a significant positive association with the company's future profitability.

Equation 1:
$$ROA_{t+1} = \alpha_0 + \alpha_1 ABUY_t + \alpha_2 FCF_t + \alpha_3 LD_t + \alpha_4 SIZE_t + \alpha_5 CR_t + \alpha_6 GR_t + \alpha_7 GO_t + \alpha_8 GDP_{t+1} + \varepsilon_t$$

Equation 2:
$$ROA_{t+1} = \alpha_0 + \alpha_1 CashD_t + \alpha_2 FCF_t + \alpha_3 LD_t + \alpha_4 SIZE_t + \alpha_5 CR_t + \alpha_6 GR_t + \alpha_7 GO_t + \alpha_8 GDP_{t+1} + \varepsilon_t$$

t=the current period, t+1=the period after the current period

Methodology

Our data include the listed companies in Taiwan Stock exchange market excluding financial industry and utility industry from Taiwan economic News Journal (TEJ). The data period is from 2002 to 2012. After screening and elimination of firms with incomplete data, we obtained 1,046 and 3,802 year-firm observations of share repurchase firms and cash dividends issuing firms respectively in the samples. To investigate the effects of share repurchases and cash dividends on future profitability, we adopt firm profitability in t+1 period to run the following regressions.

Empirical Results

We use the equation 1 and equation 2 to run regression analysis, and the empirical results as follows:

According to Table 1, share repurchase presents a negative, but not significant association with firms' future profitability. Free cash flow and sales growth rate present significantly positive association with future profitability, whereas the firms' growth opportunities (M/A) present significantly negative association with future profitability. These results do not support Hypothesis 1, but echoes with free cash flow theory.

Meanwhile, the results of our regression analysis on share repurchase show that stock repurchase also presents negative but not significant association on firms' future profitability in every model. However, when the sample is

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Table 1. Regression Analysis for Share Repurchase

Variables	Model 1	Model 2	Model3	Model4	Model5	Model6	Model7	Model8
ABUYt	-0.0462 (0.0389)	-0.0421 (0.0387)	-0.0438 (0.0388)	-0.0303 (0.0398)	-0.0303 (0.0398)	-0.0268 (0.0395)	-0.0268 (0.0393)	-0.0283 (0.0395)
FCFt		0.0196*** (0.0048)	0.0181*** (0.0053)	0.0168*** (0.0053)	0.0166*** (0.0054)	0.0166*** (0.0054)	0.0169*** (0.0053)	0.0174*** (0.0053)
LDt			-0.0058 (0.0063)	-0.0075 (0.0064)	-0.0067 (0.0072)	-0.0067 (0.0070)	0.0109 (0.0085)	0.0128 (0.0085)
SIZEt				0.1280* (0.0710)	0.1285* (0.0709)	0.0926 (0.0712)	0.0074 (0.0716)	0.0084 (0.0715)
CRt					0.0002 (0.0011)	0.0003 (0.0011)	0.0002 (0.0011)	0.0004 (0.0011)
GRt						0.0129*** (0.0031)	0.0082** (0.0033)	0.0087** (0.0034)
GOt							- 0.3651*** (0.0716)	- 0.39019*** (0.0702)
GDPt								-0.0437* (0.0263)
N	1046	1046	1046	1046	1046	1046	1046	1046
F-statistic	1.41	8.51	6.35	5.32	4.25	5.42	10.66	10.07
R2	0.0013	0.0187	0.0195	0.0226	0.0227	0.0407	0.0616	0.0634

Note1：ROAt+1=α0+α1Abuyt+α2 FCFt+α3 LDt+α4SIZEt+α5 CRt+α6 GR+α7GOt+α8GDPt+εt

Note2：ROAt+1 – return of asset in year t+1, CASHDt =cash dividend yield in year t, FCFt=the ratio of free cash flow in year t, LDt=the ratio of debt in year t, SIZEt= the firm size, CRt=the current ratio, GRt=the revenue growth rate, GOt=the growth of opportunity, GDPt=the growth rate of GDP

Note3：The sample period is from 2002 to 2012

Note4：***denotes 1% significant level, ** denotes 5% significant level, * denotes 10% significant level

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Table 2. Regression Analysis for Share Repurchase (Low Repurchase Group)

	Coef	Std.err	T	P>|t|	[95% Conf. Interval]	
ABUYt	0.3154**	0.1293	2.44	0.015	0.0615	0.5693
CASHDt	0.2786***	0.0357	7.80	0.000	0.2085	0.3487
FCFt	0.0010	0.0009	1.19	0.236	-0.0007	0.0027
LDt	-0.0209***	0.0063	-3.31	0.001	-0.0334	-0.0085
SIZEt	0.2503***	0.0881	2.84	0.005	0.0773	0.4233
CONS	-3.1110**	1.2393	-2.23	0.026	-5.8467	-0.3754
N	725					
F-statistic	16.87***					
R2	0.1161					

Note1: ROAt+1 = return of asset in year t+1, CASHDt=cash dividend yield in year t, FCFt=the ratio of free cash flow in year t, LDt=the ratio of debt in year t, SIZEt= the firm size, CRt=the current ratio, GRt=the revenue growth rate, GOt=the growth of opportunity, GDPt=the growth rate of GDP
Note2: The sample period is from 2002 to 2012.
Note3: *** presents the significance at 1% level; ** presents the significance at 5% level; * presents significance at 10% level.

Table 3. Regression Analysis for Share Repurchase (High Repurchase Group)

	Coef	Std.err	T	P>|t|	[95% Conf. Interval]	
ABUYt	-0.6895	0.0506	-1.36	0.174	-0.1685	0.0306
CASHDt	0.2769***	0.0444	6.23	0.000	0.1896	0.3643
FCFt	0.0004	0.0013	0.33	0.745	-0.0022	0.0031
LDt	-0.0147*	0.0085	-1.72	0.085	-0.0314	0.0021
SIZEt	-0.0069	0.1108	-0.06	0.950	-0.2247	0.2109
CONS	1.2117	1.7172	0.71	0.481	-2.1633	4.5869
N	436					
F-statistic	9.71***					
R2	0.0885					

Note1: ROAt+1= return of asset in year t+1, CASHDt=cash dividend yield in year t, FCFt=the ratio of free cash flow in year t, LDt=the ratio of debt in year t, SIZEt=the firm size, CRt=the current ratio, GRt=the revenue growth rate, GOt=the growth of opportunity, GDPt=the growth rate of GDP
Note2: The sample period is from 2002 to 2012.
Note3: *** presents the significance at 1% level; ** presents the significance at 5% level; * presents significance at 10% level.

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Table 4. Regression Analysis for Cash Dividend Yield

Variables	Model 1	Model 2	Model3	Model4	Model5	Model6	Model7	Model8
CASHDt	0.0960*** (0.0161)	0.0723*** (0.0157)	0.0728*** (0.0155)	0.0751*** (0.0155)	0.0754*** (0.0155)	0.0886*** (0.0155)	0.0907*** (0.0155)	0.0907*** (0.0155)
FCFt		0.0314*** (0.0030)	0.0257*** (0.0031)	0.0248*** (0.0031)	0.0249*** (0.0031)	0.0250*** (0.0031)	0.0250*** (0.0030)	0.0249*** (0.0030)
LDt			-0.0204*** (0.0027)	-0.0222*** (0.0029)	-0.0229*** (0.0031)	-0.0237*** (0.0031)	-0.0051 (0.0046)	-0.0044 (0.0047)
SIZEt				0.0750** (0.0320)	0.0745** (0.0320)	0.0540* (0.0316)	0.0478 (0.0315)	0.0530* (0.0315)
CRt					-0.0003 (0.0007)	-0.0003 (0.0007)	0.0006 (0.0007)	0.0007 (0.0007)
GRt						0.0123*** (0.0018)	0.0096*** (0.0019)	0.0099*** (0.0019)
GOt							-0.2151*** (0.0396)	-0.2204*** (0.0405)
GDPt								-0.0305*** (0.0091)
N	3802	3802	3802	3802	3802	3802	3802	3802
F-statistic	35.34	71.54	72.91	54.55	46.95	47.10	40.01	36.72
R2	0.0082	0.0507	0.0623	0.0637	0.0637	0.0769	0.0912	0.0928

Note1：$ROA_{t+1}=\alpha_0+\alpha_1\ CashD_t+\alpha_2\ FCF_t+\alpha_3\ LD_t+\alpha_4\ SIZE_t+\alpha_5\ CR_t+\alpha_6\ GR+\alpha_7\ GO_t+\alpha_8\ GDP_t+\varepsilon_t$

Note2：$ROA_{t+1}=\alpha_0+\alpha_1 Abuy_t+\alpha_2\ FCF_t+\alpha_3\ LD_t+\alpha_4 SIZE_t+\alpha_5\ CR_t+\alpha_6\ GR+\alpha_7 GO_t+\alpha_8 GDP_t+\varepsilon_t$

Note3：ROA_{t+1} – return of asset in year t+1, CASHDt =cash dividend yield in year t, FCFt=the ratio of free cash flow in year t, LDt=the ratio of debt in year t, SIZEt= the firm size, CRt=the current ratio, GRt=the revenue growth rate, GOt=the growth of opportunity, GDPt=the growth rate of GDP

Note4：The sample period is from 2002 to 2012.

Note5：***denotes 1% significant level, ** denotes 5% significant level, * denotes 10% significant level

divided into low and high share repurchase groups, the low groups present a significantly positive association with future profitability, whereas the high groups still show negative but not significant association.

According to Table 4, cash dividend presents a positive and significant association with firms' future profitability. Free cash flow, sales revenue growth and GDP growth rate present positive and significant association with firms' future profitability. The firms' growth opportunities present negative and significant association with future profitability. The stepwise regression results shown in every model also present similar results. Meanwhile, when divided in low and high cash dividend groups, cash dividends still show the same significantly positive association with future

profitability in both situations. These results support Hypothesis 2, and also echo with free cash flow theory.

Conclusion

Although both share repurchase and cash dividend are thought to be a costly signal, many companies still choose to do so because of their information content. Especially due to the impact of the financial crisis, investors have lost confidence in the market and many companies repurchase their shares and pay cash dividends to attract investors. According to empirical results, share repurchase present a negative but not significant association with future profitability, which echoes with Lin's (2005) findings. Their study document that share repurchase contains implicit information asymmetry to companies' future earnings, if not public information, the performance of the firm may not have significant abnormalities. Therefore, Hypothesis 1 does not hold.

However, if divided into low and high share repurchase groups, the low group shows that share repurchase has significantly positive association with

future earnings; on the contrary, the association becomes negative and not significant in the high share repurchase group. This result means that the implementation of share repurchase, if over-bought, has no positive impact on the profitability of the firm. However, low share repurchase has an impact on the firm's future earnings results. It means that the firm's future profitability information content of share repurchase only exists when the share repurchase is in a moderate amount.

On the other hand, our empirical findings show that cash dividends have a significant positive impact on the firm's future profitability. This corresponds with the empirical results of Du (2008) on information content. Even if in a poor operating condition, many companies still pay cash dividends to convey the firm's relatively optimistic earnings outlook. Furthermore, if divided into low and high cash dividend groups, both of them still present the same significantly positive results. Therefore, this study echoes with information content theory and verify that cash dividends have positive effects upon the firm's future earnings, which is Hypothesis 2.

References

Andriosopoulos, D., & Lasfer, M. (2015). The Market Valuation of Share Repurchases in Europe. Journal of Banking & Finance, 55, 327–339.

Bhattacharya, S. (1979). Imperfect Information, Dividend Policy, and the 'Bird in the Hand' Fallacy. Bell Journal of Economics, 10, 259-270.

Chiu, Y.-C., & Liang, W.-L. (2015). Do Firms Manipulate Earning before Accelerated Share Repurchases. International Review of Economics and Finance, 86–95, 86–95.

Chuang, T.-H. (2007). An Empirical Study of Firm's Choices among Capital Reduction, Cash Dividend and Share Repurchase in Taiwan

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The International Journal of Organizational Innovation Vol 9 Num 1 January 2017 - Section C.

Stock Exchange. National Central University, Thesis.

DeAngelo, H., DeAngelo, L., & Skinner, D. J. (1996). Reversal of Fortune: Dividend Signaling and the Disappearance of Sustained Earnings Growth. Journal of Financial Economics, 40, 341-371.

Easterbrook, F. H. (1984). Two Agency-Cost Explanations of Dividends. American Economic Review, 74, 650-659.

Huang, S., & Thakor, A. V. (2013). Investor heterogeneity, investor-management disagreement and share repurchases. Review of Financial Studies, 26, 2453-2491.

Kallapur, S. (1994). Dividend Payout Ratios as Determinants of Earnings Response Coefficiencts. 17, 359-375.

Leftwich, R., & Zmijewski, M. (1994). Contemporaneous Anouncements of Dividends and Earnings. Journal of Accounting, Auditing & Finance, 9, 725-762.

Liu, C.-P., & Chen, A.-S. (2015). Do Firms Use Dividend Changes to Signal Future Profitability? A Simultaneous Equation Analysis. International Review of Financial Analysis, 37, 194–207.

Miller, M. H., & Rock, K. (1985). Dividend Policy under Asymmetric Information. Journal of Finance, 40, 1031-1051.

Skinner, D. J. (2008). The Evolving Relation between Earnings, Dividends, and Stock Repurchases.

Journal of Financial Economics, 87, 582-609.

Tu, H. C. (2008). A Study on the Effects of Asymetric Information on Cash Dividend Policy. Chaoyang University of Technology, Thesis.

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The International Journal of Organizational Innovation Vol 9 Num 1 January 2017 - Section C.
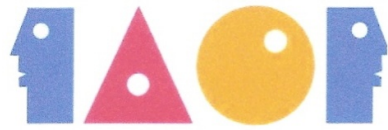
LOCALIZATIONS OF SOIL LIQUEFACTIONS INDUCED BY TECTONIC EARTHQUAKES

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Abstract

There are four different types of earthquakes such as Tectonic, Volcanic, Collapse and Explosion. All these earthquakes will induce vibrations, yet only tectonic earthquakes will induce shear banding. Vibrations can be found everywhere in the earthquake disaster area, yet shear bandings can only be found in some localized areas. The images of soil liquefactions obtained in various countries in seismic zone have revealed that localizations of soil liquefactions only take place in tectonic earthquakes; for in-depth understanding of the cause of localizations of soil liquefactions, the authors of this article have developed the elasto-plastic strain softening material model and composed a finite element method program for simulation and analysis. The analysis result indicates that, even though comprehensive vibration in tectonic earthquakes will induce excessive pore water pressure, the highly concentrated ex-

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cessive pore water pressure existed in the shear band is the primary cause of localizations of soil liquefactions. Therefore, it is suggested that the conventional soil liquefaction potential evaluation method should be modified based on the cause of localizations of soil liquefactions in order to obtain the evaluation result consistent with actual situation.

Keywords: localization, soil liquefaction, tectonic earthquake, shear bandings.

(Editor's Note: The text of this article has been formatted to a single column in order to facilitate easier reading.)

Introduction

It has been revealed that the conventional cause of soil liquefaction is "With sufficiently high horizontal seismic coefficient kh and sufficiently long earthquake duration while the ground water table is near ground surface, loose saturated sand strata within 20m of underground depth tend to compress and decrease in volume such that the induced excessive pore water pressure is greater than or equal to effective confining stress of soils thus inducing soil liquefaction."

Based on conventional cause, soil liquefactions can be divided into two different types: (1) the flow liquefaction which takes place when static shear stress is greater than liquefaction shear strength, where the major deformation is induced by static shear stress, and the cyclic shear stress only reduced shear strength of the soil; (2) the cyclic mobility takes place when the static shear stress is less than liquefaction shear strength, where the flowing deformation is induced by both static and cyclic shear stresses (Kramer, 1996).

Soil liquefaction will result in building damage during earthquake, thus design engineers must carry out evaluation of soil liquefaction potential as stipulated in Seismic Design Specifications and Commentary of Buildings (2006).

The conventional methods for evaluation of soil liquefaction potential include using simple criteria and simplified procedures. Simple criteria can be used for initial evaluation of liquefaction potential in large area; simplified procedures are empirical methods based on onsite test result, where the onsite tests include standard

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penetration test, cone penetration test, and shear wave velocity test. Currently the frequently used calculation analysis methods include Japan Road Association Method (1996), Seed Method (1987; 1990), and Tokimatsu and Yoshimi Method (1983). Among them, Japan Road Association Method (1996) is the soil liquefaction potential evaluation method adopted by Seismic Design Specifications and Commentary of Buildings (2006).

For a certain position, when depth z falls within the range of 0~20m, the safety factor against liquefaction FL(z) is defined as the ratio of the computed cyclic resistance ratio (Rz) for the soil at this depth to cyclic stress ratio (Lz) generated by the design earthquake (Ishihara 1985; 1993; Seed 1987; Seed and Harder 1990); and then the liquefaction potential of this position PL can be calculated by the equation proposed by Iwasaki, Tokida and Tatsuoka (1981) (as shown in Eq. 1).

$$P_L = \sum_{i=1}^{n} F_i(z) \cdot W_i(z) \cdot \Delta z_i$$
.... (1)

In the equation above, Fi(z)=1-(FL)i, Wi(z)=10-0.5 zi, Δz_i is the thickness of the ith layer counting from the ground surface. As for the calculated PL, when PL=0, there is no liquefaction potential; when 0<PL☐5, there is minor liquefaction potential; when 5<PL☐15, there is moderate liquefaction potential; when 15<PL, there is high liquefaction potential.

For different positions with identical horizontal seismic coefficient kh, geological condition, and ground water table, the results of liquefaction potential evaluations will all be the same. Take Tainan City of Taiwan as an example, with kh=0.33 and the ground water table close to ground surface, the soil liquefaction potential diagram published by Central Geological Survey, MOEA based on conventional soil liquefaction potential evaluation method is as shown in Figure 1; in Figure 1 the evaluation revealed that all areas covered by alluvial soil layer in Tainan City are equipped with high, moderate, or low soil liquefaction potential.
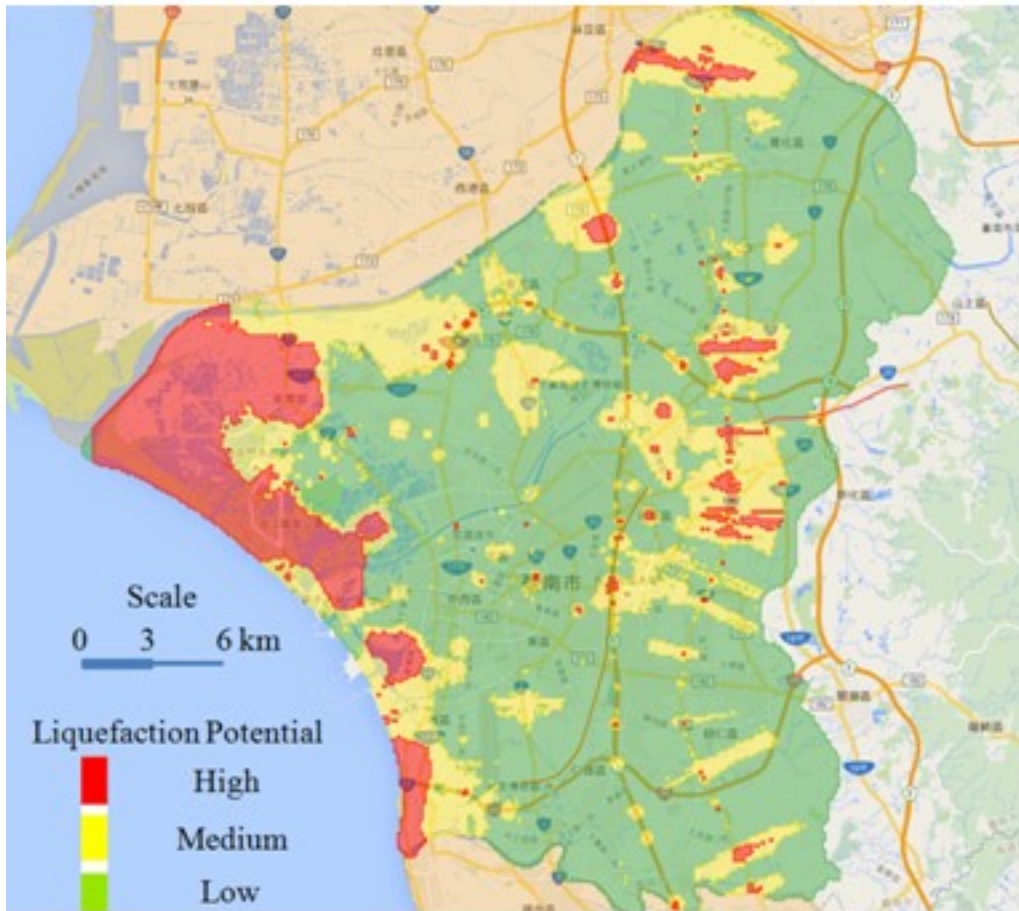
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Figure 1. Distribution of soil liquefaction potentials in Tainan City of Taiwan
(Central Geological Survey, MOEA, 2016)

The actual location of soil liquefaction in Tainan City took place during Mei-nong Earthquake on February 6th, 2016 is as shown in Figure 2; it has been revealed in Figure 2 that: (1) soil liquefaction was merely a kind of localized phenomenon; (2) the actual area of soil liquefaction is far less than the area of soil liquefaction potential announced by Central Geological Survey, MOEA; (3) the actual locations of soil liquefaction were mostly outside the areas with high liquefaction potentials. Thus we know that the conventional cause of soil liquefaction is different from the cause of localizations of soil liquefactions. The result of soil liquefaction potential evaluation obtained from conventional cause of soil liquefaction cannot fully reflect the actual localizations of soil liquefactions behavior.

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To capture the localizations of soil liquefactions, it is known that localizations of deformations have to be produced during tectonic earthquakes before obtaining the highly concentrated excessive pore water pressure in the shear bands. Thus it is necessary to investigate the cause of localizations of soil liquefactions via simulation and analysis of tectonic earthquakes.
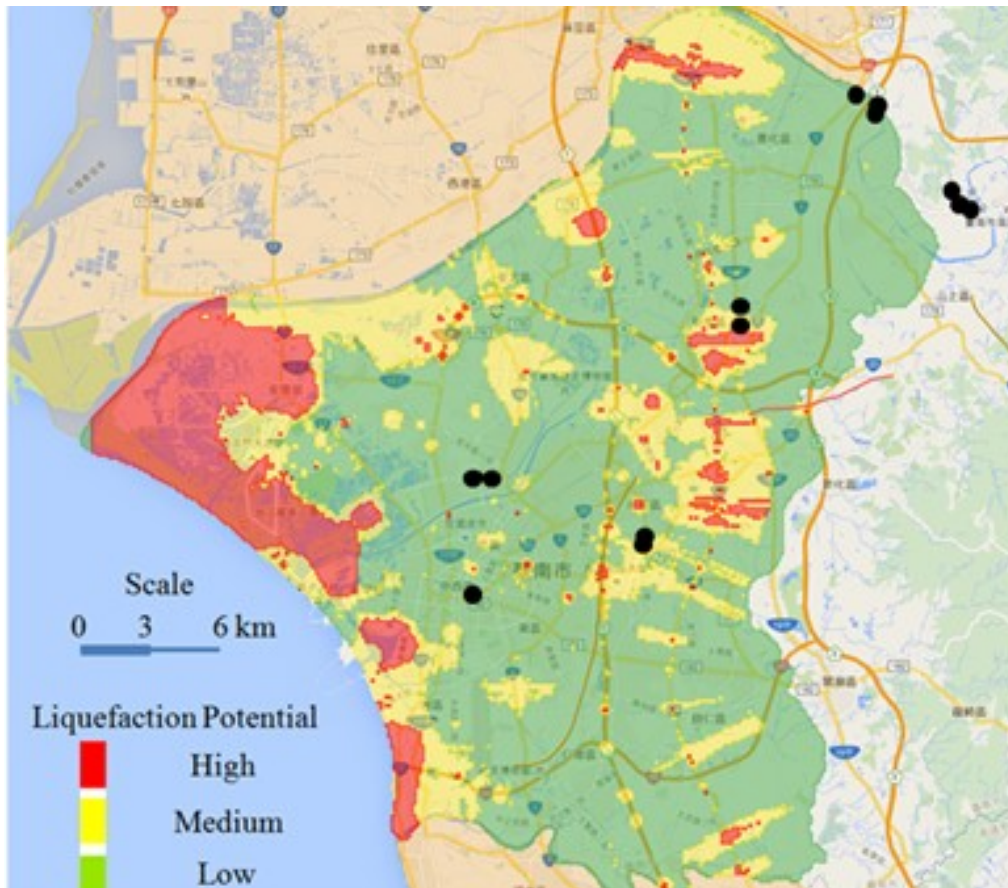

Figure 2. Comparison between the locations of soil liquefactions induced by Meinong Earthquake and the distribution of liquefaction potentials (Central Geological Survey, MOEA, 2016)

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Formulation Of Constitutive Equation

Molenkamp (1985) expressed the physical meaning of the stiffness ratio, H/2G, as equal to the ratio of the elastic incremental deviatoric strain to the plastic incremental deviatoric strain if the partial derivatives of the yield surface, F = 0, are normalized with $\partial F / \partial S_{ij}$ which is the partial derivative of the yield surface with respect to the deviator stress, S_{ij}. A quantity called octahedral shear strain (γ_{oct}) is frequently used in engineering practices. The stiffness ratio and the plastic octahedral shear strain, γ_{oct}^{p}, are closely related to each other because the deviatoric strain is proportional to the octahedral shear strain. Thus it makes more sense to use the stiffness ratio and the plastic octahedral shear strain to update the size of the yield surface. The proposed yield function, F, is then expressed as follows:

$$F = J_{2D}^{1/2} - \left(\kappa + H\, \gamma_{oct}^{P} \right) = 0 \quad \text{......(2)}$$

where:

J_{2D} = the second invariant of deviatoric stress;

κ = the size of the initial yield surface;

γ_{oct}^{p} = the plastic octahedral shear strain;

H/2G = the strain softening parameter;
G = the shear modulus.
Differentiating Equation 1 leads to

$$dF = \frac{\partial F}{\partial \sigma_{ij}'} \sigma_{ij}' + \frac{\partial F}{\partial \gamma_{oct}^{p}} d\gamma_{oct}^{p} = \frac{\partial F}{\partial \sigma_{ij}'} d\sigma_{ij}' - H\, d\gamma_{oct}^{p} = 0 \quad \text{...... (3)}$$

where:

$d\sigma_{ij}'$ = the incremental effective stress vector;

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$d\gamma_{oct}^{p}$ = the incremental plastic octahedral shear strain;

The plastic incremental octahedral shear strain can be found as follows:

$$\left(d\gamma_{oct}^{p}\right)^{2} = \frac{1}{9}\left[(d\varepsilon_{11}^{p} - d\varepsilon_{22}^{p})^{2} + (d\varepsilon_{22}^{p} - d\varepsilon_{33}^{p})^{2} + (d\varepsilon_{33}^{p} - d\varepsilon_{11}^{p})^{2}\right]$$

$$+ \frac{2}{3}\left[(d\varepsilon_{12}^{p})^{2} + (d\varepsilon_{23}^{p})^{2} + (d\varepsilon_{31}^{p})^{2}\right] \quad \ldots\ldots\ldots (4)$$

The flow rule is:

$$d\varepsilon_{ij}^{p} = \lambda \frac{\partial F}{\partial \sigma_{ij}'} = \lambda \left(\frac{1}{2} J_{2D}^{-1/2} S_{ij}'\right) \quad \ldots\ldots(5)$$

Substitution of Equation 5 into Equation 4 leads to:

$$\left(d\gamma_{oct}^{p}\right)^{2} = \frac{1}{9}\left(\frac{\lambda}{2} J_{2D}^{-1/2}\right)^{2}\left[(S_{11} - S_{22})^{2} + (S_{22} - S_{33})^{2} + (S_{33} - S_{11})^{2}\right]$$

$$+ \frac{2}{3}\left(\frac{\lambda}{2} J_{2D}^{-1/2}\right)^{2}\left[(S_{12})^{2} + (S_{23})^{2} + (S_{31})^{2}\right]$$

$$= \frac{\lambda^{2}}{6} \quad \ldots\ldots(6)$$

Therefore:

$$d\gamma_{oct}^{p} = \frac{\lambda}{\sqrt{6}} \quad \ldots\ldots (7)$$

Substitution of Equation 7 into Equation 3 leads to:

$$dF = \frac{\partial F}{\partial \sigma_{ij}'} d\sigma_{ij}' - \frac{1}{\sqrt{6}} H\lambda = 0 \quad \ldots\ldots(8)$$

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The incremental effective stress vector is

$$d\sigma'_{ij} = \overline{D}^e_{ijkl}\left(d\varepsilon_{kl} - d\varepsilon^p_{kl}\right) = \overline{D}^e_{ijkl}\left(d\varepsilon_{kl} - \lambda\frac{\partial F}{\partial \sigma'_{kl}}\right) \quad ......(9)$$

Substituting Equation 9 into 8 leads to

$$\lambda = \frac{\dfrac{\partial F}{\partial \sigma'_{ij}}\overline{D}^e_{ijkl}d\underline{\varepsilon}}{\dfrac{1}{\sqrt{6}}H + \dfrac{\partial F}{\partial \sigma'_{ij}}\overline{D}^e_{ijkl}\dfrac{\partial F}{\partial \sigma'_{kl}}} \quad ......(10)$$

The stress-strain matrix is therefore can be obtained as follows:

$$\overline{D}^{ep}_{ijkl} = \overline{D}^e_{ijkl} - \overline{D}^p_{ijkl}$$

$$= \overline{D}^e_{ijkl} - \overline{D}^e_{ijkl}\frac{\partial F}{\partial \sigma'_{kl}}\frac{\partial F}{\partial \sigma'_{ij}}\overline{D}^e_{ijkl}\left[\frac{1}{\sqrt{6}}H + \frac{\partial F}{\partial \sigma'_{ij}}\overline{D}^e_{ijkl}\frac{\partial F}{\partial \sigma'_{kl}}\right]^{-1} \quad ......(10)$$

Using bulk modulus of water B_w and volumetric strain $\delta_{ij}d\varepsilon_{ij}$, the excess pore water

pressure increment du_e is calculated as follows:

$$du_e = B_w\delta_{ij}\varepsilon_{ij} \quad ......(11)$$

where δ_{ij} is the Kronecker delta.

Numerical Analysis

For a 5.08cmx2.54cm plate shown in Figure 3 under plane strain conditions loaded at both ends, where the movement in the direction perpendicular to the load-

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ing is constrained, the uniform 50 x 25 mesh is used to analyze the behavior of the plate under uniformly prescribed loading conditions. Material properties used are: (1) the initial size of yield surface, κ, equal to 24kPa, (2) the Young's modulus, E, equal to 1200kPa, (3) Poisson's ratio, ν, equal to0.3, (4) the shear modulus, G, equal to 462kPa, (5) the bulk modulus of water, B_w, equal to 2140MPa, and (6) the strain softening parameter, H/2G, equal to -0.05 (for modeling strain softening behavior).

Results And Discussion

The behavior of localizations of deformations and the excessive pore water pressure contours under loading conditions are shown in Figures 4 and 5, respectively. Figure 4 shows when shear strains are deep into plastic range, shear bandings induced by localizations of deformations are captured due to the loss of symmetry and ellipticity. Figure 5 indicates that the distribution of the excess pore water pressure can be highly concentrated in each shear band. Such a phenomenon can be the cause of the localizations of soil liquefactions.

It is well known that there are four different types of earthquakes and most of the mass destruction caused by an earthquake over the history is due to tectonic earthquakes (Hubpages, 2011).

The localizations of soil liquefactions can only take place in tectonic earthquakes because they are the only earthquakes with shear bandings resulted from localizations of deformations.

Even though the conditions before the force is applied to the soil are uniform, homogeneous, and isotropic, once the shear strain of the plate gets deep into plastic range under lateral compression during a tectonic earthquake, localizations of deformations will take place in the plate due to the loss of ellipticity (Drucker, 1950; Hill, 1962; Mandel, 1966; Rudnicki and Rice, 1975; Rice, 1976; Valanis, 1989), thus leading to highly concentrated excess pore water pressure in shear bands. The brittle fractures of the soils in shear bands have led to greatly increased pore space thus forming the channel for upward ground water flow with sediment entrainment.

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Even though the vibration during earthquake will induce excess pore water pressure, there is neither highly concentrated excessive pore water pressure nor channel for upward ground water flow with fragment entrainment in the tectonic plate. Localizations of soil liquefactions can be divided into tubular soil liquefaction (as shown in Figure 6) and striped soil liquefaction (as shown in Figure 7). The tubular soil liquefaction is resulted from the tectonic plate equipped with tubular water channel similar to piping (Terzaghi and Peck, 1967). Hsu and Chiu (2016) believed that this tubular water channel is formed by intersection of shear textures of different strikes; the striped soil liquefaction is resulted from the tectonic plate equipped with striped water channel, which is the shear band under plane strain conditions (as shown in Figure 4).
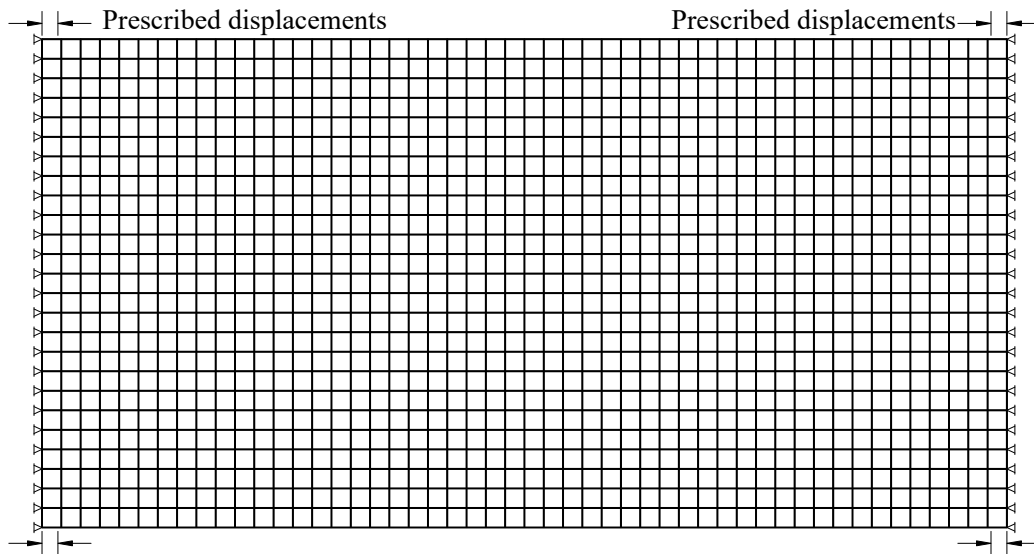

Figure 3. Finite element mesh, boundary conditions and prescribed lateral displacements

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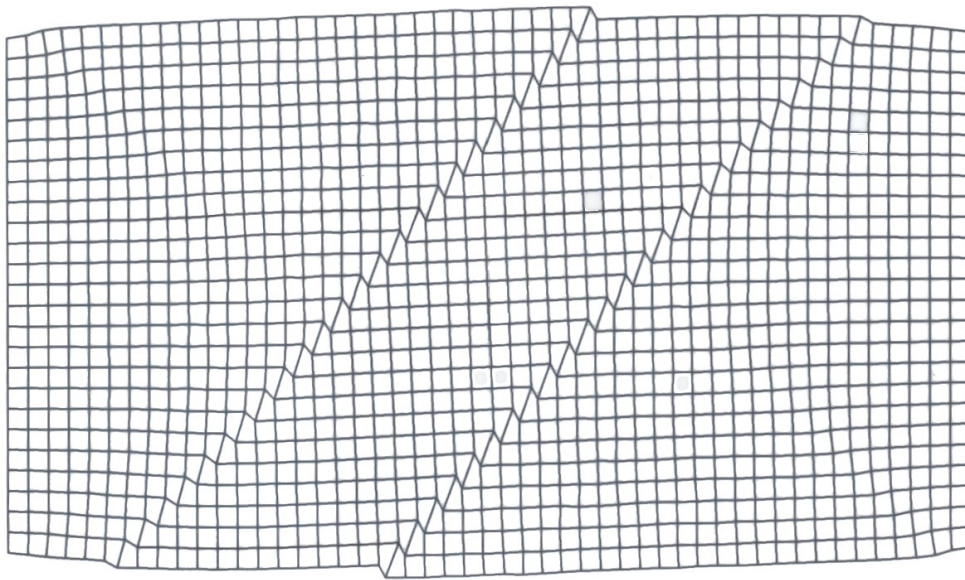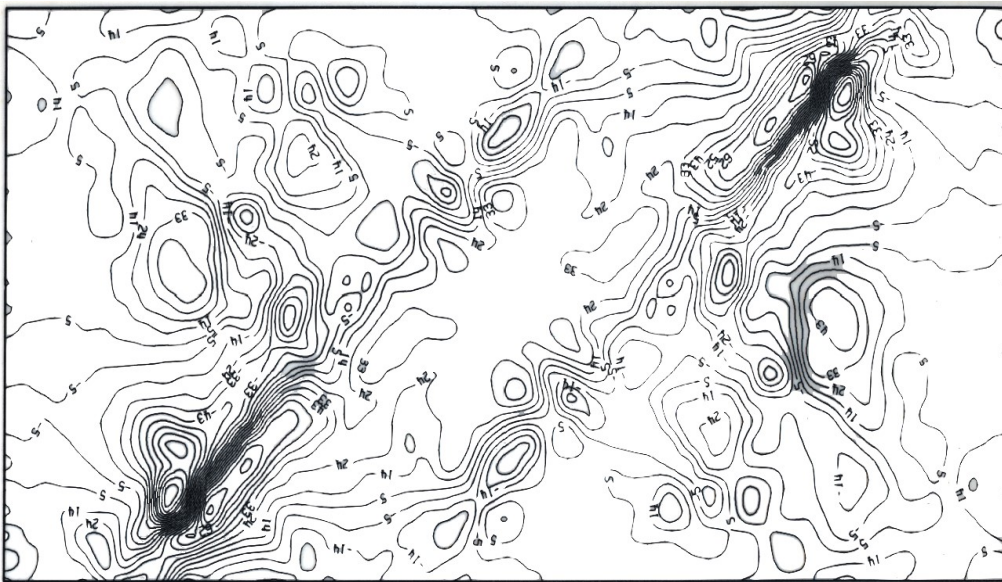
Figure 4. Deformed finite element mesh

Figure 5. Contours of excess pore water pressures

As for areas adjacent to soil liquefaction area, even though they are equipped with identical conditions, the localizations of soil liquefactions do not exist because highly concentrated excess pore water pressure and ground water channel were not induced during the earthquake.

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Causes of localizations of soil liquefactions include: (1) high shear resistance of foundation soil has led to strain softening behavior; (2) shear banding has led to tectonic local uplift of the Earth surface; (3) loosening of the shear band soil due to brittle fractures; (4) the expanded pore-space of the shear band soil becomes the channel for upward ground water flow with fragment entrainment; (5) the upward flowing water with fragment entrainment will further loosen the shear band soil.

Figure 6. Tubular soil liquefaction took place during Chi Chi Earthquake
(EOU Education Market, 2014)

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Figure 7. Striped soil liquefaction took place during Meinong Earthquake
(Liberty Time Net, 2016)

Comparison among various causes of conventional and localizations of soil liquefactions is as shown in Table 1. It appears that the cause of conventional soil liquefaction is totally different from the cause of localizations of soil liquefactions. Obviously the cause of localizations of soil liquefactions can better meet the requirement of actual soil liquefaction as shown in Figure 6 and Figure 7.

The building damage pattern induced by localizations of soil liquefactions during a tectonic earthquake is as shown in Figure 8. This kind of damage pattern is totally different from the damage pattern described by Hsu and Ho (2016) where the building was collapsed due to punching shear failure or tilted due to local shear failure.

Different damage patterns will require different disaster mitigation methods related to earthquake, so the building damage induced by foundation punching shear failure (as shown in Figure 9a) or local shear failure (as shown in Figure 9b) must not be misidentified as to be induced by soil liquefaction.

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Table 1. Comparison among various causes of conventional soil liquefaction and localizations of soil liquefactions

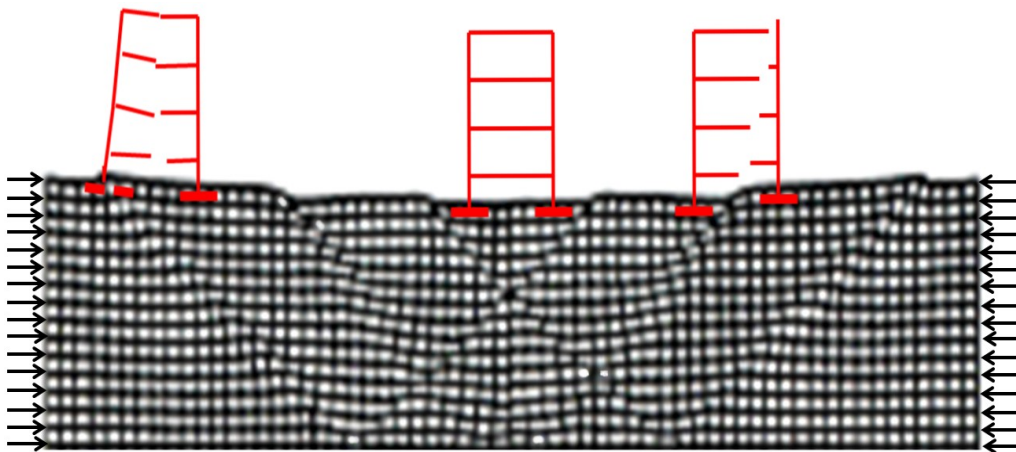|	Traditional soil liquefactions	Localizations of soil liquefactions
Soil conditions	Loose or perfectly plastic	Dense or strain softening
Type of earth-quake causing soil liquefactions	Not specified	Tectonic earthquake
Inducing factor for the major excess pore water pressure	All-around vibrations	Localizations of deformations
Change of soil conditions	All soils are changed from loose state to dense state	Only the shear band soil is changed from dense state to loose state
Highly concentrated excess pore water pressure	Not exist	Exist in shear bands
Discharge water path for ground water to flow upward	Not exist	The expanded pore-space in the shear band soil

Illustration of building damage pattern

Actual building damage pattern (Pixnet, 2010)

Figure 8. Building damage induced by localizations of soil liquefactions during a tectonic earthquake

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The case of misidentifying the punching shear failure of foundation as soil liquefaction (Lee, Der-Ho, 2016)

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The case of misidentifying the local shear failure of foundation as soil liquefaction
(Moh et al., 2000)

Figure 9. Cases of building damages during earthquake misidentified as to be induced by soil liquefaction

In the past there were soil liquefactions took place in The Lin Family Mansion and Garden in Taichung, Taiwan during the two tectonic earthquakes in 1906 and 1999, respectively. The conventional cause of soil liquefaction fails to explain why soil liquefaction took place at the same location in two consecutive earthquakes. This is because loose sands will be densified after soil liquefaction, and the densified soil will no longer suffer liquefaction theoretically. However, the aforementioned problem can easily be explained by the cause of localizations of soil liquefactions, because the localizations of soil liquefactions only take place in shear bands with highly concentrated distribution of excess pore water pressure. As long as shear

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banding takes place at the same location during two consecutive tectonic earthquakes, the soil liquefaction will occur consecutively.

Conclusions And Suggestions

Currently images of soil liquefactions all over the world clearly show that soil liquefactions only take place locally in tectonic earthquakes. For in-depth understanding of the cause of localizations of soil liquefactions during a tectonic earthquake, the authors have carried out simulation and analysis via the program of finite element method compiled based on the elastic-plastic strain softened soil model proposed in this article, and the following six conclusions have been supported by the results and discussion.

All-around vibrations can be found in tectonic earthquakes, volcanic earthquakes, collapse earthquakes, and explosion earthquakes. However, localizations of deformations induced shear bandings can only be found in tectonic earthquakes. In the simulation analysis of tectonic earthquakes where a tectonic plate is under lateral compression, when localizations of deformations are captured in a deformed finite element mesh, a highly concentrated excess pore water pressure distribution can be found in each shear band. Such phenomenon is the main cause of localizations of soil liquefactions induced in tectonic earthquakes.

Localizations of soil liquefactions include tubular and striped soil liquefactions. Among all localizations of soil liquefactions, the intersection area of shear textures of different strikes and the shear band under plane strain condition will provide water channel for tubular and striped soil liquefactions respectively.

The soil liquefaction potential evaluation method currently adopted by Seismic Design Specifications and Commentary of Buildings (2006) is based on conventional cause of soil liquefaction, such that all areas formed by alluvial soils will be evaluated as with liquefaction potentials. Such result of evaluation is totally inconsistent with the actual situation of soil liquefaction.

The conventional cause of soil liquefaction cannot explain the occurrence of soil liquefactions at the same location in two consecutive earthquakes; however, this can be explained by the cause based on localizations of soil liquefactions.

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Based on conventional cause of soil liquefaction, building damage induced by either punching shear failure or local shear failure of a foundation during an earthquake can be easily misidentified as to be caused by soil liquefaction.

Based on these six aforementioned conclusions, first of all it is strongly recommended in the future study that soil liquefaction potential evaluation should be conducted by adopting the cause of localizations of soil liquefactions such that the announced areas with soil liquefaction potentials can be consistent with the localized areas of actual soil liquefactions; secondly, various causes of building damages during an earthquake should be clearly distinguished such that different building disaster mitigation methods can be proposed in accordance with different causes of damages to achieve the effective disaster mitigation.

Acknowledgements

References

Central Geological Survey, MOEA, "Soil Liquefaction Potential System,"Website:http://www.geologycloud.tw/map/liquefaction/zh-tw, 2016.

Drucker, D. C., "Some implications of work hardening and ideal plasticity," Quarterly of Applied Mathematics, Vol. 7, No. 4, pp. 411-418, 1950.

EOU Education Market, "Soil Liquefaction happened at Tatu Creek, Shengang Village, Changhua County, Taiwan, during921 Earthquake ,"website: https://market.cloud.edu.tw/content/primary/country/tc_ua/a004/htm/p3-3.htm, 2014.

Hill, R., "Acceleration waves in solids," Journal of the Mechanics and Physics of Solids, Vol. 10, pp. 1-6, 1962.

Hsu, T.-S. and Chiu, S.-E., "Piping Failure Induced by Shear Bandings: Take the Renyitan Reservoir Spillway as an Example," The International Journal of Organizational Innovation, Vol, 9, No. 2, pp. 239-259, 2016.

128

The International Journal of Organizational Innovation Vol 9 Num 1 January 2017 - Section C.

Hsu, T.-S. and Ho, C.-C., "Shear Banding Induced Seismic Building Tilting Failure and Its Control," International Journal of Organizational Innovation, Vol. 9, No. 1, pp. 264-281, 2016.

Hubpages, "Types Of Earthquakes," website: http://hubpages.com/education/Types-Of-Earthquakes, 2011.

Ishihara, K. "Liquefaction and Flow Failure during Earthquake," Géotechnique, Vol. 43, pp. 351-415, 1993.

Ishihara, K., "Stability of Natural Deposits During Earthquakes," Proceedings, 11th International Conference on Soil Mechanics and Foundation Engineering, San Francisco, Vol. 1, pp. 321-376, 1985.

Iwasaki, T., Tokida, K., and Tatsuoka, F., "Soil Liquefaction Potential Evaluation with Use of the Simplified Procedure," Proceedings, First International Conference on Recent Advances in Geotechnical Earthquake Engineering and Soil Dynamics, St. Louis, Missouri, Session 2, Paper 12, 1981.

Japan Road Association, 1996, Guidelines and Comments to Design of Roads and Bridges, Volume V: Earthquake Design (in Japanese).

Kramer, S. L., Geotechnical Earthquake Engineering, Prentice-Hall, pp. 366-367, 1996.

Lee, Der-Ho, "Characteristic Investigation of the Geotechnical Environment for Tainan Seismic Disaster Area," Special Conference of 0206 Meinong Earthquake , Department of Civil Engineering, National Cheng-Kung University, 2016.

Liberty Time Net, "The Phenomena of Shear Bandings and Soil Liquefactions in Nanbao Golf Course during 0206Meinong Earthquake," Website:http://news.ltn.com.tw/news/life/breakingnews/1597276, 2016.

129

The International Journal of Organizational Innovation Vol 9 Num 1 January 2017 - Section C.

Mandel, J., "Conditions de Stabilite et Postulat de Drucker," In Rheologie et Mechanique des Sols (Edited by J. Kravtchenko and P. M. Sirieys), Springer, 1966.

Moh, Za-Chieh, Hwang, Richard N., Ueng, Tsou-Shin and Lin, Meei-Ling, "1999 Chi Chi Earthquake of Taiwan," Website: http://www.maa.com.tw/common/publications/2000/2000-037.pdf

Molemkamp, F., "Comparison of Frictional Material Models respect to Shear Band Initiation," Géotechnique, Vol. 35, No. 2, pp. 127-143, 1985.

Pixnet, "The Tenth Anniversary of 921: After Rain Comes Sunshine," website: http://crazeroost.pixnet.net/ blog/post/, 2010.

Rice, J. R., "The Localization of Plastic Deformation," in Theoretical and Applied Mechanics (Proceedings of the 14th International Congress on Theoretical and Applied Mechanics, Delft, 1976, ed. W.T. Koiter), NorthHolland, Amsterdam, Vol. 1, pp. 207-220, 1976.

Rudnicki, J. W. and Rice, J. R., "Conditions for the localization of deformation in pressure-sensitive dilatants materials," Journal of the Mechanics and Physics of Solids, Vol. 23, pp. 371-394, 1975.

Seed, H. B., "Design problems in soil liquefaction." Journal of Geotechnical Engineering, ASCE, 113(8), 827-845, 1987.

Seed, R. B. and Harder, L. F., Jr., "SPT-based analysis of cyclic pore pressure generation and undrained residual strength." Proceedings, Seed Memorial Symposium, J. M. Duncan, ed., BiTech Publishers, Vancouver, B. C., pp. 351-376, 1990.

Seismic Design Specifications and Commentary of Buildings (Taiwan), 2006.

Seed, H. B., Idriss, I. M., "Simplified Procedure for Evaluating Soil Liquefaction Potential," Journal of the Soil Mechanics and Foundations Division, ASCE, Vol. 97, pp. 1249-1273, 1971.

130

The International Journal of Organizational Innovation Vol 9 Num 1 January 2017 - Section C.

Terzaghi, K., and Peck, R. B., Soil Mechanics in Engineering Practice, Second Edition: John Wiley & Sons, New York, pp. 169-170, 1967.

Tokimatsu K., Yoshimi, Y., "Empirical Correlationship of Soil Liquefaction based on NSPT Value and Fine Content," Soil Foundation, Vol. 23, pp. 56-74, 1983.

Valanis, K. C., "Banding and stability in plastic materials," Acta Mech. Vol. 79, pp. 113-141, 1989.

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The International Journal of Organizational Innovation Vol 9 Num 1 January 2017 - Section C.