EIGHTEENTH ANNUAL PACIFIC-RIM REAL ESTATE SOCIETY CONFERENCE

ADELAIDE, AUSTRALIA, 15-18 JANUARY 2012

THE VALIDATION OF THE RATING FOR SUSTAINABLE SUBDIVISION NEIGHBOURHOOD DESIGN (RSSND) IN BANGKOK METROPOLITAN REGION (BMR), THAILAND

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ABSTRACT

In recent years, the problems resulting from unsustainable subdivision development have become significant problems in the Bangkok Metropolitan Region (BMR), Thailand. Numbers of government departments and agencies have tried to eliminate the problems by introducing the rating tools to encourage the higher sustainability levels of subdivision development in BMR, such as the Environmental Impact Assessment Monitoring Award (EIA-MA) and the Thai's Rating for Energy and Environmental Sustainability of New construction and major renovation (TREES-NC). However, the EIA-MA has included the neighbourhood designs in the assessment criteria, but this requirement applies to large projects only. Meanwhile, TREES-NC has focused only on large scale buildings such as condominiums, office buildings, and is not specific for subdivision neighbourhood designs. Recently, the new rating tool named "Rating for Sustainable Subdivision Neighbourhood Design (RSSND)" has been developed. Therefore, the validation process of RSSND is still required. This paper aims to validate the new rating tool for subdivision neighbourhood design in BMR. The RSSND has been validated by applying the rating tool to eight case study subdivisions. The result of RSSND by data generated through surveying subdivisions will be compared to the existing results from the EIA-MA. The selected cases include of one "Excellent Award", two "Very Good Award", and five non-rated subdivision developments. This paper expects to prove the credibility of RSSND before introducing to the real subdivision development practises. The RSSND could be useful to encourage higher sustainability subdivision design level, and then protect the problems from further subdivision development in BMR.

Keywords: Rating tool, subdivision development, neighbourhood design, sustainability, Bangkok Metropolitan Region, validation

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INTRODUCTION

Sustainable design has now become a goal of several development activities including the subdivision developments in the Bangkok Metropolitan Region (BMR), Thailand. The sustainable designs will take the responsibility for balancing long term social activities, economic, and environmental for each developments' stakeholder. Therefore, the design rating tools are the broad methods to encourage the higher sustainability levels of subdivision development. Rating tools can provide an effective framework for assessing the design performance, set the sustainable design priorities and goals, develop appropriate sustainable design strategies, and measures to guide the sustainable design during the development processes (Ali and Al Nsairat, 2009, Reed et al., 2009).

To date, BMR has introduced the numbers of the rating tools such as the Environmental Impact Assessment Monitoring Award (EIA-MA) and the Thai's Rating for Energy and Environmental Sustainability of New construction and major renovation (TREES-NC). However, the EIA-MA has included neighbourhood designs in the assessment criteria, but this requirement applies to large projects only. Meanwhile, TREES-NC has focused only on large scale buildings such as condominiums, office buildings, and is not specific for subdivision neighbourhood designs (Rinchumpoo et al., 2010).

According to the existing situation of sustainable rating tools for subdivision neighbourhood design in the BMR, the BMR still needs an appropriate sustainable rating tool for subdivision neighbourhood design, because the existing sustainable rating tools still have two practical problems.

Firstly the tools do not cover all components of the development. Most of them focus on large scale buildings such as condominiums, office buildings, commercial buildings, hotels, industrial buildings, but doesn't include the neighbourhood design features.

The second problem is that the current tools were created by government departments or government agencies, and have been developed from conservation viewpoints. They have not been fully accepted by developers who are concerned about their investment cost and economic returns. Many developers do not believe the existing standards will be useful to their firms. Some have attempted to avoid implementing sustainable standards through illegal methods or just complying with as little as possible.

There is continuing research studies about the development of new sustainable rating tool for subdivision neighbourhood design in BMR. The purpose rating tool which is introduced in this study is referred to as "Rating tool for Sustainable Subdivision Neighbourhood Design (RSSND)" (Rinchumpoo et al., 2010). The RSSND aims to encourage the high level sustainability on the subdivision neighbourhood developments. Meanwhile, the eco-efficiency is one of the well-known sustainability indicator, which promotes the high value of the product design whilst reducing the environmental impact (Huppes and Ishikawa, 2005, Lehni and Pepper, 2000). Therefore, the RSSND adopts the eco-efficiency principle to be the rating tool development approach. The RSSND's development process commenced by the developing of the eco-efficiency model of subdivision neighbourhood design in BMR, and then recruited the weighting of each design items by simplified significant value of each design variable of the model, into the practicable rating tool. However, the RSSND cannot achieve the credibility if it does not provide a robust, evidence-based approach, which is accessible to practitioners of actual subdivision developments.

This paper is the continuous study from the research on the RSSND's development. The RSSND has been developed toward the eco-efficiency model from the quantitative survey data of 50 actual subdivision developments in BMR. There were 32 design indicators which were divided into 4 categories of subdivision neighbourhood design items. This paper aims to present the validation results between the existing voluntary rating tool and the RSSND in BMR. The existing voluntary rating tool of this study is the Environmental Impact Assessment Monitoring Award (EIA-MA). The RSSND will be tested by attempting to measure the sustainability level under different subdivision neighbourhood conditions through a case study methodology. The validation process will be applied on 8 case studies of subdivision in BMR. The selected cases include of one "Excellent Award", two "Very Good Award", and five non-rated subdivision developments. The result of each case study will be compared to the existing rating result of EIA-MA. The validation result expects to prove the credibility of RSSND before introducing to the real subdivision development practices. The RSSND could be useful to encourage higher sustainability subdivision design level, and then reach the goal of sustainable subdivision development in BMR.

Subdivision neighbourhood design

The term "neighbourhood" has the basic meaning of neighbours' district or the district of local peoples or residents. The neighbourhood is the place that supports the social activity of the residents (Barton, 2000 p. 4, Choguill, 2008). Authors have broadly defined "neighbourhood designs" as the design components of community and residents living support, including project characteristic, recreation area, social facilities, and transportation system (Warrick and Alexander, 1998, Benefield, 2009).

The concept called "neighbourhood unit" presented by Perry (1929) is well known as a blueprint for residential neighbourhood designs, which is influential today and for the future (Biddulph, 2007). The design concepts of Perry (1929) focuses on the importance of neighbourhood centre, such as community school, and should be located at the centre of the community and could be assessed without crossing a main street. The density of residential units per neighbourhood area should be suitable to their social facilities such as community centre, sport facilities and playground. In addition, the design of internal streets should concern both pedestrian safety and aesthetic purposes. Moreover, the neighbourhood should dedicate enough space for recreation open space such as park, lake and other community activity areas (Lawhon, 2009, Perry, 2007). Recently, Choguill (2008) introduced the new idea about sustainable neighbourhood design by the combination of several the design theories. The sustainable neighbourhood should achieve economic, social, technical and environmental sustainability. However, the details of design components are almost similar to design concept of Perry (1929), which consider neighbourhood size, suitable location of community school and community centre to encourage walking rather than motor vehicles, clear boundaries for safety and sense of community, appropriate social facilities and services, good condition of internal street design and the minimisation of their major intersections, and provide the open space for a variety recreation activities for the residents (Warrick and Alexander, 1998, Blair et al., 2004, Asabere and Huffman, 2009, Foltête and Piombini, 2007).

Moreover, the word of residential land subdivision refers to the division of a lot, tract, or parcel of land into two or more lots for the residential or housing development purposes (Emerson and Coleman, 2008, Royal Thai Government, 2000). Meanwhile, the components of land-use in each land subdivision development are roughly divided into saleable and non-saleable area. The saleable area means the total area of by-product of residential subdivision developments. In BMR, the saleable by-products normally consist of land and the dwelling within the saleable lot. On the other hand, the non-saleable area is normally practicable for the public area which includes recreation areas, social facilities, and transportation infrastructure (REIC, 2009b, Tangmatitham, 2010, Piputsitee and Kittikunaporn, 2006). Therefore, the area of subdivision neighbourhood in this study applies to the non-saleable or public areas which are designed for support the residents' activities within the subdivision project developments. These conclusive ideas demonstrate that there are 4 categories of subdivision neighbourhood designs; neighbourhood characteristics, recreation features, social facilities, and transportation infrastructure designs. The design items from each category will be used as the indicators in the RSSND. More detail of each indicator will be provided in a further section of this paper.

The eco-efficiency principle

The term eco-efficiency has been promoted by the World Business Council for Sustainable Development (WBCSD) since 1992. The meaning of eco-efficiency is the ratio of the product or service value according to its environmental impact (Sorvari et al., 2009, Lehni and Pepper, 2000). The eco-efficiency is also a suitable sustainability indicator for developments, especially the developments which are related to the business activities (Shonnard et al., 2003, Boonmee, 2005, Li et al., 2010).

However, many researchers used eco-efficiency in a wide variety of meanings and definitions depending on the application or background of the researchers. Huppes and Ishikawa (2005) identified four eco-efficiency definitions from different objectives as follows.

- The environmental productivity eco-efficiency defines by the ratio of product value by its environmental impact.
- The environmental intensity eco-efficiency defines by the ratio of environmental impact by unit of product value.
- The environmental improvement cost eco-efficiency defines by the ratio of value of the product by the unit of environmental improves.
- The environmental cost-effectiveness defines by the ratio of environmental improvement cost per unit of the production.

Meanwhile, Sorvari et al. (2009) reported the results of their study in eco-efficiency in land development in Finland. The eco-efficiency indicator was promoted as the developed tools, guidelines, and methods to assess the product design sustainability. The life cycle assessment (LCA) technique was applied to estimate the environment impact. Moreover, Thitisawan (2009) examined eco-efficiency indicators to materials selection in public buildings of the middle tier single detached house projects in BMR. The eco-efficiency of each material was calculated by the ratio of post occupancy evaluation points with simplified materials life cycle impact. The results were presented in a prioritised format and suggested guidelines for architects to select the materials which support the appropriate function, low maintenance cost, and attractiveness from the users' opinion with those materials that emit less impact to the environment. However, the study reported that there were a lot of problems in calculating the LCA in BMR due to lack of calculation data-bases.

On the other hand, the environmental impact of subdivision neighbourhood design can be present in terms of consumption expenditure of their project (De Groot, 2006, Therapong, 1997). Helfand et al. (2006) indicated the strong relationship between water, energy and other resources with operation and maintenance cost of landscape condition. This idea was supported by Newton et al. (2009), this study suggested the new approach of eco-efficiency assessment by the ratio of products value by their resources expenditures.

This paper applies the eco-efficiency model of subdivision development to develop the RSSND for subdivision developments in BMR. In line with the eco-efficiency definitions from Huppes and Ishikawa (2005) and the problems of LCA calculation, this study proposes to develop the eco-efficiency model in the realm of environmental improvement cost. Therefore, the eco-efficiency model in this study will be formulated by the ratio between property viability (price – cost) attributable to subdivision neighbourhood designs by their operation and maintenance expenses.

In summary, the concept of the eco-efficiency consists of the principle concerning the economy and sustainability of development. Thus, this study expects that the RSSND which has been developed under the eco-efficiency principle can satisfy all stakeholders of subdivision development industry. However, the RSSND still needs the credibility assessment process before being introduced to professional subdivision development practices.

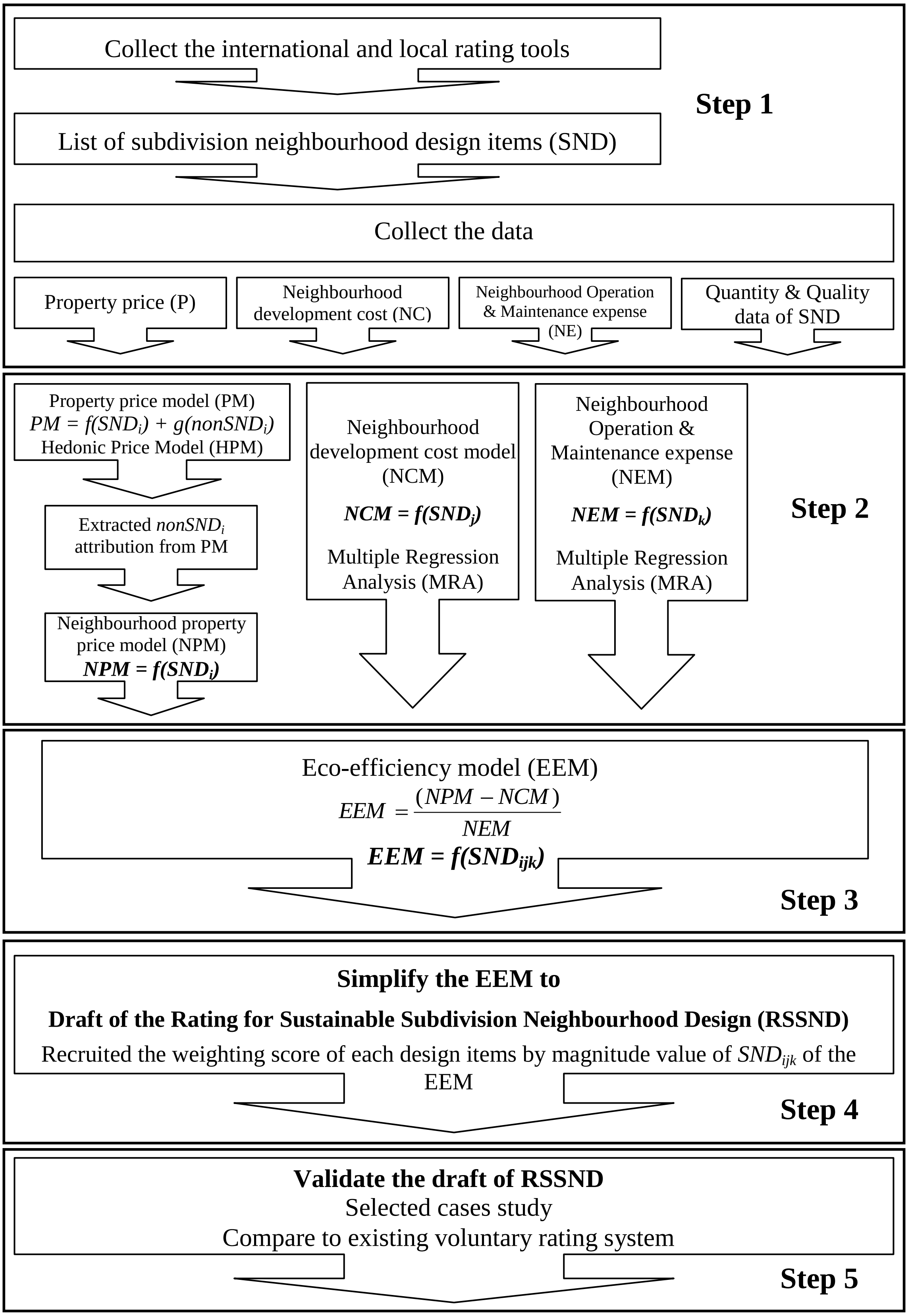

Figure 1: The development of Rating for Sustainable Subdivision Neighbourhood Design (RSSND) framework; Source: Created by the authors

The environmental impact assessment (EIA) and EIA Monitoring Award (EIA-MA)

The environmental impact assessment (EIA) is one of the most essential regulations for control the environment quality of the project development. For Thailand, EIA has been established under National Environmental Quality Act, B.E. 2535, Office of Natural Resources and Environmental Policy and Planning (ONEP), Ministry of Natural Resources and Environment since 1992 (Tongcumpou and Harvey, 1994). Subdivision developments, with a development area larger than 160,000 m^2 or more than 499 lots, have to submit the EIA report for approval from the experts' committee before the start of their project development. There are 7 major items related to landscape features: water consumption system, wastewater treatment system, water drainage system, municipal waste management, transportation system, electrical system, and fire protection system. However, the EIA report presents details of project site, location and existing condition of landscape and community. In addition, the survey of people's opinion surrounding the project area will be included into the report (Royal Thai Government, 1992, ONEP, 1999).

Moreover, ONEP has promoted the sustainable rating tool to reward for top quality subdivision developments. The Award called EIA Monitoring Award (EIA-MA) which is rated for two levels, the "Excellence Award" and the "Very Good Award". The Award scores the performance of subdivision design by following the EIA report's indicators; most of them focus on natural conservation and environmental impacts for both of buildings and neighbourhood design elements. The Excellence Award is provided to the projects where the total score is not less than 90 %, while the Very Good Award will be provide for the project that achieves a total score not less than 85 %. At present, the EIA-MA is the most powerful voluntary rating tool for motivating higher sustainable subdivision development in BMR. Nevertheless, the EIA-MA is limited to only projects under the EIA scope there is still a need for another appropriate rating tool encouraging the high level of subdivision neighbourhood development in BMR (ONEP, 2010, Kridakorn Na Ayutthaya and Tochaiwat, 2010).

The Rating for Sustainable Subdivision Neighbourhood Design (RSSND)

The RSSND is developed under the eco-efficiency principle. There are 5 steps of the RSSND development processes. The RSSND development framework is illustrated in Figure 1. Therefore, this study is the last step of the development process.

Based on the initial stage of this research study, the 32 RSSND indicators were divided into 4 categories. The details of RSSND indicators are described in Table 1.

Table 1: The details of the indicators of the rating for sustainable subdivision neighbourhood design (RSSND)

Categories	RSSND indicators	Abbreviations	Maximum weight scores
Neighbourhood characteristics	Number of property lots (Unit)	*LN*	1.0
	Land-use diversity index	*LUDI*	14.0
	Property unit per project area (U/1,000-m^2)	*PUA*	7.0
	Multi dwelling type		
	– Number of dwelling types	*NDT*	3.5
	– Duplexes ratio (%)	*DPR*	5.5
	– Townhouses ratio (%)	*THR*	5.5
	Neighbourhood identity design		
	– Number of dwelling design	*NDD*	6.5
	– Number of public art	*NPA*	6.0
	Other special design		
	– Underground electrical line	*UEL*	5.5
Recreation features	Park design		
	– Park area (1,000-m^2)	*PA*	4.5
	– Park shape as rectangular shape	*PS*	5.0
	– Park design as centralised park	*PD*	5.5
	– Park service capacity (Unit)	*PSC*	11.0
	– Park location: at middle ratio (%)	*PaM*	6.0

Table 1: The details of the indicators of the rating for sustainable subdivision neighbourhood design (RSSND) (continue)

Categories	RSSND indicators	*Abbreviations*	Maximum weight scores
Recreation features (continue)	Lake design		
	– Lake area (1,000-m^2)	*LA*	5.5
	Greenery features		
	– Mature trees density (MT/m^2)	*MTD*	5.5
	– Native plant ratio (%)	*NPR*	6.0
Social facilities	Existed of the facilities in the subdivision		
	– Clubhouse	*CH*	4.5
	– Swimming pool	*SP*	3.0
	– Tennis court	*TC*	3.0
	– Children playground	*PG*	4.5
	– Wastewater treatment plant	*WTP*	5.5
Transportation system designs	Infrastructure area (1,000-m^2)	*IA*	8.5
	Connectivity index	*CI*	8.5
	Traffic circulation		
	– Gridiron ratio (%)	*GCR*	5.5
	– Cul-de-sac ratio (%)	*CCR*	6.0
	Transportation capacity		
	– Width of right of way at major street (m)	*MjROW*	3.0
	– Width of right of way at minor street (m)	*MnROW*	4.5
	– Width of major street (m)	*MjSW*	4.0
	– Width of minor street (m)	*MnSW*	4.0
	– Width of walkway at major street (m)	*MjWW*	3.5
	– Width of walkway at minor street (m)	*MnWW*	3.5
Grand total scores			**175.0**

According to the information of RSSND indicators in Table 1, there are 3 indicators that need more explanation, the land-use diversity index (*LUDI*), park service capacity (*PSC*), and the connectivity index (*CI*).

Firstly, the land-use diversity index (*LUDI*) refers to the measurement of land-use variety in the subdivision. *LUDI* could be calculated by the Equation [1] below.

$$LUDI = -\sum_{k=1}^{K}(P_k)\ln(P_k) \qquad [1]$$

Where P_k is the proportion of the area dedicated to land use k in the subdivision. The larger value of *LUDI* indicates a more diverse land-use (Baranzini and Schaerer, 2007, Poudyal et al., 2009, Geoghegan et al., 1997). This study presents the 3 land-use types which are saleable area, recreation area, and infrastructure area.

Next, the park service capacity (*PSC*) is represented the number of properties which are located within 300 m. from the largest neighbourhood recreation park.

Lastly, the connectivity index (*CI*) is the measurement to quantify the street way connectivity. CI could be calculated by the Equation [2] below.

$$CI = \frac{SN}{IN} \qquad [2]$$

Where *SN* is the segment numbers, and *IN* is the intersection number of the street network in subdivision. A higher number of *CI* means that travellers have increased the route choice (Ewing, 1996, Matthews and Turnbull, 2007).

The indicator presents the highest maximum score for *LUDI* as 14.0 points, and then *PSC* is followed by 11.0 points. On the other hand, the number of property lots (*LN*) is the lowest maximum score at 1.0 point. These scores can represent the significance of subdivision neighbourhood design items. Moreover, the grand total RSSND score is 175.0 points and can be presented into 5 RSSND levels, which is shown in the Table 2 below.

Table 2: The RSSND score criteria, and definitions

RSSND level	RSSND score criteria	Definition
RSNSD-5	≥ 145	The highest level which refers to the very high eco-efficiency level of the subdivision neighbourhood design.
RSNSD-4	130.0 – 144.9	The level which refers to the high eco-efficiency level of the subdivision neighbourhood design.
RSNSD-3	115.0 – 129.9	The level which refers to the moderate eco-efficiency level of the subdivision neighbourhood design.
RSNSD-2	100.0 – 114.9	The level which refers to the low eco-efficiency level of the subdivision neighbourhood design.
RSNSD-1	< 100.0	The lowest level which refers to the very low eco-efficiency level of the subdivision neighbourhood design.

However, the RSSND-5 is the highest level from the very high eco-efficiency level which reflects the high of property viability which generates the low level of operation and maintenance (O&M) expense. Meanwhile, the RSSND-1 is represents the very low eco-efficiency level, it could mean that the design supports low property viability, with high O&M expense, or high property viability but very high of O&M expense.

METHODOLOGY

This study is the validation process of the new RSSND tool. This study attempts to measure the subdivision neighbourhood sustainability design of actual development projects under different conditions. The case study methodology is applied for validating 8 subdivision-case studies. The RSSND will be tested by comparing the results to the EIA-MA; and establishing the information needed to provide strong assessments of the creditable supporting to the new rating tool. The selected case studies include of one "Excellent Award", two "Very Good Award", from the EIA-MA announcement, and five non-rated subdivision developments. The detail of selected case studies will be briefly provided in the next section.

Case study summaries

The selection of case studies was also determined by practical considerations. All selected case studies were the actual development projects around Bangkok Metropolitan Region (BMR). BMR consists of the Bangkok Metropolitan Area (BMA), the capital city of Thailand, and its 5 adjacent provinces which are Nontha Buri, Pathum Thani, Samut Prakan, Nakhon Pathom and Samut Sakhon (REIC, 2009a, Sheng, 2002). Because of the project location is not the critical criteria; therefore, this study intended to select the cases on different project sizes and the currently rating result from EIA-MA. However, because of the result of this study might be affected by the business image of the developers, the names and locations of case studies cannot be published. The data employed in this study, received the permission from the developers and/or the Department of Land, Ministry of Interior. The details of selected case studies will be presented in Table 3.

Table 3: The details of selected case studies

N	Project size	Project area (1,000-m^2)	Number of property lots (Unit)	Existing rating
P1	Large size[a]	261.30	1,064	EIA-MA – Excellent Award
P2	Large size	138.28	501	EIA-MA – Very Good Award
P3	Large size	544.18	905	EIA-MA – Very Good Award
P4	Large size	260.05	463	Non-rated
P5	Medium size[b]	62.04	211	Non-rated
P6	Medium size	65.14	98	Non-rated
P7	Small size[c]	16.52	49	Non-rated
P8	Small size	7.86	40	Non-rated

Note: [a] Large size projects are the subdivisions which project area ≥ 160,000 m^2 or lot numbers ≥ 500 lots
[b] Medium size project are the subdivision which 160,000 m^2 > project area ≥ 32,000 m^2 or 500 lots > lot numbers ≥ 100 lots
[c] Small size project are the subdivision which project area < 32,000 m^2 or lot numbers < 100 lots

Moreover, all selective case studies were approved subdivision developments under the Land Subdivision Act, B.E. 2543. Additional extension information of the selected case studies will be presented as follow.

Project P1: The EIA-MA – Excellent Award

This project is located at Pathum Thani province which is located directly north of BMA. This subdivision is large size project; therefore the EIA report was submitted as required under the National Environmental Quality Act, B.E. 2535. The developer is not a listed company in the Stock Exchange of Thailand (SET) (SET, 2010), but received many of awards from the development, especially the Excellent Award of EIA-MA nominated by Office of Natural Resources and Environmental Policy and Planning (ONEP), Ministry of Natural Resources and Environment. There are 3 mix-dwelling types, Single Detached House (SDH), Duplexes (DP), and Townhouses (TH). The range of property prices are about 3,500,000 – 8,000,000 Baht, while lot sizes are between 80 m^2 – 480 m^2, and completed design of recreation features, social facilities, and sufficient transport system design.

Project P2: The EIA-MA – Very Good Award-1

This project is located at on east side of BMA. This subdivision is a large sized project; therefore the EIA report was submitted as required under the National Environmental Quality Act, B.E. 2535. The developer is a listed company in the Stock Exchange of Thailand (SET) (SET, 2010), received the Very Good Award of EIA-MA nominated by Office of Natural Resources and Environmental Policy and Planning (ONEP), Ministry of Natural Resources and Environment. There is only 1 dwelling types of SDH. The range of property prices are about 5,600,000 – 19,000,000 Baht by different dwelling design and location, while lot sizes are between 240 m^2 – 720 m^2, and completed design of recreation features, social facilities, and sufficient transport system design.

Project P3: The EIA-MA – Very Good Award-2

This project is located on east side of BMA close to the Suvarnabhumi Airport or New Bangkok International Airport. This subdivision is large size project; therefore the EIA report was submitted as required under the National Environmental Quality Act, B.E. 2535. The developer is the listed companies in the Stock Exchange of Thailand (SET) (SET, 2010), received the Very Good Award of EIA-MA nominated by Office of Natural Resources and Environmental Policy and Planning (ONEP), Ministry of Natural Resources and Environment. There is only 1 dwelling types of SDH. The range of property prices are about 5,500,000 – 7,300,000 Baht by different dwelling design and location, while lot sizes are between 240 m^2 – 320 m^2, and completed design of recreation features, social facilities, and sufficient transport system design.

Project P4: The large size – Non-rated

This project is located at Nontha Buri province, which is located directly northwest of BMA. This subdivision is large size project; therefore the EIA report was submitted as required under the National Environmental Quality Act, B.E. 2535. The developer is a listed company in the Stock Exchange of Thailand (SET) (SET, 2010), but did not receive any award. There is only 1 dwelling types of SDH. There are the completed designs of recreation features, but lack of some social facilities such as swimming pool and tennis court. However, the transport system has been sufficiently designed.

Project P5: The medium size – Non-rated-1

This project is located at west side of BMA. This subdivision is medium size project; therefore the EIA report was not required under the National Environmental Quality Act, B.E. 2535. The developer is a listed company in the Stock Exchange of Thailand (SET) (SET, 2010), but did not receive any award. There are 2 mix-dwelling types of SDH and DP. The average price of SHD is 2,550,000 Baht, while average price of DP is 2,300,000. There is no lake within the subdivision, a lack of some social facilities such as tennis court, and wastewater treatment plant. However, the transport system has been sufficiently designed.

Project P6: The medium size – Non-rated-2

This project is located at east side of BMA. This subdivision is medium size project; therefore the EIA report was not required under the National Environmental Quality Act, B.E. 2535. The developer is a listed company in the Stock Exchange of Thailand (SET) (SET, 2010), but did not receive any award. There is only 1 dwelling types of SDH. There is the no lake within the subdivision, a lack of some social facilities such as swimming pool, tennis court, and wastewater treatment plant. However, the transport system has been sufficiently designed.

Project P7: The small size – Non-rated-1

This project is located at south side of BMA. This subdivision is small size project; therefore the EIA report was not required under the National Environmental Quality Act, B.E. 2535. The developer is not a listed company in the Stock Exchange of Thailand (SET) (SET, 2010), did not receive any award. There is only 1 dwelling types of SDH. There is the no lake within the subdivision, limited-use of the park, a lack of some social facilities such as swimming pool, tennis court, and wastewater treatment plant. The transport system has met the minimum requirement of standard design.

Project P8: The small size – Non-rated-2

This project is located at south side of BMA. This subdivision is small size project; therefore the EIA report was not required under the National Environmental Quality Act, B.E. 2535. The developer is not a listed company in the Stock Exchange of Thailand (SET) (SET, 2010), did not receive any award. There is only 1 dwelling types of TH. There is no lake within the subdivision, and limited-use of the park, no voluntary social facilities. The transport system has met the minimum requirement of standard design.

RESULTS

This study presents the comparison of subdivision neighbourhood design rating from RSSND and the existing rating result from EIA-MA. The rating results will be present in Table 4 below.

Table 4: The rating results of selected case studies

Project number	Project size	Existing rating	RSSND score	RSSND rating
P1	Large size	EIA-MA – Excellent Award	150.5	RSSND-5
P2	Large size	EIA-MA – Very Good Award	131.5	RSSND-4
P3	Large size	EIA-MA – Very Good Award	136.3	RSSND-4
P4	Large size	Non-rated	124.7	RSSND-3
P5	Medium size	Non-rated	120.0	RSSND-3
P6	Medium size	Non-rated	121.3	RSSND-3
P7	Small size	Non-rated	105.3	RSSND-2
P8	Small size	Non-rated	115.2	RSSND-3

The rating results of RSSND in Table 4 found that there is only project P1 that received the RSSND-5 with the highest scores at 150.5 points. Moreover, there are 2 projects that achieved the RSSND-4 which are projects P3 and P2, with the scores at 136.3 points and 131.5 points, respectively. Meanwhile, there are 4 projects at the RSSND-3, only 1 project rated at the RSSND-2 while there was no project at the RSSND-1.

The comparison to the existing rating found that the RSSND-5 of project P1 is compatible to the EIA-MA – Excellent Award, while the 2-projects of the RSSND-4 are also synchronized to EIA-MA – Very Good Award. However, among the 5 non-rated projects the results are divided into 2 rating levels. However, there is not any project rated at the RSSND-1, this is because the RSSND-1 is represented to the under design standards. All of the selected projects received the development approval from the Department of Land, Ministry of Interior, thus there are none rated as fail.

The results present that the large size projects will get the higher scores compare to the medium and small size projects. This is because the large size projects have to undertake the EIA report under the National Environmental Quality Act, B.E. 2535. The Act mandates the large size projects have to prepare the ultra-subdivision neighbourhood design items compared to the normal subdivision development standards, such as the flood control reservoir – normally present in format of a lake for the recreation area, wastewater treatment plant, neighbourhood school – it normally convert to the park or other green area if the school cannot be founded. All of the extra design items will be generated high level of property viability (Jones et al., 2009, Jim and Chen, 2006, Hui et al., 2007, Troy and Grove, 2008), thus reflect to the higher value of the eco-efficiency and RSSND score.

Moreover, the comparison between small medium and small size projects found that the medium size project achieved a higher score. The strong reason to support the result is the completely of social facilities, and the sufficiency of transport system design. Both of medium size projects (include the large size projects) provided the higher and more complete social facilities and transport system design, thus they also support the high level of property viability (Benefield, 2009, Southworth and Ben-Joseph, 2004, Grammenos and Tasker-Brown, 2010, Matthews and Turnbull, 2007), and then reflect to the higher value of the eco-efficiency and RSSND score.

Finally, the results of the rating attempting and comparison imply that the RSSND is significantly consistent to the EIA-MA. Because of the design indicators of RSSND are based on the indicators from EIA-MA. However, the EIA-MA has the limitation on scope of involving projects, it limited to only large size projects only, while the RSSND can cover to all size of the subdivision developments. Thus, the RSSND as the new rating tool will be useful to the subdivision development practice.

CONCLUSION

This study aims to prove the credibility of new rating tool, RSSND by the validation on the case studies methodology. The validation of 8 selected subdivision developments around BMR presents the valuable results. The results support that the RSSND is a robust, reliable, and flexible to apply for the all range of subdivision development sizes. The projects that have been awarded in the two existing top rating categories are consistent with the outcome calculated from the RSSND. The results also present the consistency between the existing design standard (EIA designs criteria) and the design items of the RSSND. Moreover, the RSSND can be used to all type of development sizes such as projected that classified as non-rated can be rated to RSSND-1 to RSSND-5. In conclusion, this study is fully confident to introduce the RSSND to the profession subdivision neighbourhood design practice. The RSSND will be solved the lacking of appropriate rating tool, and expect to be increase the sustainability level to the subdivision developments in the Bangkok Metropolitan Region (BMR), Thailand.

Acknowledgements

This paper is developed from a research study of School of Urban Development, Queensland University of Technology, Brisbane, Australia. The first author would also like to thank Thammasart University, Thailand on the scholarship during this study. Moreover, the authors would like to provide special thank for the Department of Land, Ministry of Interior, and all of survey participants.

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