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"Standard Model" approach to building projects in the UK and potential role of project team to mitigate any local difference～from international developer's perspective

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Abstract

In order to improve the sustainability and smart construction, it is discussed arguably that developing and applying consistent "standard model" to plan business, design, construct and operate a building is considered to be one of the effective and efficient approach.

The scope of this article is to examine, from the international developer's perspective, the "standard model "approach of a hotel brand to building projects in the UK, and also to explore potential role of project team to mitigate any local difference at the project level. These projects are developed by the same developer adopting the same business plan, design and operation to each project. In order to clarify the actual and likely difference in construction results, reference is also made to those building projects located in other geographical markets including Japan, Germany and USA, and focus is given on the analysis of its programme and cost.

Principle findings are that there exists geographical difference especially in environmental and planning system, and that major local difference is found at least in the programme at the design stage. In contrast, the difference in the building cost itself may not be necessarily considered major if currency exchange rate being taken into account appropriately. It is also observed that there were cases where any difference in the programme was mitigated by taking different approach to procuring and defining roles of management and professional team at the project level.

In conclusion, from the international developer's perspective, the geographical difference of the "construction system" surrounding building projects can typically lead to major prolongation of programme, however, these different construction results could be mitigated at least to a certain extent by introducing appropriate changes to the role of project team.

Key words: Standard model, Carbon footprint, Conservation, Wind climate, Project team

BACKGROUND, LITERATURE REVIEW and INTRODUCTION

Standard model has been discussed as one of the methods to improve the sustainability and efficiency of construction, however, the approach and number of case studies of those actual challenges and risks at the project level are limited. Therefore, there is an expectation among the developers and clients for a more practical methodology of project management to be developed. For example, Fisher[1] analysed that actual risks perceived by the office developers in the UK are largely "market risks" (such as letting and rent), whereas, Egan report[2] identified instead the systematic problems which lead to actual "construction risks". RICS[3], CIOB[4] and other professional bodies have identified the problems of difference in industry practices and worked out various "standards" how professionals work professionally and ethically. However, Koskela[5] pointed that there is a potential bigger role for the academics to play. Among others, case studies are considered to be an area to be further developed[6], and some of the efforts are seen in several academic and professional journals and conferences.[7,8,9,10]

The objective of this paper is to examine the standard of an international hotel brand to clarify both business and design & construction model, to study the risks of those models in terms of carbon emission, conservation and wind climate within the UK context, then, to measure the impact on the project programme and cost, and to assess the role of project team to mitigate those risks. The measure and methodology of the research is to choose an actual case of a development project in the UK in which the author himself has been involved, to identify the risks, and to suggest possible solutions based on quantitative assessment. Key findings are that risks for a standard model can be seen in environment and planning system such as carbon emissions, conservation and wind climate mainly due to different regulations, and those risks can affect the programme if not cost of the project. One insight from this research is that international developers are taking different management strategy against these risks, however, there is a possibility that appointing a local professional 'deputy" could be one of the effective management options.

1. SUSTAINABILITY and SMART CONSTRUCTION

The problems of project management have been approached largely from three aspect which are to increase the value, reduce the cost and make ease of comparison & compatibility. Those issues around sustainability and smart construction can be approached in the same way, however, in this article, focus is placed on the standard model how it should be developed and applied, based on the analysis of actual projects in the UK, invested, developed and operated by international developers especially in the hotel sector.

1.1 Standard model- Business model

In the hotel sector, each brand has its own brand policy which can be applied to building production cycle of acquisition, concept, design, construction and operation. This brand policy can be a written manual which typically binds all the professionals and construction companies, such as acquisition agent, architect, engineer, contractor as well as operators, and those documents for construction tendering purpose form a part of "employer's requirements, which have the priority over other tender documents including contract, drawing, specification, programme and cost. The extent and depth of brand policy is often detailed to the extent that it is applied to all its brand hotels regardless of difference in geographical location, building, and management team, and even customers. One example of international hotel groups shows that there are many structures and layers how the standard model can be categorized and analysed.

Table 1 –Standard business model

	Category	Examples consisting standard model
1	Ownership	Founders, shareholders and directors are taking leadership and engaged in daily business
2	Partnership	Working with local land owners on long term basis, committed to local council, neighbours for sharing benefits
3	Location	Strong local presense, diversifying globally, focusing on traffic hub with regional develoment opportunity
4	Customer	Corporate, business and tourism customers, either domestic or international, single or family
5	Pricing	Non-fluctuating flat pricing regardless of season and location, web & membership-based booking system
6	Concept	Guest room-focused design and services, with minimum amenity facilities such as meeting room and restaurant
7	Design	Layout to maximise guest room numbers, standardised guest room and common facility, off-site manufacturing
8	Construction	Internal design, construction and maitenance team. Separate constuction sequence for Shell&Core, Fit-out, FFE
9	Services	Wide variety of services including breakfast, laundry, business couter, night gowns, slippers and cosmetics
10	Management	Branch manager-focused recruitment and management supported by central procurement system

Firstly, the scope of standard model is not limited only to design or construction rather it covers all the process of building production cycle. Secondly, the level of standard model can be as detailed as seen in the guest room dimensions. Thirdly, the consistency of standard model is observed as is seen in Japan where most of the hotel branches have same building design including external façade and internal fit out details. Overall the business model as well as operation model are observed to dictate the physical features of the building including location, size, layout and even the external and internal design of both architecture, structural, M&E and other engineering. Interestingly, however, large difference in external façade can be seen in the buildings in France and UK compared to those in Germany, US and Japan. One of the reasons for this is considered to be that the local authority in France or UK has more discretionary power in terms of development and building permit especially around the design of external façade of the buildings , whereas the rules and principles in Germany, US and Japan are considered more prescriptive and written in the laws, codes and regulations. In contrast, the difference in architectural internal layout is considered minor, although some difference related with fire or acoustic regulations (e.g. door width, corridor width, staircase, smoke ventilation, fire hydrant, insulation) is still observed. Further, mechanical and electrical design has wide diversity especially around the energy resource and heating equipment, for example, where the brand policy is to provide electric hot water equipment to each guest room, to which the UK currently imposes tighter CO_2 conversion rate of grid electricity whereas US and Japan have less or almost no compulsory regulations in this area. There was no significant difference in terms of ventilation, air conditioning, water supply or foul or rain water system, although the location of air conditioning condensers is found different (e.g. balcony, each floor, roof, or others) depending on the regulation of external façade as well as the height of the building.

1.2 Standard model approach- Design & Construction model

When the business is considered to be standard model regardless of its geographical location, a question arises whether the building design and construction can or should also be standardised in a particular country or jurisdiction, if so, whether that would contribute to the overall concept of sustainability and smart construction. In particular, the issue for a hotel brand which has coherent standard model spanning from business model, building design, construction and operation, is whether he should pursue its building design standard model in a country where there is wide difference in terms of climate, regulation, building production system and people. In this chapter, a more detailed analysis has been conducted in terms of the physical features of building especially the layout of the buildings. This is because the value of the buildings for this model can be and is calculated simply based on the number of the guest rooms, as the room price for guest rooms does not fluctuate depending on the seasons or booking status(busy or empty occupancy) and it is also almost flat (except for the difference in exchange rate) as the absolute figures compared to other branches of this brand in different global locations (e.g. 60 UK Pound, 60 Euro, 60 US$, 6,000 JPN Yen). Further, there are no income producing facilities with the building other than guest rooms as there are no restaurants, meeting rooms, spas and any other space of amenity or ancillary function, which means that maximizing the number of guest rooms is the highest priority at least for building design (taking into account of course of the effective and efficient construction and operation at later stages).

Table 2: Design & Construction model (Source: UK Planning Portal)

Based on this principle to maximise the number of guest rooms and efficiency rate of the floor area, a study has been conducted on a building of total floor area (GIA) of 7,400m2, typical floor area (GIA) of 322m2 and 23stories high (with no basement). This is essentially to define the minimum size of the guest room and to maintain the minimum width of corridor based on the I shape layout as above. In this model, the width of guest room is 2.85m dictated by the width of guest room door(1.0m) and unit-bath pod (1.7m), and length is either 4.5m (single room), 5.0m (double room) or 5.5 m (twin room) dictated by the width of bed (1.6m), desk (0.45m), chair (0.75m) and unit-bath pod (1.5m), likewise the floor to floor height is 2.85m dictated by the height of unit-bath pod and minimum clearance above the unit-bath pod for supply & drainage pipes, ventilation and electric heater. From structure aspect, this will create a concrete shear wall and flat slab (200mm thk) system, with one staircase for fire escape route maintaining minimum escape route length, with minimum one lift for firefighting lift together with smoke ventilation and fire hydrant system incorporated within the lift lobby, coupled with one or two more passenger lifts. From acoustic perspective, internal partition walls are either concrete shear walls of 175 mm or metal stud and double plaster boards of total 150mm thick with thermal and sound insulation, floor is concrete with steel trowel finish covered by tile carpets, and wall is covered by the cloth or paint, ceiling is suspended and covered by plaster boards with cloth or paint finish. Overall, this would create a floor plate of 26.5 m length and 12.5 m width, maintaining maximum fire escape length of 15.0m. Total floor area is appx 330.0m2, including total floor area of guest rooms of 250.0m2, efficiency rate is 75.0% at a typical floor. Mechanical and Electrical equipment are installed for each guest room including unit-bath pod, ventilation, air conditioning, electric heater for hot water, so that it is risk-free or risk-less even in the face of natural disasters which might cause damages to the central system requiring all the guest rooms to be closed as not functioning in satisfaction.

2. STANDARD MODEL and ITS CHALLENGES

When implementing standard model, environment and planning system in each country creates another challenge mainly because each project is required to submit detailed planning application to the relevant local authority for approval, although it is rare for the environmental impact assessment to be required for a typical small to medium size building project in the city environment. This is typically the case in the UK where there are less prescriptive regulations around the planning and building regulations for example about the building usage, mass and height, which places almost all international developers in a difficult situation as the bases of assessment are literally the subjective view of the authority.

2.1 Carbon footprint

Providing an individual electric heater with 23kw capacity (for bath and wash basin hot water) for each guest room is the standard brand policy. However, under National Calculation Methodology (NCM) modelling guide (for buildings other than dwellings in England and Wales) which is a model to calculate the CO2 emission for a nominal building, grid supply electricity is treated as Class D fuel oil. This means that CO2 calculation of electric heater system is much higher than gas boiler system, thus it is often the case that gas boiler system becomes the only option to achieve the reduced CO2 emission target as a condition of planning permit unless biomass and other LZC system can be adopted (which is almost impossible within city environment due to lack of supply of those renewable energy sources) . It is expected, however, that review of the CO2 emission of grid supply electricity may be confirmed in 2020 which then reduces the value down to 250 gCO2 eqkWh (similar level to gas boilers) from the current max 550 gCO2eqkWh. The expectation is that CO2 consumption of grid supply electricity will further fall to 100gCO2 eqkWh in 2030, however, this example shows how the regulatory system is uncertain, which makes the implementation of standard approach almost impossible in some cases.

Table 3- Carbon footprint estimates for water heating, Carbon footprint estimates for electric heating technologies (Source: UK Houses of Parliament postnote May2016)

Technology	Footprint range (gCO_2eqkWh)	Number of estimates
Oil boilers	310-550	3
Gas boilers	210-380	6
Gas micro-CHP	220-300 [22]	4
GAHP	150-200 [40]	4
Bio-sourced gases	20-100 [41]	2
Biomass boilers	5-200 (most below 100) [42]	9
Geothermal	10	1
Solar thermal	10-35	6

Technology	Electricity footprint estimate	Footprint range (gCO_2eqkWh)	Number of estimates
Electric heaters	Current (370)	~370	Personal Communication [59]
	Reduced (250)	~250	
	Low (100)	~100	
Ground source heat pumps	Current (370)	70-190	15
	Reduced (250)	50-125	
	Low (100)	20-50	
Air source heat pumps	Current (370)	90-250	11
	Reduced (250)	60-170	
	Low (100)	30-70	

2.2 Conservation

Conservation is one of other challenges which international developers are facing as the level of conservation is largely left to the interpretation and judgement by authority where it is practically impossible to make a good argument based on regulations and even logics. This can be seen in this case where two planning applications have been made in different years for exactly the same building design, which nevertheless led to different conclusion of the permit because of the change of views by conservation officers of the same city council. In this case, the previous property owner has obtained a planning permit in 2013 to build a new 21 stories tower and to renovate the existing building into a hotel, however, he decided not to develop the project and then sold the property to the current owner in 2014. The current owner explored the opportunity to redesign a much taller building of 32 stories however were not able to gain even preliminary consent of the council and the original planning perming has expired in 2017(after 3 years validity period). Eventually, the developer was required to go back to the original design of same height for resubmission. However, that second application was not straight approved because the authority increased the level of conservation of the existing building. As a result, significant amendment of design was needed prior to gaining 2nd approval in 2019. TCPA (Town and Country Planning Act1990, clause 54(a) (repealed by Planning and Compulsory Purchase Act 2004) says that "If regard is to be had to the development plan for the purpose of any determination to be made under the planning Acts the determination must be made in accordance with the plan unless material considerations indicate otherwise." This clause is considered to allow the authority to make their own judgement different from the local plan if material considerations indicate otherwise, as such, some aspects (e.g. conservation) are often treated to be more important than commercial viability of the project, which could lead to a conflict between the conservation and development, unless those are well balanced considering both short-term and long - term merit for the developer, users, neighbours, city councils and other wide stakeholders.

2.3 Wind climate

New challenges within the city environment can also be found around the wind climate as a result of taller and high-density building environment where typical down drafts between buildings cause uncomfortable and dangerous conditions around the neigubouring buildings and streets. This among others will demand standard model approach to subject itself to mediations such as reviews of building direction, height as well as additional canopy and other protection around the entrance and ground floor level. The problem observed is, however, not only the increased demand and sensitivity around the wind climate but also the fact that approach and method of assessing wind climate is not clear as it is expected, and it is often that different approach is used against unreliable data which lead different experts in this area into different conclusions and mitigation advice. As an example, one expert carried out the desk top study and confirmed the requirement of 3m width canopy over the surrounding entire pedestrian pavements, whereas another expert recommended wind test which concluded there is no problems of wind climate even post to the completion of the newly proposed development. In these assessments, however, the question may lie around the interpretation by the expert as well as by the authority who ultimately is required to make decision in terms of acceptability of the wind climate report where it is difficult to identity clear regulations or guidance established in this area.

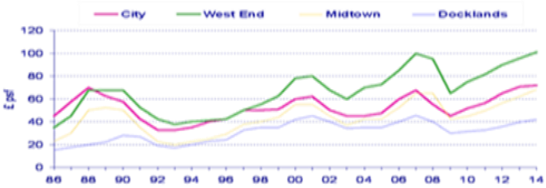
Table 4- Wind tunnel test and its result (Source: microclimate)

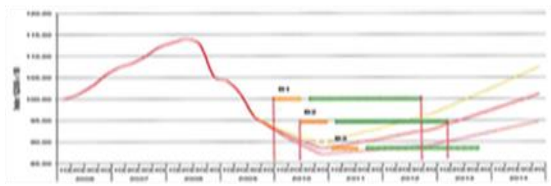
3. IMPACT ON PROGRAMME, COST and PROJECT TEAM

The impact on programme can be analysed from these two aspects, which are standard approach and sustainability challenges. Under the business plan, if the developed building is to be leased to a third party operator, additional risk of programme and cost arise mainly because the lease price fluctuates during the development stage until the developer agrees the lease price with the operator, and third party operation has his own brand policy which needs to be taken into account for design and construction.

This becomes more complicated if the developer owns the leasehold title of the land and not the freehold title, because the leasehold title has the lease period beyond which the rights to the land (and property) will be lost and also the freeholder has a power to intervene in the development and future operation by way of development agreement, license agreement and so forth, which would increase the risk of programme and cost. In this case we examined in this article, however, the business plan for the developer is to acquire the freehold title and to operate the building by itself post to construction completion, therefore no risks associated with these have been observed although the developer shall be left to the direct risk around the future income as that is affected by the room price and occupancy rate and operation cost in the future. As background, this is considered to reflect both economic and social changes since Law of Property Act 1925 where the land ownership and usage are separated in principle, allowing flexibility to the land and stake holders to improve the value, programme and cost.

Table 5 - Rent income in each district in London, Construction cost and forecast- financial crises (Source: K. Tanaka, case study for RICS Assessment. CBRE and Davis Langdon)

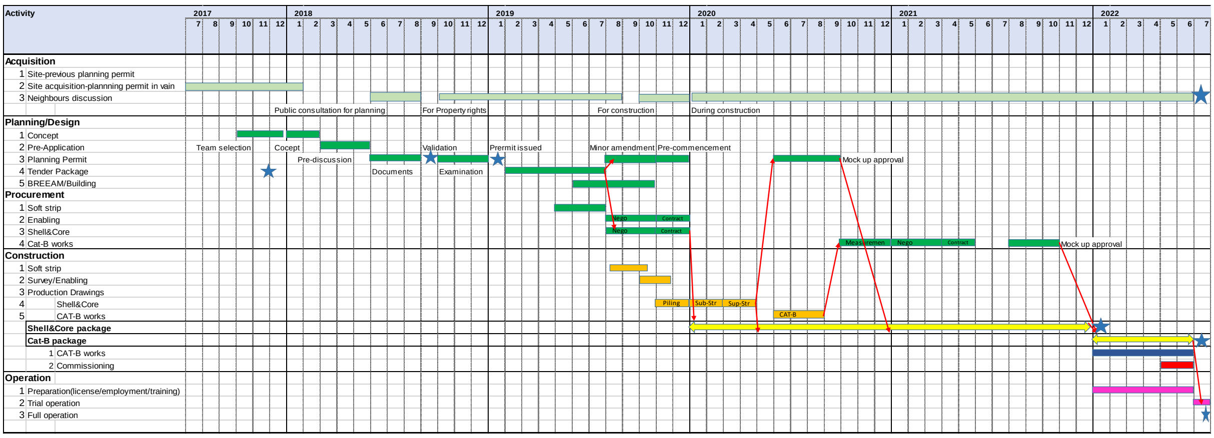




3.1. Programme analysis

Once the project team is set up, it takes two years to obtain planning permit and commence construction (1 year for planning permit, and further 1 year for preparation for construction), whereas the construction takes only 2 years. This is further exacerbated by the risk and fact that the developer may not even be able to obtain planning approval if their approach was not acceptable for the authority, and that obtained approval places conditions to gain further approval of external cladding mockups and other minor amendments. Contrary, planning permit in Japan (Germany and US) is either not required or prescriptive, and building permit is also prescriptive in these countries, which takes in Japan only 9 months (3 months for each design, permission and preparation for construction). Lastly, there is no major difference observed in the construction programme.

Table 6– Building development Programme



3.2. Cost analysis

UK development and design cost are high due to requirement to resolve property rights associated with the neighbours (e.g. rights of light) and heavy involvement in planning process. The statutory fixed fee for architects in Germany is higher, whereas it is less in US and Japan, especially because contractors in Japan (typical D&B contractors) tend to play a bigger role in terms of development and design. In terms of building cost, construction room size is appx 15.3m2, and efficiency rate is appx 0.62, which leads to estimated cost per room of appx £60,000. We do not yet have data of actual construction cost in other countries, however, based on the assumed market construction cost, the building cost is expected to be between US$ 55,400-72,700 per room in these countries.

Table 7– Calculation of cost per room

Calculation of cost per room			UK		Japan		Euro		US	
Assumed Market Construction cost			225	£/sf	1,000,000	JPN/Tsubo	2,250	Euro/m2	2,250	US$/m2
	Local Cost per m2		2,419	£/m2	303,030	JPN/m2	2,250	Euro/m2	2,250	US/m2
	Exchange rate(actual)		1.193		0.009		1.083		1.000	
	US$ Cost per m2		2,952	US$/m2	2,755	US$/m2	2,414	US$/m2	2,250	US$/m2
Assumed Cost per room			59,625	£/room	57,448	£/room	50,333	£/room	46,921	£/room
	Room size(actual)	15.28	7,751,301	JPN/room	7,468,231	JPN/room	6,543,290	JPN/room	6,099,677	JPN/room
	Efficiencey rate(actual)	0.62	65,689	Euro/room	63,290	Euro/room	55,452	Euro/room	51,692	Euro/room
			72,743	US$/room	67,893	US$/room	59,484	US$/room	55,452	US$/room

3.3. Role of project team

There is wide difference between the international developers in terms of their own experience and knowledge both in their sectors and local area. In this analysis, experience and knowledge are categorized into 3 layers of level 1 fundamentals, level 2 demand & supply, and level 3 standards and professionals. Among 5 Japanese developers, 2 Japanese professional developers have level 1&2 experience and knowledge whereas 2 other non-professional Japanese developers do not have in any layer. In contrast, among 5 Asia developers (Singapore, Malaysia, China-HK, China, Taiwan), 4 professional developers have experience and knowledge in 1&2 layers whereas one non- professional developer does not have experience and knowledge in any layer. None of Japanese nor Asia developers have the depth of experience and knowledge in the level 3 layer which is Standard and Professionals.

Table 8 - Developer's experience and knowledge: ○= Yes, ×=No

Japanese Developer / experience&knoweledge	A	B	C	D	E
Level 1: Fundamentals	○	○	○	×	×
Level 2: Demand & Supply	○	△	×	×	×
Level 3: Standards & Professionals	×	×	×	×	×

Asia Developer / experience&knoweledge	F	G	H	I	J
Level 1: Fundamentals	○	○	○	○	×
Level 2: Demand & Supply	○	△	○	○	×
Level 3: Standards & Professionals	×	×	×	×	×

Among 5 Japanese developers, 4 had their management present in the UK, and one did not have any management present in the UK. 3 professional developers appointed PMr either internal or external, or equity partner (or both). One of non-professional developers appointed PMr, and the other did not because it appointed contractors directly. Among 5 Asia developers, all 5 developers appointed PMr either internal or external (or both). Among 5 Japanese developers, A and C managed successfully, B, D and E failed. Among 5 Asia developers, F, G, I and J managed successfully, and H failed.

Table 9 - Developer's contract arrangement of "deputy": ○=appointed, ×not appointed

Japanese Developer	A	B	C	D	E
UK Management	○	○	×	○	○
internal PM	○	○	○	×	×
external PM	×	○	×	○	×
equity partner	○	×	×	×	×
Assessment	○	×	○	×	×

Asia Developer	F	G	H	I	J
UK Management	○	○	×	○	○
internal PM	○	○	×	○	×
external PM	○	×	△	×	○
equity partner	×	×	×	×	×
Assessment	○	○	×	△	○

Table 10 – Developer's contract arrangement of "professional": ○=appointed, ×not appointed

Local Project team	Director	Manager	Architects	Engineer	QS	Workers	Maintenance
Full employment base	○	○	○	○	○	○	○
Mix- Station and Outsource	△	△	△	△	Outsource	Outsource	Outsource
Outsource base	△	○	Outsource	Outsource	Outsource	Outsource	Outsource

There are wide variations observed in terms of the nature of developers, policy of developers, as well as the management of developers. Firstly, there is indication that all developers are willing to establish their status within the local area by appointing "deputy". Secondly, the measures to appoint a "deputy" are diversified, either setting up local subsidiary company, equity partnering with local companies, dispatching an expat director, employ a local manager, or outsource to external professionals. Meanwhile, there is also a tendency that most of new coming developers struggle to establish the right management style, although existing developers seem to have already established their own management style which are however very different between developers. Among existing developers, it is also observed that their management style has changed over the years depending on locations and circumstances. One case is full employment of almost all types of professions and jobs, the other is almost full outsource, although there existed a case of mixture of these two extremes.

CONCLUSION

Issues surrounding sustainability and smart construction are analysed from the aspect of standard model in the hotel sector. The extent of standard is wide covering both "soft" business model and "hard" building model, however, it is observed that there exists a standard model in the market, which is described as brand policy or employer's requirement, occupying important position among and against concept, design, construction and operational documents and procedures. However, implementation of standard model often faces challenges especially from environment and planning system. Detail analysis of carbon footprint, conservation and wind climate is conducted and impact on programme, cost and project team are measured and discussed. In summary, from the international developer's perspective, it can be said that the geographical difference of the "construction system" surrounding building projects can typically lead to major prolongation of programme if not cost, however, these different construction results could be mitigated at least to a certain extent by introducing appropriate changes to the role of project team, especially at least by appointing a professional "deputy" for a building project.

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