Construction Industry Council

Committee on Productivity

Meeting No. 003/16 of the Committee on Productivity (Com-PRO) was held on 27 September 2016 (Tuesday) at 9:30 am at Construction Industry Council Headquarters, 15/F, Allied Kajima Building, 138 Gloucester Road, Wanchai, Hong Kong.

Present:	Christopher LEUNG	(KYL)	Chairman
	Kai-sing KWAN	(KSKn)	for Permanent Secretary for Transport and Housing (Housing)
	Kwok-Kwan NG	(NKK)	
	Tommy NG	(TN)	Association of Consulting Engineers of Hong Kong
	Kam-leung TSE	(KLT)	Architectural Services Department
	Clarice YU	(CYu)	Buildings Department
	Vincent CHEUNG	(VC)	Hong Kong Construction Association
In Attendance:	Miroslaw J. SKIBNIEWSKI		(Presenter)
	Jeff FUNG		(Presenter)
	Wei PAN		(Presenter)
	Zongjin LI		(Presenter)
	Ivan SHAM		(Presenter)
	Colin CHENG	(CC)	Represent for Vincent MAK
	Victor CHAN	(VCh)	Buildings Department
	Ka-Kui CHAN	(KKCh)	The CIC Chairman
	Julian LEE	(JnL)	Senior Manager - Research & Development
	James WONG	(JsW)	Assistant Manager - Research & Development
	Eric SIU	(ES)	Senior Officer – Research & Development

Apologies:	Vincent MAK	(VM)	for Permanent Secretary for Development
	Sze-chun WONG	(SCW)	
	Shujie PAN	(PSJ)	
	Ivan Chin-shing FU	(FI)	
	Ringo SHEA	(RSh)	Hong Kong Federation of Electrical and Mechanical Contractors

PROGRESS REPORT

Action

2.1 **Confirmation of Progress Report of the Previous Meeting**

Members confirmed the notes of Meeting No. 002/16 for the Com-PRO (Paper CIC/PNR/R/002/16) having taken into account minor amendment raised by ArchSD. **All to Note**

2.2 **Investigating the Potential Application of 3D Printing Technology for Construction Supply Chains in Hong Kong**

Professor Miroslaw J. SKIBNIEWSKI from the University of Maryland delivered a presentation on "Impact of Potential Application of 3D Printing Technology on Construction Supply Chains". Four major goals include:

1) Identifying current issues of the Hong Kong's construction industry where the concept of mass customization by leveraging 3D printing technology can be applied;
2) Configuring 3D printing construction supply chain and critical links for Hong Kong;
3) Establishing construction supply chain performance measurement model and key performance indicators of the supply chain; and
4) Examining the risks and recognizing the prospects of applying 3D printing in Hong Kong construction industry.

Professor Skibniewski suggested achieving the above goals through developing a 5-year strategy with case study on fabrication of window frame.

The Chairman suggested that the scope of the consultancy should include a road map for application of the 3D printing technology in the coming 5 years. Professor SKIBNIEWSKI responded that the road map could be demonstrated through the case study.

A member concerned the quality control of the material in application

of the technology. Professor SKIBNIEWSKI quoted that the current 3D printing technology could largely meet client's requirements and be more cost effective with reducing labour to be deployed.

After deliberation, Members proposed that Professor SKIBNIEWSKI should be invited to prepare a proposal for consideration of the committee. All to note

*[**Post-meeting note**: Professor SKIBNIEWSKI submitted a proposal in November 2016. It would be discussed in Agenda no. 2.5.]*

2.3 **Achieving Productivity Leap through Construction Process Re-engineering (CPR)**

Mr. Jeff FUNG form the Hong Kong Productivity Council (HKPC), the Principal Investigator of the consultancy study, introduced the Consultancy entitled "Achieving Productivity Leap through Construction Process Re-engineering (CPR)". The Consultancy would focus on potential productivity improvement measures for three key trades, namely the formwork erecting, rebar fixing and concreting in both private and public projects. The scopes of the work include:

1) Reviewing and scrutinizing the current design and construction practices of the selected trades in Hong Kong;
2) Proposing strategies and alternative designs, construction methods/processes and materials to enhance the productivity of the selected trades;
3) Quantitatively evaluating the productivity enhancement and cost effectiveness of the strategies and measures proposed; and
4) Formulating a short-to-medium term action plan for implementing the proposed strategies and measures to enhance productivity of the selected trades

Mr. Jeff FUNG briefed the methodology to be adopted and the designed work plan for the aforementioned Consultancy.

KKCh opined that HKPC should collaborate with sub-contractors to

collect data through site visits. VC pointed out that HKPC might approach concerned trades associations such as Hong Kong Bar-Bending Contractors Association for data collection.

TN raised the concern about the effect of different construction contract forms and arrangement on the study. HKPC responded that given the tight schedule, the study would mainly focus on the investigation for the selected trades in private and public residential building.

*[**Post-meeting note**: After CIC and HKPC agreeing contract terms regarding liability and insurance of the Consultancy Assignment, the study commenced in November 2016.]* All to note

2.4 **A Comprehensive Productivity Appraisal of the Hong Kong Construction Industry**

Dr. Wei PAN from the University of Hong Kong (HKU), the Principal Investigator of the consultancy study, delivered a presentation on the research progress. Interviews with 32 experts and 21 questionnaire surveys have been conducted. He added that the focus of the study would be placed on the following aspects:

(i) Policy formation;
(ii) Regulatory requirements;
(iii) Planning and design;
(iv) Project management and administration; and
(v) Site construction.

Key drivers and constraints of productivity enhancement in the industry had been identified. Comparison of the findings amongst Hong Kong, Singapore, UK and USA would be covered in the final report. The final report was expected to be issued in May 2017.

KKCh asked whether the high construction cost issue in Hong Kong would be addressed in the study. Dr. PAN replied that they would investigate factors affecting the construction productivity including

construction cost. A case study on a building project would be conducted to verify the study findings.

KKCh furthered whether the construction cost considered in the study would include the cost of site supervision conducted by the employers and clients. Dr. PAN responded that he would investigate the issue.

The Chairman asked about the details of the interviews. Dr. PAN explained that possible drivers and constraints for productivity enhancement was first determined based on literatures review. Then, HKU identified suitable industry stakeholders and conducted interviews and questionnaire surveys to rate the drivers and constraints in priority order.

CYu asked how HKU determined the construction productivity of non-typical building projects. Dr. PAN responded that the information about non-typical building projects was collected from the questionnaire surveys. He would address factors affecting productivity for buildings with non-typical floors in the study.

2.5 **Development of High Modulus Concrete for Tall Buildings**

Prof. Zongjin LI from the Hong Kong University of Science and Technology (HKUST), the Principal Investigator of the research study, presented the key findings of the research project entitled "Development of High Modulus Concrete for Tall Buildings". He submitted the draft final report in August 2016.

Volcanic aggregate was an ingredient of high modulus concrete mix under the study. A member said that as a related issue, the alkali-silica reaction between volcanic aggregate and cement paste in concrete using pulverised fuel ash (PFA) and ground-granulated blast-furnace slag (GGBS) had been being discussed in the Standing Committee on Concrete Technology (SCCT) under the Development Bureau. The strength and modulus of PFA/GGBS and volcanic aggregate concrete could be very high.

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CC opined that there was currently shortage of river sand in Hong Kong. He asked whether alternative ingredient could be considered as replacement. Professor LI responded that the high modulus concrete could also be produced when river sand was partly replaced by rock powder.

KSKn commented that the handling of the brittle behaviour of high modulus concrete would be a concern. Professor LI advised that fibrous material could be added to the concrete mix to enhance its performance in ductility.

A member raised the high strength concrete spalling problem under fire. Professor LI advised that further study on fire resistance of the high modulus concrete should be conducted.

*[**Post-meeting note**: CIC Secretariat has liaised with SCCT under DEVB to arrange discussion of the research finding in its meeting on 22 December 2016. CIC Secretariat would keep track of the issue.]* All to note

2.6 **Development of Ultra-Ductile Cementitious Waterproofing Rendering by Recycled Plastic**

Mr. Ivan SHAM from Nano & Advanced Materials Institute (NAMI) delivered a presentation on the development of Ultra-ductile cementitious waterproofing rendering by using recycled plastic.

KLT commented whether any toxic rendering material would penetrate to the water tank. Mr. SHAM responded that the rendering material was mainly made of recycled plastic bottle and it would be toxic free.

KSKn wondered whether the rendering material would deteriorate if they were applied under sunlight, for instance, roof top or external wall. Mr. SHAM replied that the objective of this research was to apply the material under indoor condition. If the rendering material was intended to be applied outdoors, further tests should be conducted

to investigate its performance affected by temperature changes, etc.

CC raised the concerns for replacement of using river sand in the researched rendering material. Mr. SHAM advised that they might further explore possible replacement of river sand with other materials such as rock powder or hybrid material.

2.7 **Amended Operation Framework of CIC Research Fund and Proposal of Research Agenda**

CIC Secretariat detailed the amended operation framework of CIC Research Fund and proposed research agenda under Com-PRO. The proposed research agenda included robotics and automation; constructability; re-engineering the planning and design process; effective inspection of ageing buildings; and advanced materials. Members endorsed.

2.8 **Nomination for Task Force on Research**

Members agreed to nominate Ir. Tommy Ng to represent Com-PRO to be a Member in the Task Force on Research.

2.9 Any Other Business

There is no any other business in this meeting.

2.10 **Tentative Date of Next Meeting 004/16**

The next meeting was tentatively scheduled in December 2016. The Secretariat would inform Members when the meeting date was confirmed.

The meeting was adjourned at 12:30 pm.