SUSTAINABILITY PERFORMANCE EVALUATION IN BUILDING PROJECTS BY INTEGRATING LEAN AND SUSTAINABLE MANAGEMENT USING THE DELPHI METHOD

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Poor management between the areas of production and sustainability

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Sustainability performance evaluation in building projects

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1. Propose an evaluation methodology

Indicators
N° of meetings of planning of the project sustainability
N° of credits for project sustainability
Compatibility between the areas of design, production and environmental management
N° of meetings between areas of production and environmental

2. Validate the proposed methodology (Delphi study)

3. Apply the generated tool (Buildings of Peru)

4. Evaluate results

Tool to evaluate the project sustainability performance

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Phase		Indicators
Design	1	N° of meetings of planning of the project sustainability
	2	N° of credits for project sustainability
	3	Compatibilization between areas of design, production and environmental management
Construction	8	Update of environmental management plan according to update of production programming
	9	N° of environmental monitorings carried out regarding those programmed
	10	N° of monitorings carried out with results below the LMP of air/N° of monitorings of air programmed
Use	19	N° of inspections of equipment operation
	20	N° of preventive maintances of facilities
	21	N° of corrective maintances of facilities

Validate the proposed methodology-Delphi study

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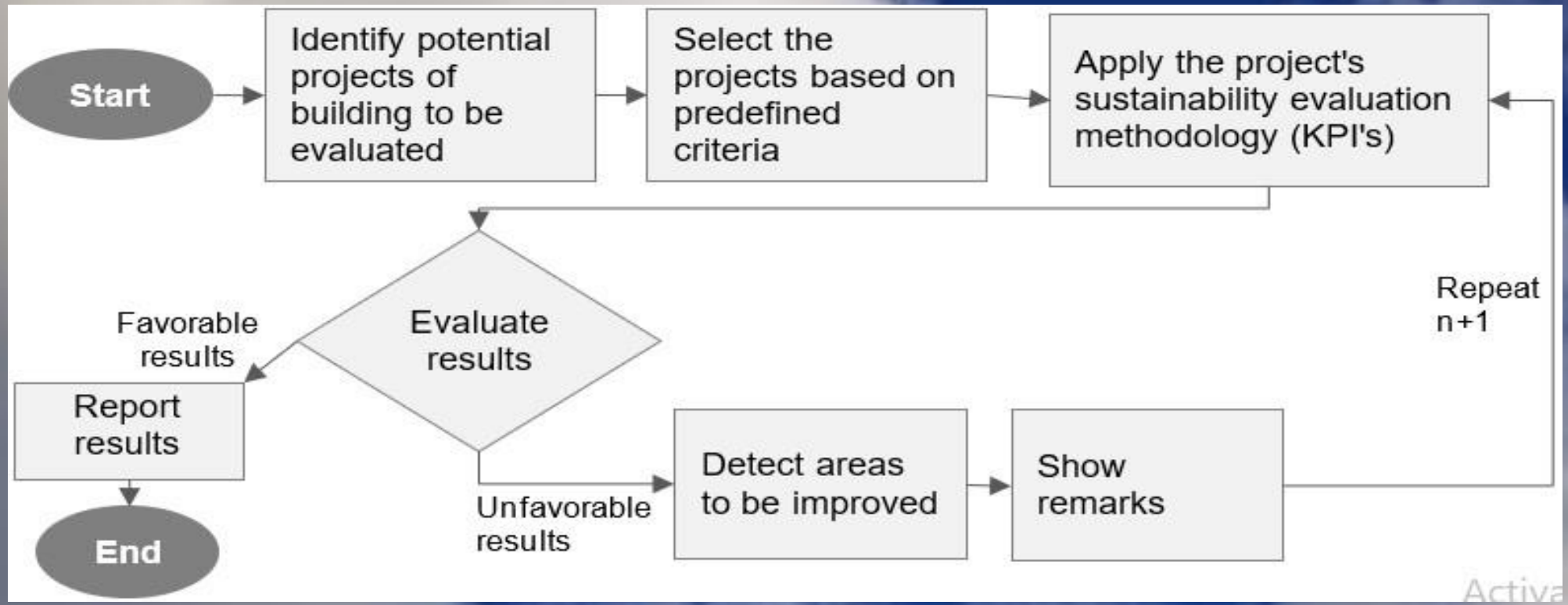
The Delphi method seeks to obtain reliable group opinion from a panel of experts who are asked their views individually on various topics in an interactive way

Table 1: Profile characteristics of the expert panel members

Position	Year Exp.	Profession	Level of Education	Sector	Category
Specialist in Sustainability	9	Architect	Master's Degree	Private	Consultant
Specialist in Sustainability	16	Architect	Professional Degree	Private	Consultant
Projects and Innovation	10	Architect	Master's Degree	Private	Stockholder
Executive Coordinator	7	Design	Master's Degree	Private	Consultant
Construction Manager	18	Civil Engineer	Master's Degree	Private	Builder
General Manager	10	Architect	Professional Degree	Private	Administrator
Project Manager	24	Civil Engineer	Master's Degree	Private	Administrator

Apply the tool generated



Apply the generated tool

Project Details	N°01	N°02	N°03	N°04	N°05
Use	Offices	Offices	Offices	Offices	Offices
Floors	10	30	18	27	6
Basements	4	4	8	10	5
Built area	30.146 m2	66.580 m2	27.452 m2	35.000 m2	9.792 m2

Application of the tool to building projects in Peru

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https://issuu.com/cosapiofical/docs/banco_nacion

Evaluation of sustainability performance					
Project Details:	**N°01**	**N°02**	**N°03**	**N°04**	**N°05**
Lean Practices	✓	✓	✓	✓	✓
Environmental management	✓	✓	✓	✓	✓
LEED Certification	✓	✓	✓	×	×
Obtained Score:					
Design	16	16	16	3	11
Construction	60	63	56	26	40
Use	Not applicable	19	Not applicable	Not applicable	12
Total (points)	76	98	71	29	62

Conclusions

- The proposed tool is flexible and easy to be implemented.
- The research work revealed the importance of the design stage in comparison to the later phases.
- The collaborative work between the production management and the environment department allows a greater effectiveness of sustainability in building projects.
- We can conclude that a sustainability performance evaluation methodology was developed integrating the Last Planner System and sustainability management, and validated using the Delphi method.

Thank you for your attention
Any questions ?