CHAPTER 5
RESULTS OF DEPHI STUDY

INTRODUCTION

In the previous chapter, the study provided an insight into the framework of sustainable engineering practices that was advocated for by the staff at Hwange Safari Lodge through the interviews. The framework provided information on aspects such as the actual practices that can be adopted, their contribution and their potential to enhance sustainability in the business' infrastructure. This fifth chapter therefore sought to get an insight of experts in the hospitality sector and also engineers with regards to the proposed framework. The Delphi study was undertaken with an objective to examine the level of agreement from the expert panelists s to determine the sustainable engineering practices that could be adopted on the infrastructure. The results from the Delphi study led to the formation of a comprehensive framework integrating the sustainable engineering practices that can be adopted at Hwange Safari Lodge. Therefore, the chapter starts by showing the profiles of the panelists s followed by the results and findings of the Delphi survey, and the reliability examination. Finally, the findings of the Delphi surveys will be summarised.

Profile of the panelists

A total of 10 experts formed the panelists from which the study gathered data for the Delphi study from the panelists. These panelists included experts who were construction project owners, electrical engineers, civil engineers, structural engineers and EMA. 2 potential participants from each group were approached and all of the potential panelists s expressed their interest and agreed to participate. Therefore, a 100% participation rate was attained in the Delphi study. The participants represented a wide spectrum of the construction industry. The distribution of the panel was shown below in Figure 5.1:

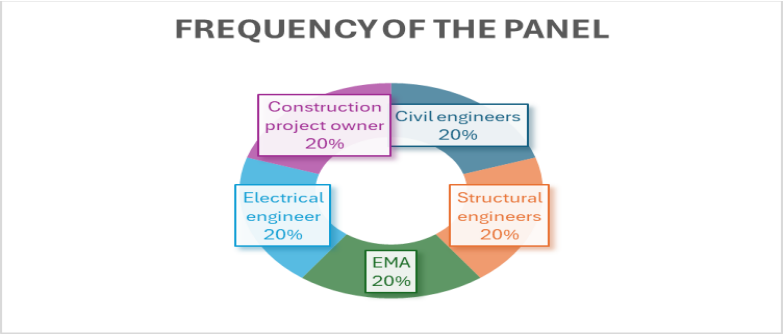

Figure 5.1: Composition of panellists *(Primary data, 2024).*

The panellists of the study had different experiences and had at least 5 years up to 21 years' experience in the construction sector. Eight of the panellists s had at least 10 years' experience in infrastructure projects. Regardless of D5 having minimal experience in the engineering field, this panellist had in depth research background and knowledge in engineering related studies. Table 4.1 below provides a summary of the demographics of the panellists.

Table 5.1: Demographic profile of the panellists *(Primary data, 2024)*

Panel ID	Position	Years of experience in the engineering sector	Years of experience in construction projects	Professional Body membership	Advanced degree
D1	Project manager	7	6	Yes	Pending
D2	Electrical engineer	20	13	Yes	Yes
D3	EMA	7	5	Yes	Pending
D4	EMA	9	6	No	Pending
D5	Structural engineer	5	5	Yes	Pending
D6	Project manager	17	11	Yes	Yes
D7	Electrical engineer	14	12	Yes	Yes
D8	Structural engineer	12	9	Yes	Yes
D9	Civil engineer	10	8	Yes	Yes
D10	Civil engineer	8	6	No	Yes

The study undertook a Delphi study in which in the survey, 15 items from 3 questions were classified under category 1 as shown in Table 4.2 below. The study considered every item under this category relevant to their respective questions and that the results they attained where also relevant. This was based on the agreement from a majority of the panellists. In the study, consensus was reached for all items, and these were agreed as being relevant in creating the framework for sustainable engineering practices. This was perceived as a sign of agreement between the panellists because there was significant improvement in the number

of items that reached consensus. The study therefore presents the results of the Delphi study separately for each of the questions. Two types of corresponding tables summarise the results for each question; rating the results with the value of interquartile range and level of agreement for each item in Round and the mean rating results by sub-group.

The Table 5.2 below illustrates the results from the expert panellists and shows their rating for the engineering practices that they deemed to be sustainable and that can also enhance sustainability of the infrastructure at Hwange Safari Lodge. The results showed that majority of the practices that were illustrated by the staff at the lodge were deemed important by the expert panellists s as the level of agreement was more than 60%. The agreement level was highest on the practice of continuously checking for faults and problems on the infrastructure and fix them at their infancy.

Table 5.2: Rating results for sustainable engineering practices adopted in the framework *(Primary data, 2024)*

Item		IQR	Level of agreement %		Consensus was reached?
			Not agree	Agree	
ROUND 1					
1	Regular checks and fixing	1.0	12%	80%	Yes
2	Technology adoption	2.0	20%	74%	Yes
3	Green equipment	1.0	13%	68%	Yes

Table 5.3 shows results of the mean rating and the rankings of the items. The overall rating showed that 2 of the practices were highly rated (mean ≥4.0): regular checks and fixing as well as technology adoption. It therefore showed that these two practices are within the reach of the lodge and are expected to be implemented more often in the refurbishment of the infrastructure.

Table 5.3: Mean rating of the sustainable engineering practices from the panellists *(Primary data, 2024)*

Item	All panellists		EMA		Structural engineer		Civil engineer		Electrical engineer		Project managers	
	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank
Regular checks and fixing	4.28	1	3.33	2	4.38	1	4.22	2	4.71	1	4.80	1
Technology	4.20	2	3.22	3	4.28	2	4.89	1	4.53	2	4.62	2
Green equipment	3.88	3	4.78	1	3.22	3	3.82	3	4.21	3	4.11	3

As shown above, the staff at EMA ranked the adoption of green equipment as the most significant sustainable engineering practice while the other panellists s ranked it lowed than any other practice. This is because EMA is more into environmental protection and sustainability hence, they advocate more for equipment that does not pollute the environment.

On the other hand, the structural engineer, electrical engineer and the project managers reflected those regular checks and fixing of the infrastructure as the most important factor. This is because the engineers believe that doing so is key in making sure that costs are saved and that the detected problems are solved before they become worse which is key in making sure the infrastructure remains strong and even improve.

Also, the civil engineer ranked adoption of technology on number 1 while the structural engineer and the electrical engineer ranked it second on the list. This was because the use of technology is key in supporting the two other practices through enhancing innovation and efficiency in revitalising or renovating infrastructure of the lodge.

This study also explored the contribution of sustainable engineering practices in enhancing infrastructure sustainability. This followed the study had explored the key sustainable engineering practices that can be adopted on the infrastructure of the lodge. This subsection therefore discusses the sustainable engineering practices

contribution to infrastructure sustainability through showing of the panellists' agreement on the four advantages that were found from the staff members at Hwange Safari Lodge. Thus, the Table 5.4 below shows the panellists' ratings of the contribution of sustainable engineering practices in enhancing infrastructure sustainability. All of the items attained absolute agreement and managed to gain consensus.

Table 5.4: Rating results for contribution of sustainable engineering practices in enhancing infrastructure sustainability *(Primary data, 2024)*

Item		IQR	Level of agreement %		Consensus was reached?
			Not agree	Agree	
ROUND 1					
1	Improves standards	1.0	15%	84%	Yes
2	Saves costs	2.0	23%	70%	Yes
3	Leads to innovation	1.0	10%	82%	Yes
4	Proactiveness	1.0	20%	72%	Yes

As shown above, the panellists reached a consensus on all the items. The fact that the engineering practices enhances improved standards of the infrastructure was agreed most by the panelists s as it is driven by practices such as technology adoption and continuous fixing of small problems. This was also followed by innovation which is driven mostly by technology adoption and helps to make sure the engineers in the lodge are bringing in new aspects to refurbish the infrastructure. On the other hand, Table 5.5 below shows distribution of the panellists' views by sub-groups and the results showed that improved standards were the feature that majority of them deemed to be the key driver of infrastructure sustainability driven by sustainable engineering practices.

Table 5.5: Mean rating on contribution of sustainable engineering practices in enhancing infrastructure sustainability *(Primary data, 2024)*

Item	All panellists		EMA		Structural engineer		Civil engineer		Electrical engineer		Project managers	
	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank
Improves standards	4.80	1	3.88	2	4.72	1	4.50	1	4.66	1	4..74	1
Innovativeness	4.77	2	3.42	3	4,60	2	4.34	2	4.32	2	3.20	4
Proactiveness	4.62	3	3.21	4	3.65	4	3.58	3	3.82	3	4.11	2
Saves costs	4.50	4	4.20	1	4.20	3	3.20	4	3.60	4	3.89	3

The above results showed that four out of five ranked top the fact that sustainable engineering practices contributes improved standards of the infrastructure of the lodge. This is because when the lodge is revitalized using practices such as regular checking and fixing, small problems are fixed before they become big hence ensuring that the infrastructure stays in good shape and quality. On the other hand, it was also shown that innovativeness was ranked 2nd by three of the panellists s and this is mostly driven by the adoption of technology in the engineering processes when revitalising the infrastructure. Innovation is key in introducing new and advanced aspect on the infrastructure now and in the future therefore driving sustainability.

The aspect of saving costs was however ranked 1st only by panellists s from EMA and the other groups either rank it 3rd or 4th. This is because they pointed out that implementing the sustainable engineering practices may be expensive for instance purchasing new technologies and doing regular checks on the infrastructure requires financial backing. But they did not have an insight on the fact that the expenses are mostly incurred in the short run, in the introductory stages and once the practices are being implemented, costs are saved as the infrastructure is kept in good conditions. That is, in the long run, the adoption of sustainable engineering practices helps to save costs and the firm is left with more funds to its disposal to invest in advanced aspects that helps to improve the standards of the hospitality they provide to customers.

The study also sought to get the confirmation from the panellists pertaining the potential of sustainable engineering practices in facilitating the redevelopment of infrastructure in the hospitality sector. The panellists in their majority agreed that sustainable engineering practices have a strong potential to facilitate the redevelopment of infrastructure through the same aspects that were pointed out by the staff at Hwange Safari Lodge. The most advocated practice was enhancing international standards through technology and green equipment adoption. The results were shown first in Table 5.6.

Table 5.6: Rating for potential of sustainable engineering practices in facilitating the redevelopment of infrastructure in the hospitality sector *(Primary data, 2024)*

Item		IQR	Level of agreement %		Consensus was reached?
			Not agree	Agree	
ROUND 1					
1	Meets international standards	1.0	15%	80%	Yes
2	Benchmarking	1.0	23%	72%	Yes
3	Continuous improvement	1.0	10%	78%	Yes
4	Proactiveness	2.0	20%	68%	Yes

The results showed that the panellists reached consensus on all the items that shows how the sustainable engineering practices. Most of the panellists agreed that through sustainable engineering practices, the facilitation of the redevelopment of infrastructure in the hospitality sector is done with international standards and this is enhanced mostly by technology adoption. The results also showed that sustainable engineering practices helps to enhance benchmark with advanced facilities, and it helps to improve the outlook of the infrastructure as well as the internal aspects such as in guest rooms, the conference rooms, dining areas and the bars amongst others.

The rankings shown below in Table 5.7 shows the distribution of the panellists' views by sub-groups. The results showed that meeting international standards was the top ranked followed by continuous improvement.

Table 5.7: Mean rating on the potential of sustainable engineering practices in facilitating the redevelopment of infrastructure in the hospitality sector *(Primary data, 2024)*

Item	All panellists		EMA		Structural engineer		Civil engineer		Electrical engineer		Project managers	
	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank
International standards	4.80	1	4.50	1	4.92	1	4.92	1	4.82	1	4..68	1
Continuous improvement	4.22	4	3.88	2	4,60	2	4.64	2	4.32	2	4.20	2
Proactiveness	4.36	3	3.28	3	3.65	4	3.20	4	3.82	3	4.13	3
Benchmarking	4.50	2	4.22	4	4.20	3	3.88	3	3.60	4	3.89	4

The results in Table 5.7 above showed that most of the panellists ranked the notion that international standards are enhanced by sustainable engineering practices most because through adoption of technology, research is done to show how other 5-star facilities are being redeveloped. Further, the results proved that continuous improvement is also enhanced through sustainable engineering practices such as the regular checking and fixing of the problems on the infrastructure.

The aim of the research after the Delphi study was recognizing the items where consensus recognise the items were consensus. The panellists provided responses that were variable and had differing opinions therefore, the Delphi study was designed and adopted to attain a holistic agreement on the topic understudy. The Delphi study have the panellists the chance to review the relevance of collective responses which was key on construct validity. This is known as self-validating mechanism, and this was done through selecting panellists due to their expertise and experience in the engineering sector.

Therefore, the consistency of the panellists s rating was examined for the Delphi study using the interrater reliability which shows the variation of the raters measured the same factors (Li, 2016). In this study it was used to describe how the responses of each panellists were strong and resembled each other. It was adopted to assess the consistency of the responses which made by different

experts and measuring the same item. According to Cicchetti (1994), the ICC values that are less than 0.4 shows poor agreement and values that are between 0.49 and 0.59 shows a fair agreement. Further, values that are between 0.60 and 0.74 shows a good agreement and the values that are 0.75 and above reflects an excellent agreement. An ICC estimate and their 95% confidence interviews in this study was calculated based on the mean rating, absolute-agreement and a 2-way mixed effects model. This was shown in the Table 5.8 below and a fair-good agreed was attained in the Delphi study as the average measure of the ICC was 0.624 with a 95% confidence interval therefore showing that the Delphi's results were valid.

Table 5.8: ICC value for each round of Delphi survey *(Primary data (2024)*

Delphi round	ICC	Confidence interval	
		Lower bound	Upper bound
1	0.624	0.533	0.732

Therefore, the above showed that the results from the Delphi study were valid as proven by the ICC of 0.624. With that regard, the study found that the framework that was developed by the staff members in the organization shown in Figure 4.2 above was agreed to by the experts in the engineering phenomenon hence no changes were made in the study but rather the framework was reinforced by the experts.

This fifth chapter therefore aimed at attaining insight of experts in the hospitality sector and also engineers regarding the proposed framework. The Delphi study was undertaken to examine the level of agreement from the expert panellists to determine the sustainable engineering practices that could be adopted on the infrastructure. The results from the Delphi study led to the formation of a comprehensive framework integrating the sustainable engineering practices that can be adopted at Hwange Safari Lodge.

Therefore, the chapter started by showing the profiles of the panellists followed by the results and findings of the Delphi survey, and the reliability examination. Finally, the findings of the Delphi surveys were summarised. The next chapter presented the discussions of the results and the conclusions