ASSIGNMENT 3: NEW PRODUCT DEVELOPMENT
for
GROUP 2 / ECO-PEG™

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EXECUTIVE SUMMARY

Eco-Peg™ is an innovative, eco-friendly survey marker designed to solve operational and environmental problems with traditional survey pegs used in the surveying and construction sectors. Traditional survey markers, such plastic as plastic hubs and chemically treated wooden stakes are widely used but abandoned after projects, which leads to soil contamination, plastic waste, and needless site revisits that raise operating expenses.

The goal of Eco-Peg™ is to offer a high performance, completely biodegradable substitute that eliminates the need for post-project while maintaining the necessary durability and visibility throughout the survey time. Compressed bamboo fiber and cornstarch-based resin (PLA) are used to create Eco-Peg™, a biocomposite material with a controlled decomposition feature that enables it to function for three to six months before spontaneously decomposing into non-toxic organic waste.

Land surveyors, survey crews, construction companies, developers, and infrastructure-related professionals are the main target market for Eco-Peg™, especially those engaged in regular site surveys and projects that place a high priority on sustainability and operational effectiveness. Another secondary market sector consists of students and educational institutions that engage in surveying activities.

The concept for Eco-Peg™ was developed by identifying issues in the surveying sector and was supported by primary data collecting, industry observation, and a research of the literature. A questionnaire survey involving 43 respondents from surveying, construction, and related fields was conducted to evaluate current practices, user pain points and market acceptance. The results showed a high level of awareness for environmental sustainability, a strong interest in biodegradable survey markers, and a clear need for a solution that reduces the waste production. These realizations led to the creation of Eco-Peg™, a useful, affordable and sustainable invention with significant commercial potential.

1.0 INTRODUCTION

The surveying industry depends on physical markers such as wooden stakes and plastic pegs to mark boundaries and reference points. These markers are commonly used in land surveying, construction and infrastructure projects. However, the traditional wooden and plastic survey pegs have made some issues regarding environmental impact, work efficiency and long-term waste generation.

Plastic survey pegs are widely preferred because of their durability but they are not biodegradable and can contribute to environmental pollution when left on site. In a long time, plastic materials will break down into microplastics that contaminate soil and surrounding ecosystems (UNEP, 2021). On a global scale, more than 300 million tonnes of plastic waste are produced every year, with construction and industrial activities being among the major sources (OECD, 2022). In surveying and construction projects where large numbers of pegs are used regularly, this issue can lead to a serious impact on the environment. Even though wooden pegs are biodegradable, they tend to have a shorter lifespan as they are easily damaged by weather conditions or breakage resulting in frequent replacement and increased material use (Berntsen International, n.d.).

Beyond environmental concerns, conventional surveying practices usually involve a two-trip workflow, where survey crews must return to the site to remove the markers after doing their work. This practice makes time longer, fuel consumption and overall operational costs, especially for large or remote project sites (Amerisurv, 2018). As awareness of sustainability continues to grow within the construction and surveying industries, there is increasing pressure to adopt solutions that can reduce waste, minimise site disturbance and improve field efficiency (World Economic Forum, 2020).

These challenges have led to the development of a new product concept known as Eco-Peg™, a biodegradable survey peg designed to naturally decompose after use. The Eco-Peg™ aims to remove the need for peg retrieval, reduce plastic-related pollution and support a more efficient one-trip field workflow.

To further refine theEco-Peg™ concept, this study adopted a qualitative and exploratory research approach. Data were gathered through literature reviews, case study analysis and industry observations related to current surveying practices and existing marking products. Sources of information included academic journals, sustainability reports, and product documentation from established surveying manufacturers such as Berntsen International. The data collection was carried out between October and December 2025, focusing on common surveying and construction practices in land development projects.

The collected data were then analysed to identify key user needs, operational challenges and potential market gaps related to survey pegs. These findings were used to refine the Eco-Peg™ concept in terms of material selection, functionality and overall value proposition. However, this study has certain limitations, including reliance on secondary data and limited field testing. Future research involving real-site performance testing and long-term biodegradation assessments under various environmental conditions is recommended to further validate the effectiveness of the proposed product.

2.0 NABC APPROACH

The NABC framework highlights the core value proposition of the Eco-Peg™ by identifying the market need, our unique solution, the tangible benefits, and our competitive advantage.

- **Need (N):** In the Malaysian surveying and construction industry, thousands of non-biodegradable plastic hubs and chemically treated wooden stakes are abandoned on-site annually. This leads to long-term soil contamination and the accumulation of microplastics. Currently, surveying firms face a "hidden cost" dilemma: they must either pay for expensive, non-billable labour and fuel to send crews back for peg retrieval, or risk their reputation by leaving litter behind. There is an urgent demand for a marker that satisfies both environmental regulations and project budget constraints.
- **Approach (A):** Our approach is the Eco-Peg™, a high-performance, fully biodegradable survey marker. It is manufactured from a biocomposite of compressed bamboo fibre and cornstarch resin (PLA). The product is engineered with a "Controlled Decomposition" feature, ensuring the peg remains structurally sound and visible for a period of 3 to 6 months—the typical duration for topographic or boundary surveys—before breaking down into non-toxic organic matter.
- **Benefit (B):** The primary benefit is the "One-Trip Workflow." By using Eco-Peg™, firms eliminate the need for post-survey site cleanup entirely. This can reduce project operational costs by an estimated 15% to 20% regarding labour and transport. Additionally, it allows firms to align with Malaysia's Green Technology Master Plan (GTMP) and UN Sustainable Development Goal 12 (Responsible Consumption and Production), providing a significant advantage in Government Green Procurement (GGP) exercises, as the Eco-Peg™ directly supports the government's initiative to increase the use of eco-labelled products in the public sector (KeTTHA, 2017).
- **Competition (C):** Current competitors include traditional wooden stakes, which often rot prematurely or harbour termites, and plastic hubs, which are permanent pollutants. While international brands like Berntsen offer "recycled" plastic stakes, those products still do not biodegrade. The Eco-Peg™ is the only product in the local market that provides the precision required for surveying (visibility and tack-holding) while offering a guaranteed zero-waste end-of-life.

3.0 NEW PRODUCT DEVELOPMENT

3.1 DEFINITION

Eco-Peg™ is known as a systematic and innovation- driven process of designing, developing, and introducing a fully biodegradable survey marker that addresses both operational efficiency and environmental sustainability within the surveying and construction industry. From the innovator's point of view, Eco-Peg™ is a specially designed eco-innovation designed to function dependably throughout a project lifecycle before safely decomposing into non-toxic organic matter rather than just a replacement for traditional wooden or plastic pegs.

This product's unique combination of controlled biodegradation, structural durability, and field usability guarantees that will continue to function for the necessary survey duration without requiring post-project retrieval. The creation of Eco-Peg™ is exchange from traditional single-function marker to a sustainable solution that lessens operational expenses, lessens environmental impact, and promotes green procurement activities. Thus, Eco-Peg™ is an example of how an environmental issue may be transformed into a workable, marketable invention that is especially suited to the demands of need surveying practices.

3.2 CLASSIFICATION OF NEW PRODUCT DEVELOPMENT

New Product Development (NPD) can be classified into several categories depending on the level of innovation and the degree of change introduced to the market. According to the ENT600 in the textbook Chapter 5: New Product Development, common classifications of NPD include new-to-the-world products, new product lines, additions to existing product lines, product improvements or modifications, repositioning and cost reduction products.

The Eco-Peg™ can be classified as a New Product Development. This is because the product introduces a new category of survey peg that is biodegradable which is not currently offered as a mainstream any such as plastic and wooden stakes already exist. The Eco-Peg™ differs significantly in terms of material composition, environmental impact and usage concept, particularly its ability to decompose naturally after use.

Although the Eco-Peg™ has a similar function to any existing survey pegs, it offers new value through its sustainable design and one-trip workflow concept which eliminates the need for peg retrieval. This aligns with the definition of a new product line, where a firm introduces a product that is new to the company and expands its existing product offerings to meet emerging market demands and particularly sustainability requirements.

In addition, the Eco-Peg™ may also be considered a new innovation, as it improves upon existing survey peg products by addressing their weaknesses rather than completely replacing their core function. The innovation lies in the use of biodegradable materials and improved operational efficiency rather than a radical change in surveying methods. Therefore, the Eco-Peg™ represents a practical and market-driven form of NPD that balances innovation, sustainability and user needs within the surveying industry

3.3 NEW PRODUCT DEVELOPMENT PROCESS

3.3.1 RESEARCH AND DEVELOPMENT

The Research and Development phase for Eco-Peg™ is aligned with Strategic Thrust 4: Research, Development and Commercialisation (R&D&C) of the National Green Technology Master Plan (KeTTHA, 2017). The focus was placed on three critical pillars: Material Science, Structural Integrity, and Environmental Lifecycle.

1. **Biocomposite Material Formulation:**
   The R&D team conducted extensive trials to find the optimum ratio between bamboo fibre (for tensile strength) and cornstarch-based polymers (for binding and water resistance). Bamboo was chosen due to its rapid growth and high cellulose content, which provides the "wood-like" feel surveyors prefer when driving tacks.
2. **Controlled Degradation Testing (Tropical Climate Simulation):**
   Given Malaysia's high humidity and heavy rainfall, the R&D process involved "accelerated weathering" tests. The pegs were subjected to cycles of UV exposure and moisture to ensure the degradation does not begin prematurely. The team successfully formulated a natural wax coating that protects the peg for the first 90 days, after which microbial action in the soil begins the breakdown process.
3. **Impact and Stress Analysis:**
   Survey pegs must withstand significant force from a 4lb hammer during installation into hard or compacted soil. Our R&D utilized a Mechanical Impact Tester to ensure the Eco-Peg™ head does not shatter or "mushroom" upon impact. We redesigned the internal ribbing of the peg to distribute the strike force evenly down the shaft to the tip.
4. **Visibility and Pigmentation Research:**
   Standard biodegradable plastics are often translucent or dull. Our R&D developed a method to infuse the biocomposite with high-visibility, eco-safe fluorescent dyes (Pink, Orange, and Lime Green). These dyes are tested to ensure they do not leach heavy metals into the soil during decomposition, maintaining the product’s 100% eco-friendly status.

3.3.2 PRODUCT DESIGN/FEATURES & TECHNOLOGY USED

The product's design and feature set have been developed through a comprehensive assessment of both user needs and market expectations to ensure optimal performance, usability, and competitive differentiation. Physically, the product dimensions are specified to balance ergonomics, portability, and functional space requirements, with precise measurements determined to fit the intended operational environment and end-user interactions.

These dimensions are backed by engineering drawing standards that define geometry, tolerances, and material finish criteria to guarantee consistency in manufacturing and assembly. The architectural design incorporates a modular layout that supports ease of production, serviceability, and integration of technological components, ensuring that hardware and any embedded systems function reliably within the allocated form factor.

From an artistic standpoint, the aesthetic design emphasizes a modern, user-centric appearance that resonates with contemporary market preferences, deploying colour schemes, surface textures, and form factors that enhance visual appeal while reinforcing brand identity. This aesthetic direction is informed by research into consumer behaviours which highlights that visual attractiveness significantly influences purchasing decisions and user satisfaction.

To satisfy market needs effectively, the product design also integrates key technological requirements such as material choices for durability and sustainable performance, ergonomic contours for comfort, and feature sets that align with target user expectations. These parameters including performance standards, aesthetic expectations, and functional capabilities are iteratively refined to align with competitive benchmarks and regulatory constraints, ensuring that the final design not only meets but exceeds market expectations.

3.3.3 CONCEPT TESTING

Concept testing is the initial test for new product designs. The main purpose of concept testing is to present and clarify the product idea before proceeding to the prototype development stage. In this study, we presented product concepts through a combination of verbal description and design illustration. This approach was selected to ensure that the overall concept and the material-related aspects of the product could be clearly understood.

With verbal description , it gave an overview of the product, including its main purpose, how it works, how it will help users and learn about its important features. This method was chosen because the product was still in the early stages of development, and there was no physical prototype or visual representation yet. By using a verbal concept description, the team was able to clearly explain the main idea and value of the product in a simple and convincing manner. Other than that, a simple design drawing was included to help explain, especially to show the product's shape and the different materials used. The visual design helped enhance understanding of the product concept without using a functional prototype at this early stage.

As a result, the team was able to clearly explain the product idea in a structured way by using both verbal and design for the concept testing methods to ensure that the idea was clearly delivered and understood by the potential customer. Lastly, this idea will be tested further during the test marketing phase along with a questionnaire.

3.3.4 BUILD PROTOTYPE (2D OR 3D)

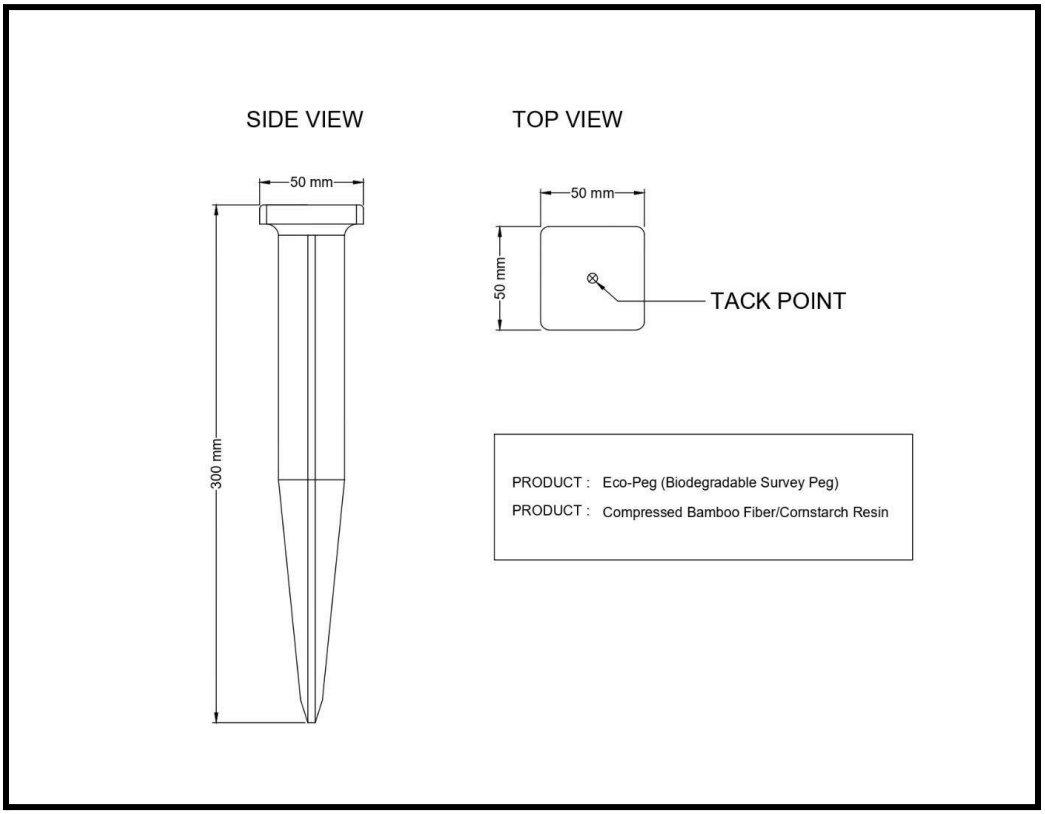

Figure 3.3.4.1 : Layout Eco-Peg™

Figure 3.3.4.2 and 3.3.4.3 : 3D Illustration of Eco-Peg™ Model and surveyor using on the site

3.3.5 TEST MARKETING

The test marketing for Eco-Peg™ was carried out through a questionnaire survey distributed to the public, particularly individuals involved in surveying, construction, and related fields. The questionnaire gathered information on respondents' demographic background, current usage of survey markers, perception of Eco-Peg™, and their likelihood of using the product once implemented. The purpose of this test marketing was to evaluate market acceptance, user interest, and purchase intention towards Eco-Peg™ as a biodegradable alternative to conventional survey pegs.

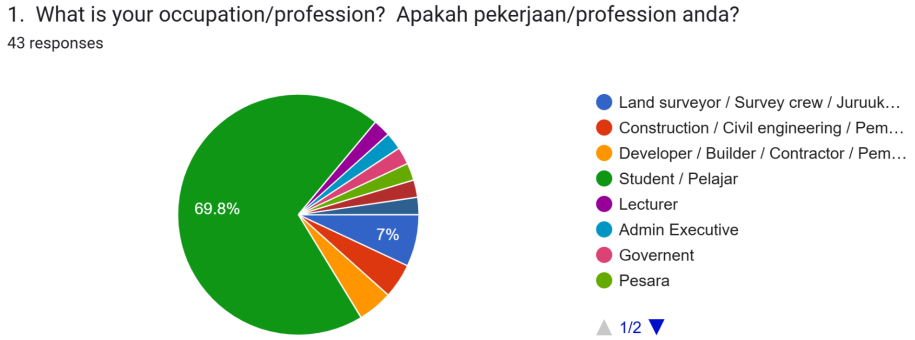

Figure 3.3.5.1: Respondents Occupational Background

A total of 43 respondents participated in the survey. The majority were students (30 out of 43 respondents, 69.8%), followed by land surveyors / survey crew (7%), developers / builders / contractors (4.7%), and construction/civil engineering (4.7%). The remaining respondents (13.8%) belonged to various other occupations not directly related to surveying or construction. Although students represented the largest proportion, the survey also included industry professionals directly involved in surveying and construction activities, who are the primary target users of Eco-Peg™. Their participation ensures that the feedback collected reflects practical field experience, which is essential for evaluating the product's usability and market acceptance.

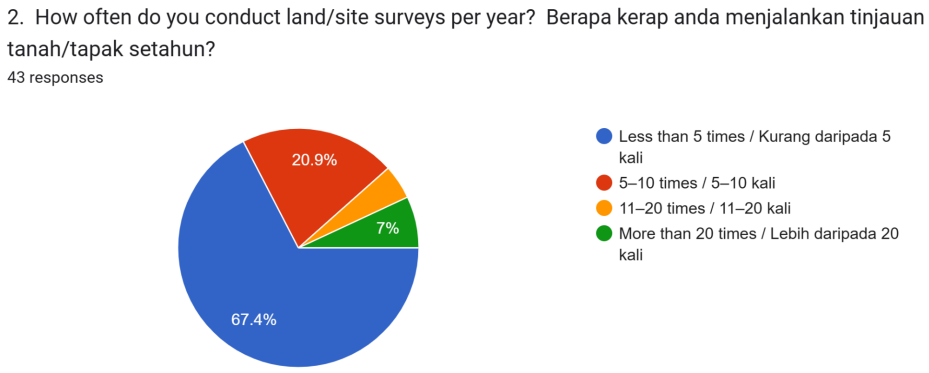

Figure 3.3.5.2: Frequency of Conducting Land/Site Surveys per Year

The survey results in Figure 3.3.5.2 show that the majority of respondents (67.4%) conduct land or site surveys less than 5 times per year, followed by 20.9% who conduct surveys 5–10 times per year. The remaining respondents conduct surveys more frequently. The data indicates that most respondents are infrequent users of survey markers. This suggests that Eco-Peg™ could be particularly appealing to these users due to its convenience and time-saving features, such as not requiring peg retrieval after use. At the same time, the smaller group of frequent surveyors may benefit from Eco-Peg™'s durability and biodegradability for more intensive field operations.

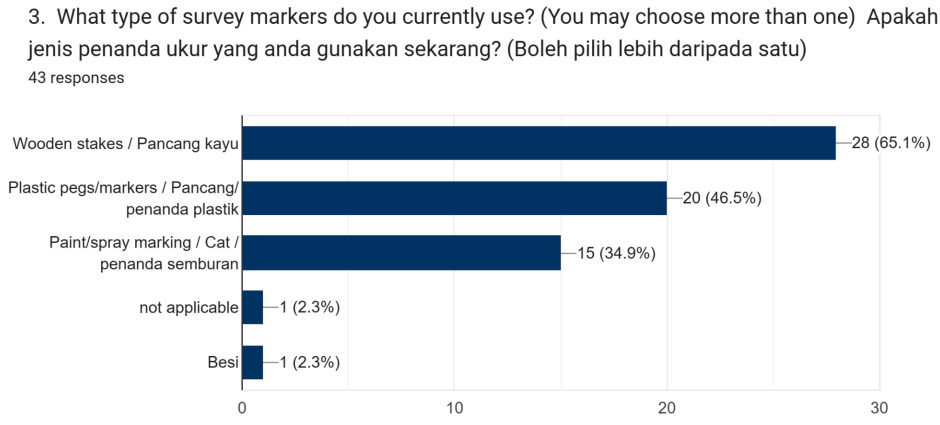

Figure 3.3.5.3: Types of Survey Markers Currently Used by Respondents

Based on the survey results, the majority of respondents (65.1%) currently use wooden stakes as their survey markers, followed by plastic pegs/markers (46.5%) and paint/spray marking (34.9%). Only a small proportion of respondents reported using other types of markers, such as metal stakes (2.3%) or markers not applicable to the question (2.3%). This indicates that traditional markers, particularly wooden and plastic pegs, are still the most widely used in field operations. Eco-Peg™, being a biodegradable alternative to wooden and plastic markers, could therefore be attractive to these users, especially those concerned with environmental sustainability and reducing plastic waste. The relatively high use of plastic pegs highlights the potential market opportunity for Eco-Peg™ to replace conventional markers with a more eco-friendly and convenient option.

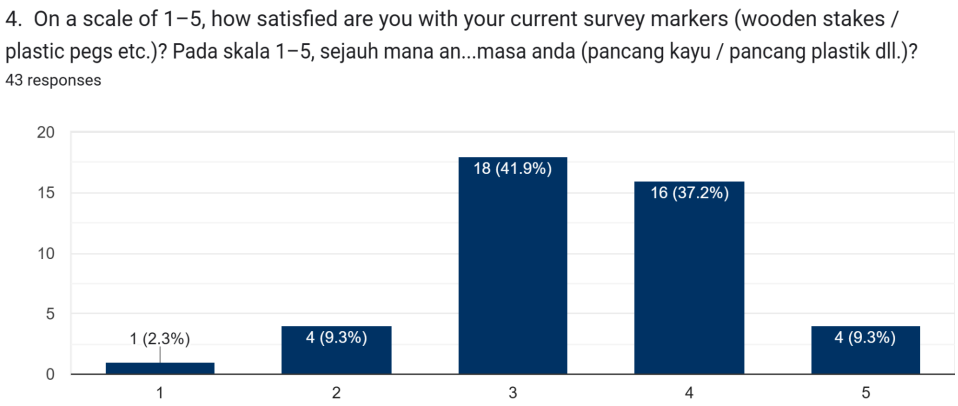

Figure 3.3.5.4: Satisfaction Level with Current Survey Markers

Based on Figure 3.3.5.4, most respondents rated their satisfaction with current survey markers as moderate to high. The largest proportion (41.9%) selected 3 (neutral), followed by 37.2% who chose satisfied. A smaller number of respondents indicated low satisfaction, with 9.3% (unsatisfied) and 2.3% (very unsatisfied). Only 9.3% of respondents choose very satisfied. This indicates that while most users find their current markers acceptable, there is space for improvement, particularly regarding convenience, durability, and environmental impact.

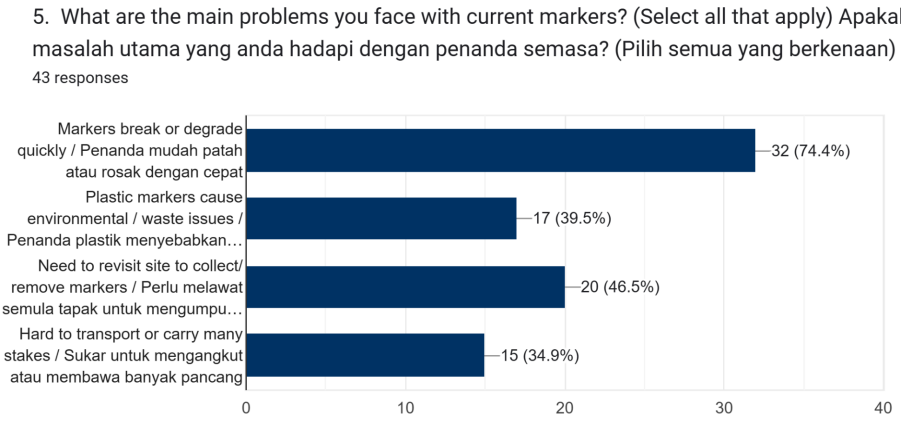

Figure 3.3.5.5: Main Problems Faced by Respondents with Current Survey Markers

Based on Figure 3.3.5.5, the most common problem reported by respondents was that markers break or degrade quickly (74.4%), followed by the need to revisit the site to collect or remove markers (46.5%), and plastic markers causing environmental or waste issues (39.5%). Another issue highlighted was the difficulty of transporting or carrying many stakes (34.9%). These findings indicate that the majority of current survey markers face durability and environmental challenges, as well as operational inefficiencies. Eco-Peg™, with its biodegradable material, durability for project timelines, and elimination of retrieval trips, directly addresses these concerns. This suggests that Eco-Peg™ has the potential to improve field operations while reducing environmental impact, making it an attractive alternative to conventional markers.

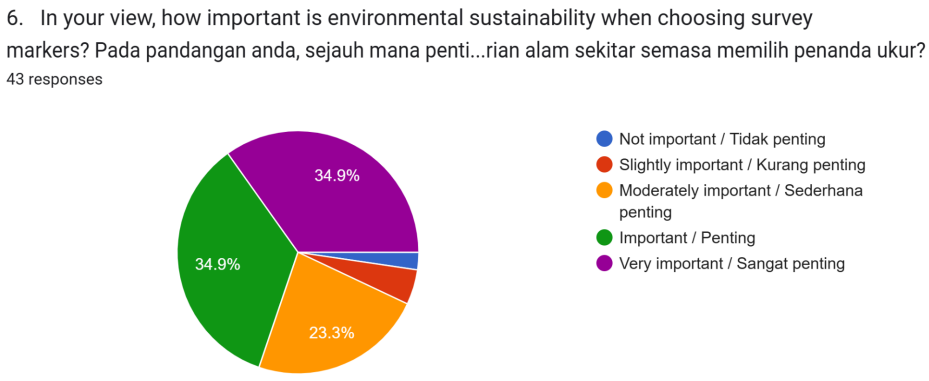

Figure 3.3.5.6: Importance of Environmental Sustainability When Choosing Survey Markers

Figure 3.3.5.6 shows that the majority of respondents consider environmental sustainability to be important when selecting survey markers. Specifically, 34.9% rated it as Important and another 34.9% rated it as Very Important, indicating that almost 70% of respondents place high value on sustainability. A smaller proportion of respondents rated sustainability as moderately important (23.3%), while very few considered it slightly important (4.7%) or not important (2.3%). This highlights that environmental considerations are a key factor for most users when choosing survey markers. Eco-Peg™, being biodegradable and eco-friendly, directly aligns with these priorities, suggesting strong market acceptance among respondents who value sustainability in their field operations.

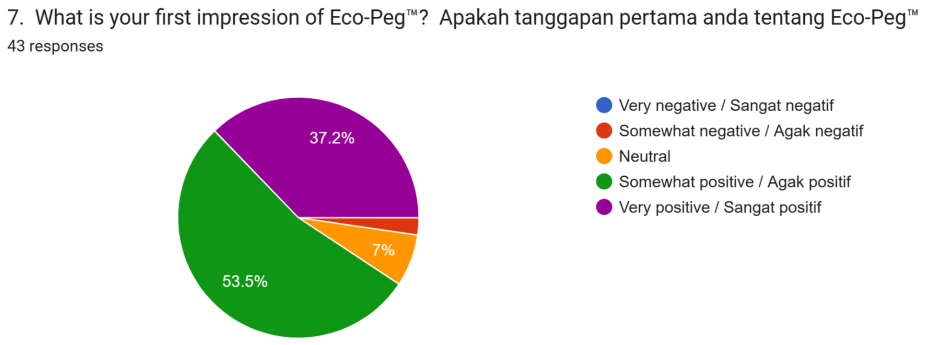

Figure 3.3.5.7: Respondents' First Impressions of Eco-Peg™

Figure 3.3.5.7 shows that the majority of respondents have a positive first impression of Eco-Peg™. Specifically, 53.5% rated it as Somewhat Positive and 37.2% as Very Positive, while only 2.3% rated it Somewhat Negative and none as Very Negative. A small portion (7%) were neutral. These findings indicate that Eco-Peg™ is generally well-received and suggests strong initial acceptance among both industry professionals and students. The positive perception reflects the respondents' appreciation of its eco-friendly, biodegradable, and practical features compared to conventional survey markers.

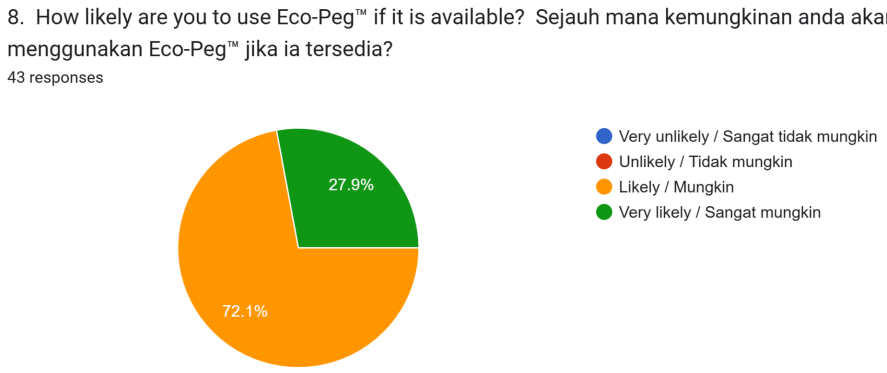

Figure 3.3.5.8: Respondents' Likelihood of Using Eco-Peg™ if Available

Figure 3.3.58 indicates that respondents are generally willing to use Eco-Peg™ if it becomes available. The majority of respondents (72.1% or 31 respondents) indicated that they are likely to use the product, while the remaining 27.9% (12 respondents) expressed that they are very likely to use it. And no respondents selected unlikely or very unlikely. This suggests a high level of interest and potential adoption of Eco-Peg™ among the surveyed population. The positive response reflects the product's appeal, particularly due to its biodegradable nature, convenience, and eco-friendly features, which align with the needs of both occasional and frequent survey marker users.

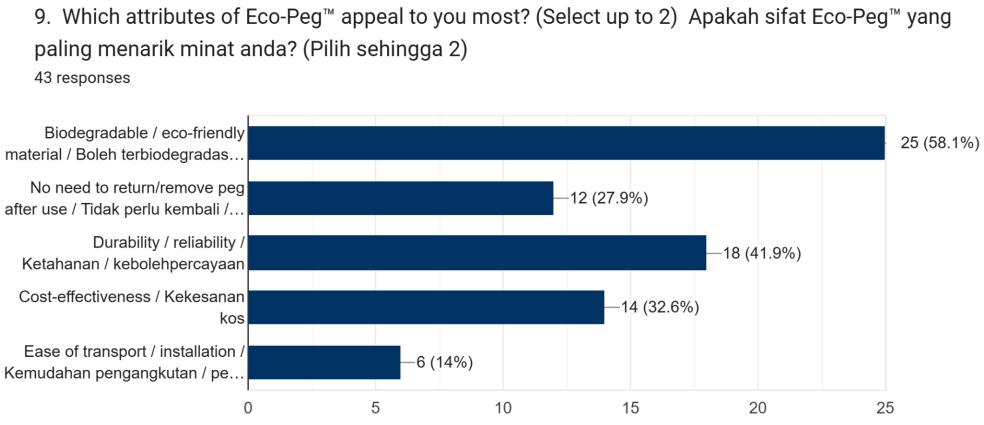

Figure 3.3.5.9: Respondents Most Appealing Attributes of Eco-Peg™

Figure 3.3.5.9 shows that the attribute most appealing to respondents is biodegradability and eco-friendly material, selected by 58.1% (25 respondents). Other notable attributes include durability/reliability (41.9%), cost-effectiveness (32.6%), and the convenience of not needing to return or remove the peg after use (27.9%). Ease of transport or installation was the least selected attribute (14%). These findings indicate that respondents place high importance on environmental sustainability and product reliability, while operational convenience and cost are also valued. Eco-Peg™'s biodegradable design and durable yet convenient nature align well with the key factors that influence potential adoption, suggesting strong market acceptance among users seeking sustainable and practical survey markers.

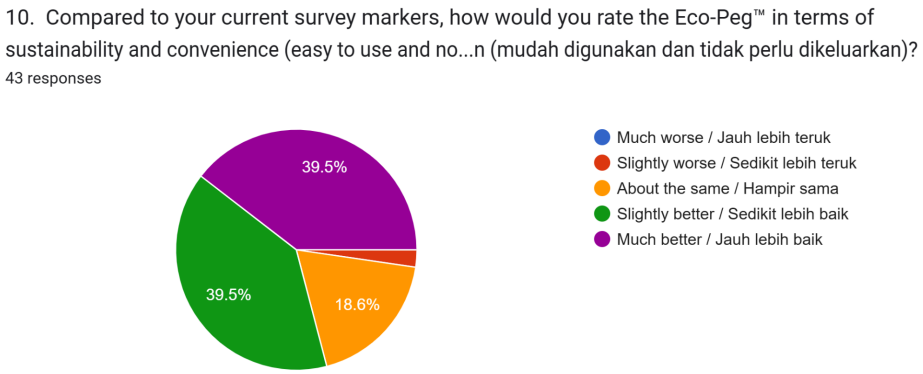

Figure 3.3.5.10: Comparison of Eco-Peg™ with Current Survey Markers in Terms of Sustainability and Convenience

Figure 3.3.5.10 shows that respondents generally view Eco-Peg™ as better than current survey markers in terms of sustainability and convenience. Specifically, 39.5% rated it as Slightly Better and another 39.5% rated it as Much Better than current survey markers, while 18.6% considered it About the Same. Only 2.3% (1 respondent) felt it was slightly worse, and no respondents rated it as much worse. These findings suggest that Eco-Peg™ is perceived as a significant improvement over conventional markers, particularly due to its biodegradable material and ease of use without requiring retrieval.

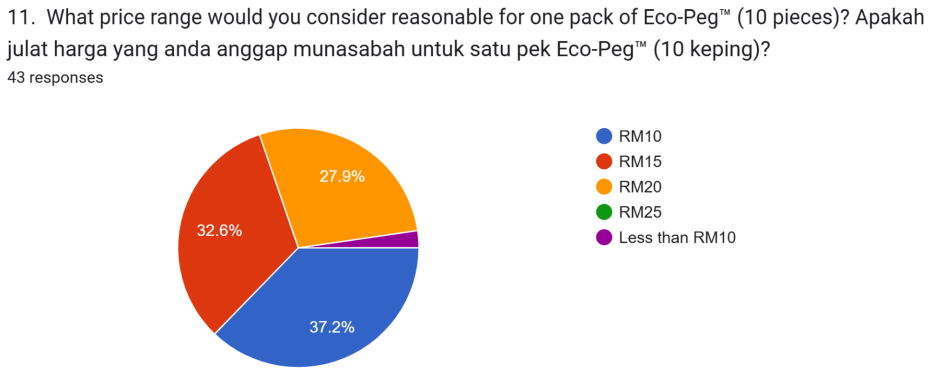

Figure 3.3.5.11: Respondents' Preferred Price Range for One Pack of Eco-Peg™

Figure 3.3.5.11 shows that respondents generally consider Eco-Peg™ to be reasonably priced between RM10 and RM20 per pack. The largest proportion (37.2% or 16 respondents) preferred RM10, followed by 32.6% (14 respondents) who selected RM15, and 27.9% (12 respondents) who chose RM20. Only 2.3% (1 respondent) considered RM25 reasonable. These findings suggest that the majority of respondents are price-sensitive and prefer Eco-Peg™ to be affordable while maintaining its quality and sustainability features.

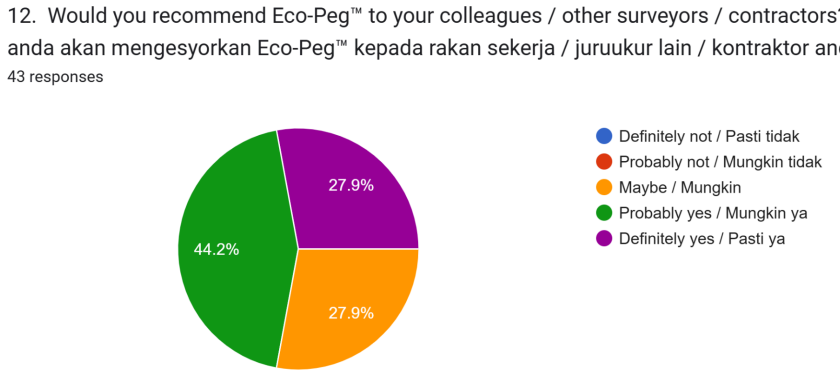

Figure 3.3.5.12: Respondent Willingness to Recommend Eco-Peg™ to Colleagues or Other Professionals

Figure 3.3.5.12 shows that respondents are generally willing to recommend Eco-Peg™ to their colleagues, other surveyors, or contractors. Specifically, 44.2% of respondents indicated Probably Yes, 27.9% chose Definitely Yes, and another 27.9% responded Maybe. No respondents selected Probably Not or Definitely Not. These findings indicate a positive recommendation intention, reflecting respondents' confidence in Eco-Peg™'s usefulness, convenience, and eco-friendly features. The willingness to recommend the product further suggests strong market acceptance and potential for wider adoption among professionals in surveying and construction fields.

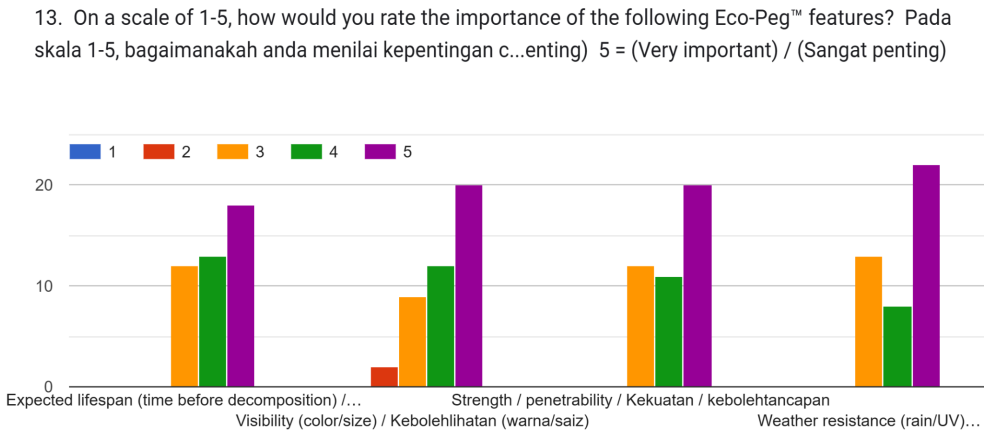

Figure 3.3.5.13: Importance of Eco-Peg™ Features

Figure 3.3.5.13 indicates that respondents generally consider all listed Eco-Peg™ features to be important to very important. For expected lifespan, most respondents rated it highly, with 18 respondents chose Very Important, followed by 13 respondents chose Important, and 12 chose neutral. This shows that durability and the time before decomposition is a key consideration for potential users. Regarding visibility (color/size), the majority of respondents also placed high importance, with 20 respondents choosing Very Important and 12 choosing Important, highlighting the need for pegs that are easily distinguishable in the field. For strength and penetrability were similarly valued, with 20 respondents rating Very Important, indicating that users expect Eco-Peg™ to be robust enough for practical surveying tasks. For weather resistance

was rated as highly important, with 22 respondents choosing Very Important, followed by 8 choosing Important and 13 selecting Neutral, reflecting that surveyors are concerned about the peg's performance under rain, sunlight, and other environmental conditions.

The last question in the questionnaire is open-ended responses indicating that respondents generally have constructive suggestions and practical concerns regarding Eco-Peg™. Key concerns include durability and resilience, particularly under adverse weather conditions, wet, or muddy soil, and the need to maintain strength over time. Respondents also highlighted the importance of clear identification on site, suggesting the use of eco-safe dyes or different sizes to improve visibility and usability. Several responses focused on product accessibility and affordability, emphasizing the need for competitive pricing and ease of purchase.

4.0 CONCLUSION

The findings from the test marketing survey indicate that Eco-Peg™ has strong potential for acceptance in the surveying and construction sectors. The results show that commonly used survey markers, particularly wooden and plastic pegs, are associated with several limitations, including limited durability, environmental concerns, and the need for retrieval after use. Although respondents generally expressed moderate satisfaction with existing markers, these issues highlight the need for an improved and more sustainable alternative.

Overall, Eco-Peg™ received a positive response from respondents, with a high level of interest in its potential use. Environmental sustainability was identified as an important factor influencing user preference, which aligns well with the biodegradable nature of Eco-Peg™. In addition, respondents perceived Eco-Peg™ as more sustainable and convenient compared to conventional survey markers and expressed a willingness to recommend the product to others. These findings suggest that Eco-Peg™ effectively addresses current user needs and demonstrates strong potential for successful adoption within the surveying and construction industries.

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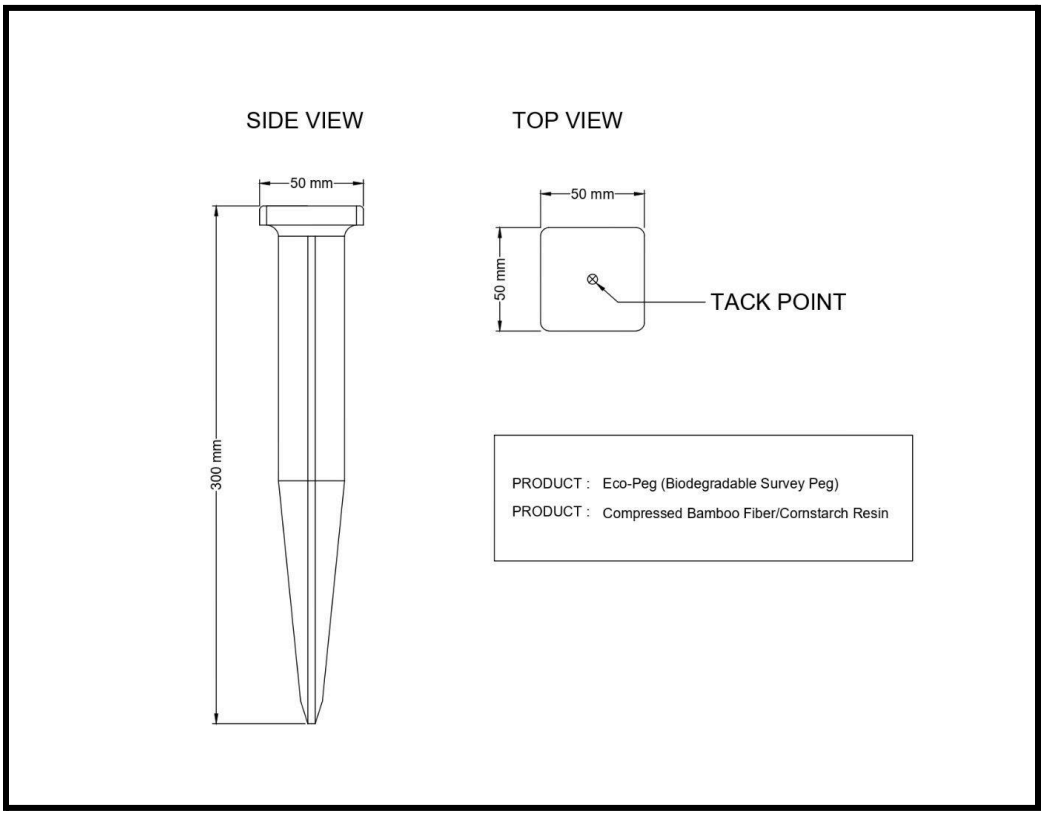
APPENDICES



Layout Eco-Peg™

3D Illustration of Eco-Peg™ Model

A questionnaire survey distributed to the public

https://docs.google.com/forms/d/e/1FAIpQLScRLz0hk0wWoQJQq3frNExAQeKPKFX9ha3CaRMZ9FYqMR6Ylg/viewform

Our Eco-Peg™ Product Survey

Assalamualaikum and greetings to everyone!

We are Semester 7 students from the Bachelor of Surveying Science and Geomatics (Hons), Faculty of Built Environment, UiTM Shah Alam. We are currently conducting a survey for our ENT600 subject to gather feedback on a new product development known as Eco-Peg™.

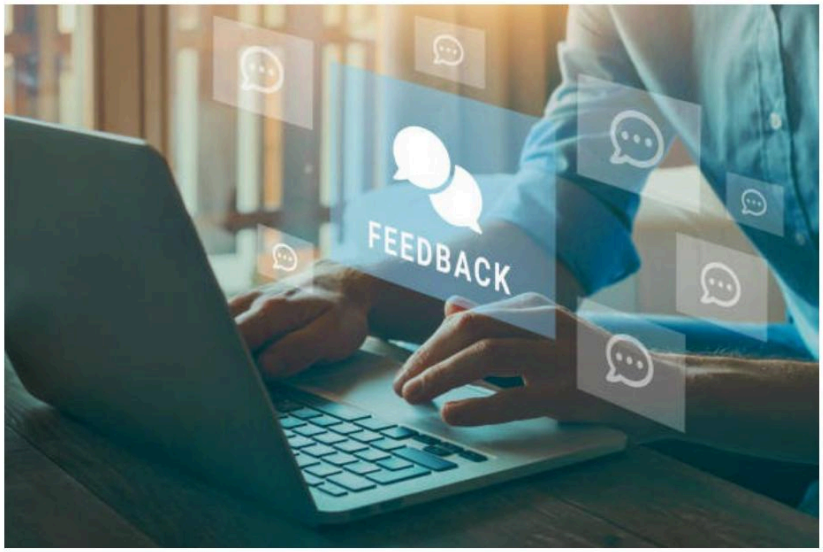
This survey aims to understand user needs and improve the design and user experience of Eco-Peg™. Eco-Peg™ is a biodegradable survey peg designed to decompose naturally after use, eliminating the need for retrieval and reducing environmental impact.

This survey will take only 2–3 minutes of your time.

All responses will remain confidential and will be used solely for academic purposes.

Your feedback is highly appreciated, and your support means a lot to our project.

Thank you for your time and cooperation.



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Our Eco-Peg™ Product Survey

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* Indicates required question

Section A: Respondent Demographics / Background

Bahagian A: Demografi / Latar Belakang Respondent

What is your gender? *
Apakah jantina anda?

- ◯ Male
- ◯ Female

*

What is your age?
Berapakah umur anda?

- ◯ 18 - 21
- ◯ 22 - 25
- ◯ 26 and Above

1. *

What is your occupation/profession?
Apakah pekerjaan/profession anda?

- ◯ Land surveyor / Survey crew / Juruukur tanah / Krew ukur
- ◯ Construction / Civil engineering / Pembinaan / kejuruteraan awam
- ◯ Developer / Builder / Contractor / Pemaju / Pembina / Kontraktor
- ◯ Student / Pelajar
- ◯ Other:

2. *

How often do you conduct land/site surveys per year?
Berapa kerap anda menjalankan tinjauan tanah/tapak setahun?

- ◯ Less than 5 times / Kurang daripada 5 kali
- ◯ 5–10 times / 5–10 kali
- ◯ 11–20 times / 11–20 kali
- ◯ More than 20 times / Lebih daripada 20 kali

3. *

What type of survey markers do you currently use? (You may choose more than one)
Apakah jenis penanda ukur yang anda gunakan sekarang? (Boleh pilih lebih daripada satu)

- ☐ Wooden stakes / Pancang kayu
- ☐ Plastic pegs/markers / Pancang/penanda plastik
- ☐ Paint/spray marking / Cat / penanda semburan
- ☐ Other:

Our Eco-Peg™ Product Survey

Sign in to Google to save your progress. Learn more

* Indicates required question

Section B: Perception & Attitude towards Existing Tools

Bahagian B: Persepsi & Sikap terhadap Alat Sedia Ada

4. *

On a scale of 1–5, how satisfied are you with your current survey markers (wooden stakes / plastic pegs etc.)?
Pada skala 1–5, sejauh mana anda berpuas hati dengan penanda ukur semasa anda (pancang kayu / pancang plastik dll.)?

	1	2	3	4	5	
1 = Very unsatisfied / Sangat tidak berpuas hati	○	○	○	○	◉	5 = Very satisfied / Sangat berpuas hati

5. *

What are the main problems you face with current markers? (Select all that apply)
Apakah masalah utama yang anda hadapi dengan penanda semasa? (Pilih semua yang berkenaan)

- [ ] Markers break or degrade quickly / Penanda mudah patah atau rosak dengan cepat
- [ ] Plastic markers cause environmental / waste issues / Penanda plastik menyebabkan masalah alam sekitar / sisa
- [ ] Need to revisit site to collect/remove markers / Perlu melawat semula tapak untuk mengumpul/mengeluarkan penanda
- [ ] Hard to transport or carry many stakes / Sukar untuk mengangkut atau membawa banyak pancang
- [ ] Other:

6. *

In your view, how important is environmental sustainability when choosing survey markers?
Pada pandangan anda, sejauh mana pentingnya kelestarian alam sekitar semasa memilih penanda ukur?

- ○ Not important / Tidak penting
- ○ Slightly important / Kurang penting
- ○ Moderately important / Sederhana penting
- ○ Important / Penting
- ○ Very important / Sangat penting

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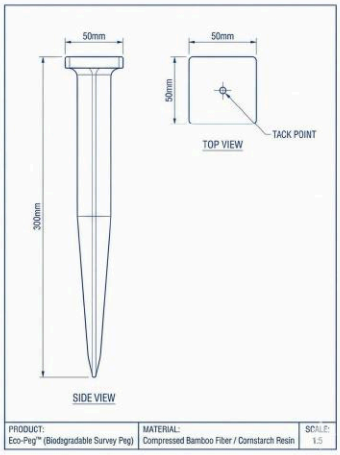
Our Eco-Peg™ Product Survey

* Indicates required question

Section C: Reaction & Interest towards Eco-Peg™ Concept

Bahagian C: Reaksi & Minat terhadap Konsep Eco-Peg™

First prototype of Eco-Peg™
Prototaip pertama Eco-Peg™



Introduction:

What is Eco-Peg™? Eco-Peg™ is an innovative survey peg designed to tackle industrial waste in the geomatics and construction fields. Unlike traditional plastic or treated wooden pegs that are often abandoned and cause long-term pollution, Eco-Peg™ is made entirely from organic materials (bamboo fiber and cornstarch resin).

Why Eco-Peg™?

- Natural Decomposition:
It is engineered to stay durable for 3 to 6 months (perfect for project timelines) before safely decomposing back into the soil.
- Saves Time & Labor:
Eliminates the need for "retrieval trips." Surveyors no longer need to return to the site just to pull out or dispose of old pegs—saving fuel and manpower.
- Zero Waste:
Helps prevent microplastic contamination and supports Malaysia's Green Technology Master Plan and Global Sustainability Goals (SDG 12).

Pengenalan:

Apa itu Eco-Peg™? Eco-Peg™ adalah pancang ukur inovatif yang direka khusus untuk menangani isu sisa industri dalam bidang ukur tanah dan pembinaan. Tidak seperti pancang plastik atau kayu tradisional yang sering ditinggalkan dan mencemarkan tanah, Eco-Peg™ diperbuat daripada bahan organik sepenuhnya (serat buluh dan resin jagung).

Kenapa Eco-Peg™ penting?

- Biodegradasi Semulajadi:
Ia akan mereput sepenuhnya ke dalam tanah selepas 3 hingga 6 bulan—cukup lama untuk tempoh projek tetapi tidak mencemarkan alam sekitar.
- Jimat Kos & Tenaga:
Juruukur tidak perlu lagi kembali ke tapak semata-mata untuk mencabut atau membuang pancang lama (tiada kerja pembersihan diperlukan).
- Sifar Mikroplastik:
Membantu mengurangkan sisa plastik di tapak pembinaan dan menyokong matlamat kelestarian negara (SDG 12).

7. *

What is your first impression of Eco-Peg™?
Apakah tanggapan pertama anda tentang Eco-Peg™

- ◯ Very negative / Sangat negatif
- ◯ Somewhat negative / Agak negatif
- ◯ Neutral
- ◯ Somewhat positive / Agak positif
- ◯ Very positive / Sangat positif

7(a). *

Please explain the reason for your answer in Question 7.

Your answer

8. *

How likely are you to use Eco-Peg™ if it is available?
Sejauh mana kemungkinan anda akan menggunakan Eco-Peg™ jika ia tersedia?

- ◯ Very unlikely / Sangat tidak mungkin
- ◯ Unlikely / Tidak mungkin
- ◯ Likely / Mungkin
- ◯ Very likely / Sangat mungkin

8(a). *

Please explain the reason for your answer in Question 10.

Your answer

9. *

Which attributes of Eco-Peg™ appeal to you most? (Select up to 2)
Apakah sifat Eco-Peg™ yang paling menarik minat anda? (Pilih sehingga 2)

- [ ] Biodegradable / eco-friendly material / Boleh terbiodegradasi / bahan mesra alam
- [ ] No need to return/remove peg after use / Tidak perlu kembali / mengeluarkan pancang selepas digunakan
- [ ] Durability / reliability / Ketahanan / kebolehpercayaan
- [ ] Cost-effectiveness / Kekesanan kos
- [ ] Ease of transport / installation / Kemudahan pengangkutan / pemasangan
- [ ] Other:

10. *

Compared to your current survey markers, how would you rate the Eco-Peg™ in terms of sustainability and convenience (easy to use and no need for removal)?
Berbanding dengan penanda ukur semasa anda, bagaimanakah anda menilai Eco-Peg™ dari segi kelestarian dan kemudahan (mudah digunakan dan tidak perlu dikeluarkan)?

- ◯ Much worse / Jauh lebih teruk
- ◯ Slightly worse / Sedikit lebih teruk
- ◯ About the same / Hampir sama
- ◯ Slightly better / Sedikit lebih baik
- ◯ Much better / Jauh lebih baik

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Our Eco-Peg™ Product Survey

* Indicates required question

Section D: Purchase Intent & Feedback

Bahagian D: Niat Pembelian & Maklum Balas

11. *

What price range would you consider reasonable for one pack of Eco-Peg™ (10 pieces)?
Apakah julat harga yang anda anggap munasabah untuk satu pek Eco-Peg™ (10 keping)?

- ◯ RM10
- ◯ RM15
- ◯ RM20
- ◯ RM25
- ◯ Other:

12. *

Would you recommend Eco-Peg™ to your colleagues / other surveyors / contractors?
Adakah anda akan mengesyorkan Eco-Peg™ kepada rakan sekerja / juruukur lain / kontraktor anda?

- ◯ Definitely not / Pasti tidak
- ◯ Probably not / Mungkin tidak
- ◯ Maybe / Mungkin
- ◯ Probably yes / Mungkin ya
- ◯ Definitely yes / Pasti ya

13. *

On a scale of 1-5, how would you rate the importance of the following Eco-Peg™ features?
Pada skala 1-5, bagaimanakah anda menilai kepentingan ciri-ciri Eco-Peg™ berikut?

1 = (Very not important) / (Sangat tidak penting)
5 = (Very important) / (Sangat penting)

	1	2	3	4	5
Expected lifespan (time before decomposition) / Jangka hayat yang dijangka (tempoh sebelum reput)	○	○	○	○	○
Visibility (color/size) / Kebolehlihatan (warna/saiz)	○	○	○	○	○
Strength / penetrability / Kekuatan / kebolehtancapan	○	○	○	○	○
Weather resistance (rain/UV) / Rintangan cuaca (hujan/UV)	○	○	○	○	○

14.

What concerns or suggestions to improve our Eco-Peg™? (Open-ended)
Apakah kebimbangan atau cadangan yang anda ada tentang Eco-Peg™? (Soalan terbuka)

Your answer

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Our Eco-Peg™ Product Survey

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THANK YOU

Your time and response means a lot to us.

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