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Development Of Traditional Game Model With Digital Technology As Sport Tourism The Borobudur Temple Tourism Village

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Abstract

Introduction: Traditional games form part of a nation's cultural heritage and are full of educational, social, health and character-building values. However, in today's digital age, children and adolescents are losing interest in traditional games, which are being replaced by individualistic and passive online games.

Methodology: This research used a Research and Development (R&D) model with a sequential explanatory mixed methods design. The subjects included six experts and 200 participants (50 in a small trial and 150 in a large trial). Data were analysed quantitatively using descriptive statistics and t-tests, and qualitatively through reduction, presentation and conclusion.

Results: The results showed that digital Goara games were rated as 'very good' by experts (average 93.11%), with the majority of the public also expressing interest (96%). Significant improvements in acceptability and ease of play were seen in both small- and large-scale trials, while field design remained high.

Discussion: The results showed that the digital Goara game received a positive response from the community. Respondents rated the game as fun, interesting, worthy of publication and not boring.

Conclusion: The Goara-Goara game proved to be a feasible, interesting and effective innovation in sports tourism and cultural preservation. Further research will focus on wider-scale testing, the integration of interactive technology and the analysis of socio-economic impacts on tourism villages.

INTRODUCTION

Traditional games form part of a nation's cultural heritage and are full of educational, social, health and character-building values. However, in today's digital age, children and adolescents are losing interest in traditional games, which are being replaced by individualistic and passive online games. This has an impact on children's opportunities to develop motor skills, cooperation, communication and the values of togetherness inherent in traditional games (Hartanto et al., 2021; Irmansyah et al., 2020).Traditional games also play an important role in developing communication and interaction skills. They can be incorporated into physical education programmes to emphasise the role of traditional sports games in strengthening children's social skills at primary school level. Fitri et al., (2020) emphasise that traditional games are a means of preserving the nation's culture, as demonstrated by the commemoration of Independence Day, which reminds the younger generation of the importance of mutual assistance. Similarly, (Martínez-Santos et al., 2020) outline how traditional games can be meaningfully integrated into Physical Education Learning.

Traditional games are not only educational, but also reflect local knowledge. Anshory & Sulistijorini, (2019) reveal ethnobotanical elements in traditional children's games in Central Java, enriching the local wisdom tradition. Dewi et al., (2025) compared traditional and modern games, finding that traditional

games encourage more active participation and social interaction among children. Therefore, traditional games have advantages over modern games in terms of strengthening the motor, social, and cultural aspects of children.

Indonesia has great potential for developing sports tourism, particularly at the popular tourist destination of Borobudur Temple, which has seen a significant drop in visitor numbers since the pandemic. Innovatively packaged traditional games could provide a new tourist attraction while supporting the creative economy of the surrounding community. However, much of the existing research has focused on cultural preservation, education, or physical learning. The use of digital technology to innovate and improve the transparency, accuracy and appeal of traditional games remains limited (Aliriad, 2024).

The current literature emphasises the important contribution of traditional games to the motor, cognitive and social development of children. Several studies have proven that traditional games effectively develop basic movement skills, including both manipulative and locomotor skills, thereby supporting children's physical and emotional development (Rejeki et al., 2022; Santoso et al., 2024; Sapitri, 2023; Widiarti & Anggita, 2022).Sulistyaningtyas & Fauziah, (2019) research confirms that traditional games can be used in early childhood education to foster creativity, cooperation and social skills. Similarly,Williams & Pill, (2021) demonstrate that traditional Asian games can serve as a critical pedagogical tool to enrich physical education knowledge, while the study byLi et al., (2024) highlights the potential of integrating traditional games into physical education to foster students' skills and interests.

Sport tourism is developing as a global trend with the potential to stimulate the local economy and enhance the appeal of tourist destinations. Pappous & Hayday, (2016) study of the impact of the 2012 London Olympics suggests that sports, including non-traditional ones, can encourage wider community participation and engagement. This is relevant to efforts to develop sports tourism based on traditional games in Indonesia, particularly in popular tourist destinations such as Borobudur, which has experienced a decline in tourism numbers since the pandemic.

In the digital age, technology-based modernisation is essential for cultural products to remain relevant to the younger generation. However, previous research has largely overlooked traditional game models packaged in a modern, digital way. Much of the existing research focuses on preserving culture or improving physical skills without incorporating technological elements that could broaden the appeal of traditional games to the public and tourists.

The goara-goara innovation product combines traditional Indonesian sports such as Rangku Alu, sack racing, multilevel rope jumping, suda manda/engklek, spinning rope jumping, bamboo stilts and boy-boyan, as well as bamboo climbing, which are played one after the other in the fastest time possible. Digital technology is applied throughout this goara-goara game, from the start to the finish. To complete the game, goara-goara players must conquer all the challenges of the traditional games and sports, and press the finish button to signal the end of the game. The shape and size of the Goara-Goara field is unique because it is formed from a pattern of letters G facing each other, representing the word 'Goara-Goara'. The two letters G face each other and are united by two letters S, which face each other as well

and represent Slamet Santoso. The Goara-Goara field is shaped like the letter G, facing each other and connected by two S-shaped tracks. The field is 245 metres long and divided into eight posts, each with a different shape, size and length. More details can be seen in Fig. 1 below.

This innovation differs fundamentally from previous research in that it is designed using procedural development methods involving expert validation stages and trials ranging from small-scale to wide-scale. The research instruments use a combination of quantitative and qualitative approaches with a sequential explanatory design to provide more comprehensive results. The research focuses on the community of tourist villages around Borobudur, ensuring that the resulting products align with local potential and support the development of sports tourism.

This research is urgent because there is a need to revive traditional games using a modern approach. This approach is beneficial for education and public health and supports the development of local culture-based sports tourism. Unlike previous studies that focused solely on preserving traditional games, this study introduces a new concept: the modernisation of traditional games in a digital format with a unique G-S field design.

This study is the first to integrate traditional Indonesian games into digital sports tourism, combining a conservative and modern approach. This innovation is expected to contribute significantly to three key areas: the preservation of culture, the development of tourism innovation and the development of accurate and transparent digital instruments in sports tourism. It is also expected to increase the tourist appeal of Borobudur post-pandemic. To this end, the study aims to determine the acceptability of Goara-Goara game products incorporating digital technology as a form of sports tourism, analyse public interest in the game, examine tourists' and spectators' responses to participating in and watching Goara-Goara, evaluate organisers' responses to implementing this digital technology, and assess Goara-Goara's effectiveness as a sports tourism conservation initiative utilising digital technology.

METHODS

This study uses a Research and Development (R&D) model to produce innovative traditional Goara-Goara games based on digital technology. This model was chosen because it is well-suited to producing new products that can be validated and implemented in real contexts (Judijanto et al., 2024; Kamal, 2019). The research design is a sequential explanatory mixed methods approach: first, quantitative data is collected, and then this is supplemented with qualitative data to gain a more comprehensive understanding of acceptability, effectiveness and community and tourist response. This approach is considered appropriate because it integrates the strengths of numerical and qualitative data when evaluating social phenomena (Liu, 2024). Combining R&D with mixed methods, this research produces innovative products and provides an empirical evaluation of their effectiveness in improving traditional game-based sports tourism.

This study involved three main groups of subjects. Firstly, there was an expert evaluation (product validation) consisting of six experts, including two recreational sports experts, two sport tourism and

culture experts, and two traditional sports practitioners from the Department of Youth, Sports and Tourism and the Magelang Regency Committee for Sports and Recreation (KORMI). Secondly, a small-scale trial involving 50 community members was conducted in Candirejo Village, Magelang Regency. Thirdly, large-scale trials were conducted in five villages in the Borobudur district (Rejo Temple, Bumi Harjo, Wanurejo, Tuksongo and Wringin Putih), involving a total of 150 community members. Overall, the study involved 206 participants, including those in the expert validation and the small- and large-scale trials. The majority of participants came from the Tourism Village community and expressed an interest in innovation-based traditional games in the preliminary research.

Data collection instruments included observations, questionnaires, interviews and expert validation sheets with success indicators in the form of acceptance, interest, responses and the effectiveness of the game as a form of sports tourism. The research procedure begins with a preliminary study to identify needs, followed by planning and designing the initial Game Goara-Goara product. Next, the design was validated by experts and revised before being tested on a small scale with 50 participants. The results of this trial formed the basis for further revisions, after which a large-scale trial was conducted with 150 participants from five villages in the Borobudur subdistrict. Quantitative data analysis was carried out using descriptive statistics and t-tests at a significance level of 5%, while qualitative analysis involved reduction, presentation and conclusion to make the results of the study more comprehensive.

RESULT

The main problem is that people are losing interest in traditional games amid the rapid digitisation process and the dominance of online games. This causes the loss of the educational, social and health benefits that traditional games offer. This study proposes innovative Goara-Goara games based on digital technology to conserve and modernise traditional games, with the aim of attracting public interest and supporting the development of sports tourism in the Borobudur area.

Expert validation instruments were used to assess the games, and the validators, who were academics, practitioners and humanists, gave very good scores for ease of orientation, security, attractiveness, trajectory innovation and the application of digital technology in the form of timers, sound effects and monitors. Based on this assessment, the experts concluded that the Goara-Goara model requires little substantial revision and is worthy of us

Table 1
Recapitulation Of Goara-Goara Game Innovation Expert Validation Results

No	Respondent code	Total	Percentage	Criteria
1	R – 1	71	94,67%	VG
2	R – 2	68	90,67%	VG
3	R – 3	67	89,33%	VG
4	R – 4	72	96,00%	VG
5	R – 5	71	94,67%	VG
6	R – 6	70	93,33%	VG

Table 2
Expert validation assessment percentage Interval

Interval Percent	Frequency	Criteria	Persentasi	Classical average
81,26% – 100%	Very Good	6	100%	93,11%
62,51% – 81,25%	Good	0	0%	
43,76% – 62,50%	Less good	0	0%	
25% – 43,75%	Very poorly	0	0%	
Total		6	100%	Very Good

Based on the results of the expert validation of the Goara-Goara Game Innovation (see Table 1), the six expert respondents provided assessments with average scores ranging from 67 to 72 and percentages ranging from 89.33% to 96%. All of these assessments were in the 'very good' category (SB), indicating that the Goara-Goara game is considered feasible and relevant for development as an innovative product. A recapitulation of the validation results based on the percentage interval (Table 2) showed that all of the experts' assessments were in the 81.26–100% range, falling into the 'very good' category. No expert gave an assessment in the Good, Less Good or Very Less Good categories. Overall, the average classical expert validation score was 93.11%, indicating that Goara-Goara game products have a very high level of feasibility for implementation.

Table 3
Interest and public interest in the game Goara-Goara Digital technology

Questionnaire	Categories	Frequency	
		Absolute (f)	Percentage (%)
Calculation of public interest and interest in the traditional game of Goara-Goara	Not interested/interested	6	4%
	Interested/Interested	129	96%
Total		**135**	**100%**

The results of the questionnaire showed that the majority of respondents were very interested in the traditional Goara-Goara game based on digital technology. Of the 135 respondents, 129 (96%) expressed interest, while only 6 (4%) did not. This finding indicates a high level of community acceptance, suggesting that Goara-Goara has great potential for further development as a recreational activity, a means of cultural preservation and a sport for tourism, all based on digital innovation.

Table 4
Descriptive summary of small-scale and large-scale tests

Indicators	Small scale (n = 50)	Large scale (n = 150)
Accept (interest & acceptance)	Mean = 0,94 ; SD = 0,08	Mean = 0,97 ; SD = 0,06
Design (attractive field design)	Mean = 0,92 ; SD = 0,12	Mean = 0,95 ; SD = 0,10
Ease (ease of play, Pos1–8)	Mean = 0,78 ; SD = 0,15	Mean = 0,82 ; SD = 0,14

Table 5
Proportion Of “Yes”Answers

Item	Small scale (n = 50)	Large scale (n = 150)
Not boring (Q1 = no)	96%	98,5%
Interested in circuit design (Q2 = yes)	92%	94,8%
Interested in playing again (Q3 = yes)	94%	97%
Fun (Q5 = Yes)	94%	97,8%
Publishable (Q15 = Yes)	100%	100%

Based on the results of the Goara-Goara digital game trial, scores increased on almost all indicators when switching from a small-scale test (n = 50) to a large-scale test (n = 150) (see Table 4). The Accept aspect (interest and acceptance) increased from a mean of 0.94 (SD = 0.08) to 0.97 (SD = 0.06), indicating greater acceptance among participants. The design aspect (attractiveness of the circuit design) increased from a mean of 0.92 (SD = 0.12) to 0.95 (SD = 0.10), and the Ease aspect (ease of play) increased from a mean of 0.78 (SD = 0.15) to 0.82 (SD = 0.14). Data on the proportion of 'Yes' answers (Table 5) reinforce these findings. Most respondents rated the game as not boring (96% in the

small test; 98.5% in the large test), expressed interest in circuit design (92% to 94.8%) and indicated that they would like to play again (94% to 97%). Additionally, nearly all respondents rated the game as fun (94% to 97.8%) and worthy of publication (100% on both scales). These results suggest that Goara-Goara has received an overwhelmingly positive response from the public, both in small- and large-scale trials, with acceptance tending to increase as trials expand.

Table 6
Independent t-test results (small vs. large scale)

Indicators	Mean (Small)	Mean (Large)	t	df	p	Cohen's d
Accept	0,94	0,97	-2,05	198	0,042*	0,32
Design	0,92	0,95	-1,21	198	0,229	0,19
Ease	0,78	0,82	-2,15	198	0,033*	0,34

Specification: * $p < 0.05$ significant.

The results of the t-test showed that the Accept aspect of interest and acceptance increased significantly from 0.94 on a small-scale test to 0.97 on a large-scale test ($t(198) = -2.05$, $p = 0.042$, $d = 0.32$). The Ease (ease of play) aspect also increased significantly, from 0.78 to 0.82 ($t(198) = -2.15$, $p = 0.033$, $d = 0.34$). Meanwhile, the Design aspect (attractiveness of circuit design) increased from 0.92 to 0.95, but this increase was not significant ($p = 0.229$) as it was already rated very highly from the beginning, limiting the potential for further improvement. Thus, Goara-Goara digital technology is increasingly being accepted by the public, particularly in terms of acceptability and ease of use, with consistent positive assessments of the design. The Goara-Goara digital game showed a significant increase. The majority of respondents rated the game as fun and worthy of publication, and said they would like to play it again. Therefore, this product is highly feasible as a medium for recreation, cultural preservation and sport tourism based on digital innovation.

Field observations show high enthusiasm and well-established social interaction between players, indicating the potential for community participation in sport tourism. The participants' enthusiasm is clearly visible at every stage of the Goara-Goara game, from post 1 to post 8. Each post brings its own dynamic, triggering social interaction, teamwork and fun for players and spectators alike. This atmosphere demonstrates the great potential of this traditional game as a tourist attraction for sports enthusiasts. The following visual documentation displays key moments from each post during the game.

DISCUSSION

The findings of this study align with those of previous studies, which concluded that traditional games can enhance motor skills, social intelligence and cultural awareness. However, unlike previous studies that focused on conventional preservation aspects, this study broadens the scope by integrating digital technologies. This is in line with the current trend of digital literacy and the use of technology in education and culture. Alakrash & Razak, (2021) emphasise that digital technology supports not only

language learning but also strengthens digital literacy as a 21^(st)-century skill. Furthermore, Rafı & Usman, (2021) demonstrate that using Information Technology and digital learning models can enhance learning outcomes, including in citizenship education. In the context of cultural preservation, (Tian, 2020) suggests that innovation in cultural tourism can be achieved through the creative use of digital technology. Similarly, (Wang & Huang, 2023) assert that digital technology-based strategies are pivotal in developing cultural industries by innovatively utilising cultural resources. Thus, this study confirms that digitisation is a strategic dimension in maintaining and actualising traditional cultural values in the modern era, not merely a complementary means.

Numerous studies have demonstrated the positive impact of traditional games on motor skill development and physical fitness. Aliriad, (2023) confirms that using traditional games in physical education can improve both motor skills and student motivation to learn. This aligns with Badawi et al., (2023) research, which found that traditional games can enhance the physical fitness of high school students. Additionally, Bendriyanti & Haryono, (2021) and study proved the effectiveness of traditional games in developing gross motor skills in early childhood. Furthermore, Fadlan et al., (2023) emphasised that a traditional game-based active learning approach improves elementary school students' basic movement skills, and Ningsih et al., (2024) demonstrated significant improvements in these skills through traditional games.

This study confirms that modifying traditional games without losing their local essence can strengthen cultural values and address the challenges of the digital age. Therefore, traditional games serve not only as entertainment, but also as educational tools and media for cultural preservation. This aligns with the findings of Boonstra & Brillo, (2021), who emphasise the importance of sustainable innovation based on cultural values in adapting to changing times. Furthermore, Puspita et al., (2024) demonstrate that learning models based on local wisdom can improve learning outcomes, enabling cultural preservation to go hand in hand with strengthening the capacity of the younger generation. Therefore, this study contributes to the study of the revitalisation of traditional games as cultural assets and educational media in the modern era.

Integrating traditional games into sports tourism has proven to attract public and tourist interest, as well as opening up opportunities for culture-based tourism development. These findings complement previous research on the growth of post-pandemic sports tourism, particularly in the Borobudur area, which emphasises the integration of culture and sports. Similarly, (Yang et al., 2024) argue that cultural values play a moderating role in enhancing sports performance, particularly with regard to athlete well-being, exercise intensity and coaching quality.

The game is made more accurate, transparent and modern by innovations such as a unique G-S trajectory, a digital timer, a sound plant and a monitor screen. This innovation shows a significant difference from previous studies of traditional games, which are generally still oriented towards conventional preservation. From a sport tourism perspective, (Gammon et al., 2017)asserted that integrating sports and tourism requires a new conceptual framework to meet the demands of

modernisation. Consistent with this, Weed, (2009, 2011) emphasised the need for sports research, tourism and sports tourism to adopt a more dynamic identity approach. Thus, this game's innovation can be seen as a model of integration between tradition and technology, in line with the continuous innovation approach in sport tourism (Lasztovicza & Béki, 2016; Shonk, 2009).

The Goara-Goara game has the potential to become a new icon of sports tourism in Desa Wisata. As well as increasing community participation, the game opens up creative economic opportunities that support community-based tourism. Gibson & Fairley, (2022) argue that sports tourism can have a significant social impact, particularly in strengthening community ties. Fontaine, (2024) even suggests that integrating sport tourism with sustainable development could create a more resilient tourism model. In the context of destinations, (Hede, 2005) explained that sports tourism marketing strategies have been effective in increasing tourist attractions. FurthermoreChoi et al., (2020) highlighted the potential of sports tourism as a strategy for revitalising tourist areas. Furthermore, Dudney & Moghimehfar, (2024) discussed the socio-economic dynamics of sports tourism, highlighting the issue of overcrowding in sports tourism destinations. This indicates that the development of Goara-Goara must be properly managed to ensure a positive, sustainable impact. Thus, the development of the Goara-Goara game as an icon of sports tourism requires not only the right promotion strategy, but also sustainable management in order to be able to bring balanced economic, social and cultural benefits to the Tourism Village Community.

CONCLUSION

The innovation of traditional Goara-Goara games based on digital technology was very well received by the public as well as experts, where expert validation showed high feasibility on aspects of orientation, security, design, and technology integration. The results of the questionnaire also indicated a very high public acceptance, with the majority of respondents stating the game was interesting, fun, and worthy of publication as sport tourism. This innovation not only serves as a medium for cultural preservation, but also provides added value in the form of digital-based modernization that can increase the transparency, accuracy, and attractiveness of the game. Furthermore, this study reinforces the theory of the importance of revitalizing traditional games as well as presenting novelty in the context of community-based sports tourism that has the potential to support the local economy in the post-pandemic Borobudur area. For further development, this study recommends expanding the trial to other regions in Indonesia to test the external validity of the Goara-Goara model, the development of more sophisticated digital systems such as mobile applications or gamification to make the game more interactive, as well as cross-sector collaboration between local governments, cultural communities, and tourism actors in the implementation of superior sport tourism. In addition, socialization and education in schools and communities are very important to introduce Goara-Goara as an alternative to modern traditional games that support health, social interaction, and cultural preservation, accompanied by continuous evaluation to ensure sustainability, economic impact, and compliance with local wisdom.

Declarations

Ethics Agreement

This study has been reviewed by the Health Research Ethics Committee (KEPK) of the University Islamic Hospital (RSI-U). Based on the results of the review, the Ethics Committee provides an exception to the obligation of formal ethical approval (ethical approval waiver) because this study meets the criteria for minimal risk, does not involve clinical intervention, and uses data collected anonymously and/or secondarily so as not to pose additional risks to research subjects. This exception decision is issued by the KEPK RSI-U with reference number No. 14/KEPK/RSI-U/XII / 2025. This research was conducted in accordance with the principles of research ethics as well as relevant national and international guidelines, including the Declaration of Helsinki and regulations on Health Research Ethics in force in Indonesia.

Consent to participate

Free and informed consent was obtained from all participants prior to their involvement in the study. All participants have received an adequate explanation of the research objectives, procedures, potential risks and benefits, as well as their right to refuse or stop participation at any time without any consequences. For participants under the age of 16, consent is obtained from a parent or legal guardian in accordance with applicable ethical provisions.

Consent for publication

Not applicable. The study does not include any identifiable images or personal data of participants.

CONFLICT OF INTEREST

The writer states that there are no conflicts of interest.

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Author Contribution

S.S. conceived and designed the study, led the research framework, and coordinated the overall project. U.N. contributed to the methodology design and data analysis. R.F. was responsible for data collection

and field observations in the Borobudur Tourism Village. S.H. contributed to the development of the traditional game model and validation of learning activities. D.M. assisted in literature review and data interpretation. F.Y.N. contributed to the digital technology integration and technical design aspects. R.S. supported data processing and visualization. H.A. contributed to the discussion, implications, and critical revision of the manuscript. S.S. and R.F. wrote the main manuscript text. All authors reviewed, edited, and approved the final manuscript.

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Data Availability

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

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Figures

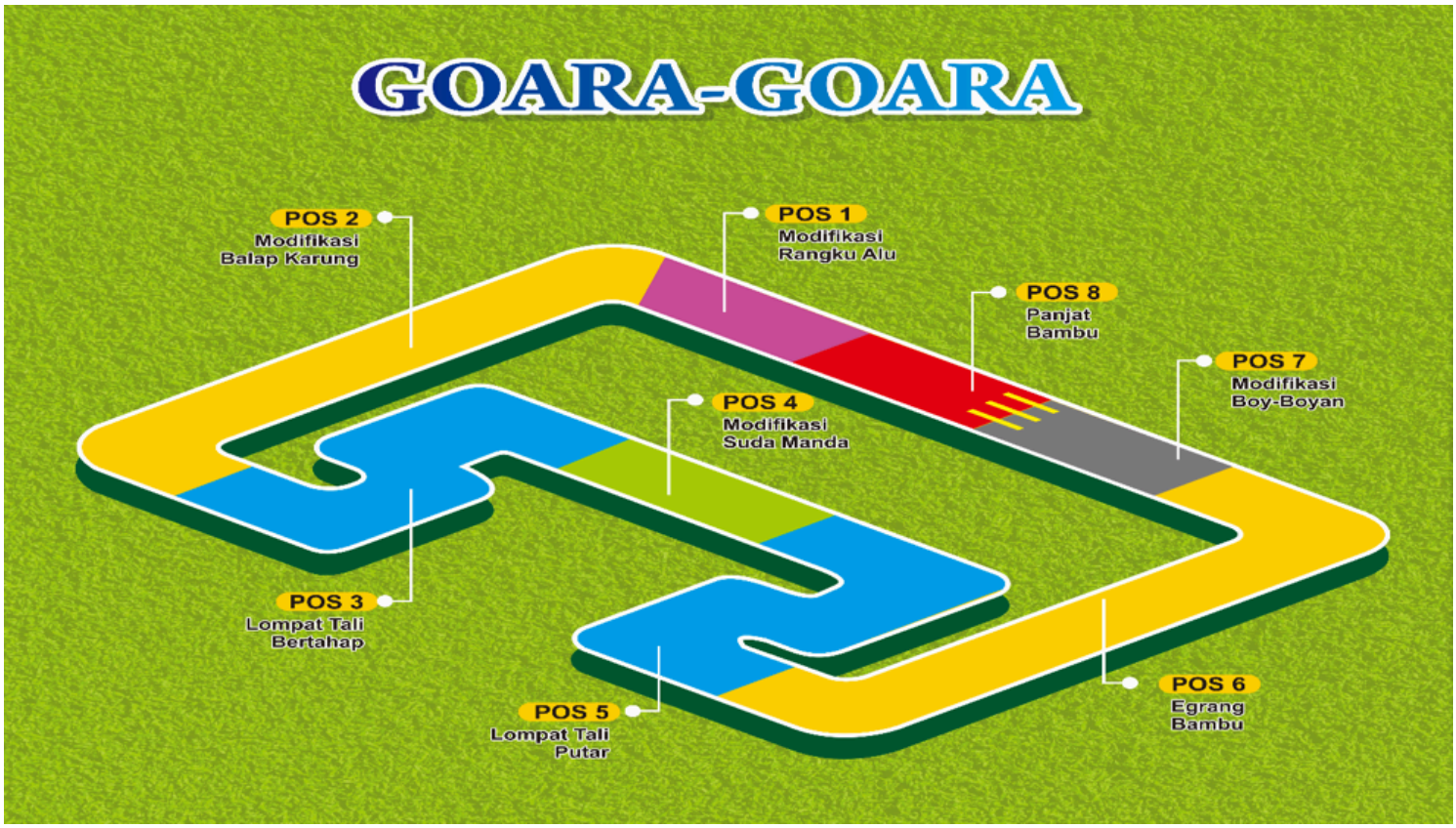


Figure 1

Goara-goara game field design

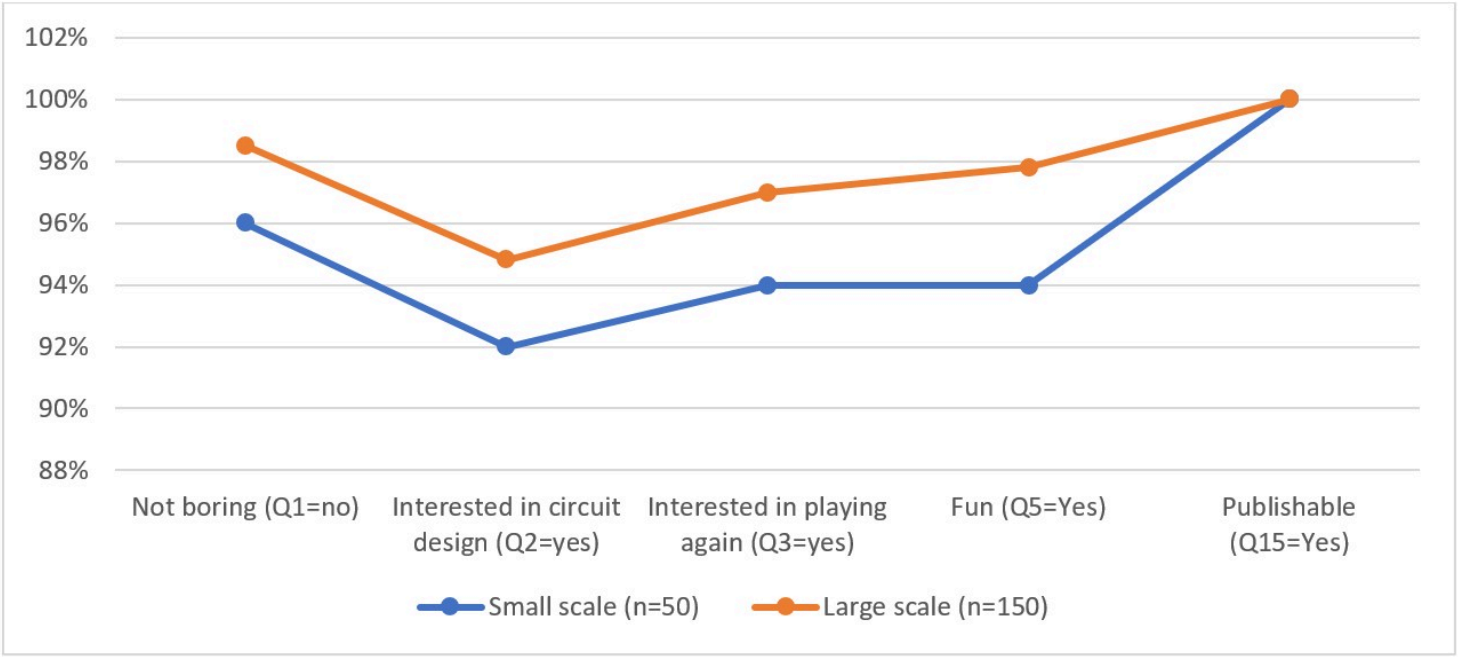


Figure 2

Small-scale and large-scale line charts