

Assessing the Effectiveness of Webinars in Delivering Knowledge of Natural Products and Pharmapreneurship

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Received Date: 05 November 2024

Accepted Date: 20 December 2024

Revised Date: 27 December 2024

Published Date: 31 January 2025

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ABSTRACT

Globally, natural products have played a pivotal role in drug discovery and the healthcare industry. Southeast Asia countries, particularly Malaysia and Indonesia, holds vast potential for innovative pharmaceuticals that integrate biodiversity with traditional knowledge. However, translating these resources into commercially viable products requires expertise in both pharmaceutical science and entrepreneurship, an emerging field known as pharmapreneurship. Pharmapreneurship, a concept that merges pharmaceutical aspects with entrepreneurial strategies to market natural product-based therapies, is a new field that has yet to be discovered in Malaysia. Given the limited local expertise in Malaysia, this study aimed to assess the effectiveness of a webinar as a knowledge-sharing platform on natural products and pharmapreneurship. This issue can be addressed through a webinar, which gathers participants and speakers worldwide. The primary objective of this study is to evaluate the effectiveness of a webinar in delivering knowledge on natural products and pharmapreneurship. A total of 388 participants participated in this study, with simple questions used to gauge their understanding. The effectiveness of the webinar is measured by comparing participants' knowledge before and after the webinar. Data were analysed using Statistical Package for Social Sciences (SPSS) version 28.0 and presented in tables and percentages. The findings revealed a significant improvement in participants' knowledge following the webinar ($p < 0.001$). In conclusion, this study underscores the role of webinars in enhancing professional education, especially in niche fields where expertise is limited. While the convenience sampling and simple question format were the limitations, presented results provide empirical support for webinars as effective tools for continuous learning and knowledge dissemination in pharmacy education for the advancement of pharmapreneurship.

Keywords: knoweldge, natural products, pharmapreneur, webinar

INTRODUCTION

Natural products have been known to originate from plants and animal sources, including microorganisms like marine organisms or fungi (Bontempo et al., 2023). Generally, they played a critical role in drug discovery, where some became essential drugs such as antibiotics, anticancer agents, and analgesics (Atanasov et al., 2021). Southeast Asia, including Malaysia and Indonesia, represents an

extraordinary opportunity to develop innovative pharmaceutical products by integrating biodiversity with traditional knowledge (Martin, 2023). In Malaysia, natural products have been utilised since ancient years for numerous purposes like health care, functional foods, cosmetics and dietary supplements. According to a review by (Othman et al., 2020), medicinal plants such as Aloe vera, *Curcuma longa*, and *Cocos nucifera* are among the commonly used plants in Malaysia that have been used for cosmetic formulations to treat skin conditions and hair problems.

Notably, the pharmaceutical industry is recently undergoing a paradigm shift as it is undeniably recognising the potential of natural products in the development of novel therapies (Thomford et al., 2018). However, integrating these natural resources into commercially tangible products requires the combination of expertise from scientific and entrepreneurial knowledge (Zaveri, 2024), as the goal is not only to produce pharmaceutical products but also for them to be able to compete in the global market, and eventually generate income for the economy. An emerging yet-to-be-discovered field known as pharmapreneurship is a field that combines the pharmaceutical sciences and entrepreneurship as one, focusing on the need for innovative business models that aim to bring natural products-based therapies from the research phase to the market (Akriti Singh, 2023).

Due to the lack of expertise in Malaysia, a sharing knowledge session (Zamiri & Esmaeili, 2024) from other experts outside Malaysia is recommended to expand the knowledge about pharmapreneur and advancing natural products in the pharmaceutical industry. The advantages of using webinars in sharing knowledge include their flexibility and accessibility (Dhawan, 2020). However, a lack of interaction and passive learning behaviours have become significant challenges in conducting webinars (Roslim et al., 2022). There is limited empirical data on its effectiveness in enhancing participants' knowledge, especially in the field of natural products and pharmapreneurship. Therefore, the objective of the study is to evaluate the effectiveness of webinars in sharing knowledge on advancing natural products in the pharmaceutical industry and pharmapreneurship.

LITERATURE REVIEW

The Use of Natural Products in Pharmaceutical Development

Natural products have been known for years ago for their originality from plants and animal sources, including microorganisms like marine organisms or fungi (Bontempo et al., 2023). Previously, it referred to as herbs or as traditional or herbal medicine to reflect its originality (H.G. Mikail, 2011). This is supported by the growing and widespread use of herbs such as valerian root, chamomile, lavender and ashwagandha in managing mental health well-being (Ohwovoriole, 2024). Natural products offer a vast untapped source of chemical diversity that is crucial for the development of new drugs, unlike synthetic compounds, as they may possess distinctive structural features and complex scaffolds that allow them to interact with biological targets (Newman & Cragg, 2020). A vast analysis performed on the use of natural products as the sources of the development of new drugs from 1981 to 2014 reported that about 75% of the newly approved anticancer drugs are derived from natural products (Newman & Cragg, 2016). Furthermore, a recent report on natural products over four decades by Newman & Cragg in 2020 revealed that approximately 50% of new drugs derived from natural products were introduced between 1981 and 2019 (Newman & Cragg, 2020).

Next, the integration of natural products into marketable drugs generally requires a synthetic modification to optimise and enhance their pharmacological properties (Bauer & Brönstrup, 2014; Chopra & Dhingra, 2021). This is because natural products, particularly herbal extracts, are composed of a complex mixture of multiple constituents that often interact synergistically with physiological systems, potentially leading to a broader range of effects and interactions depending on the content and dosage (Rocha, 2024). In contrast, most synthetic active pharmaceutical ingredients (APIs) used in product development consist of single substances with a defined mechanism of action (Rocha, 2024).

The development of 'nature-to-new' products, transforming natural resources into therapeutic solutions, can be achieved through an in-depth understanding of molecule-to-medicinal property analysis, supported by advancements in instrumentation technology (Acharya et al., 2024). The recent advancements in technology, such as virtual screening, high-throughput bioassays, and molecular modelling, have improved the efficiency of natural products in the drug discovery process (Najmi et al., 2022; Rodrigues et al., 2016). Lastly, advances in computational techniques such as quantum computing and predictive software, have further opened up a new path for synthesising and designing drugs based on natural compounds (Thomford et al., 2018; Zhang et al., 2020).

The Concept of Pharmapreneurship

Pharmapreneurship, a merger of the concept of pharmaceutical sciences and entrepreneurs, has been increasing in trend recently, where it encourages pharmacists and researchers to create innovative products by translating expertise into viable business ventures (Scahill & D'Souza, 2022). Pharmapreneurship concept is interested in identifying market needs, developing products that meet the needs and standards, and helping to navigate the regulatory background to guarantee that the published products are effective, safe, and accessible (Akriti Singh, 2023). There is limited data and research on the pharmapreneurship concept or the pharmapreneur. Therefore, there is a need for further research focusing on the interest in pharmapreneurship, particularly among registered pharmacists, as it could open whole new ideas for them. Even though there is no proper definition to define a pharmapreneur, it has been agreed that a pharmapreneur is a registered pharmacist with skilled sets of sales, marketing, and key accountant access to market experience in local and multinational companies (Sam & Parasuraman, 2015). A study among Jordanian pharmacists reported that entrepreneurial motivation (i.e., desirability for self-employment) can affect their pharmapreneurship intention (Osama Mohammad Ayesh et al, 2023). In another study, around 80% of the respondents, comprising pharmacist and pharmacy students, indicated their interest in entrepreneurship and believed it holds significant potential (Alnuhait et al., 2024). In Malaysia, there is a scarcity of the concept of pharmapreneur among registered pharmacists as they are comfortable with a permanent job and steady payslip in established pharmacies rather than being entrepreneurs on their own (Sam & Parasuraman, 2015). This is supported by the recent findings on the career choice among pharmacists that reported 92.8% of them preferred to work with the Ministry of Health (MOH) (Yussof et al., 2022) as it offers better job security and benefits.

Webinars as Learning Tools

A combination of web and seminar, also known as a webinar, has been identified as one of the learning methods since COVID-19 hit worldwide. As its name suggests, a webinar consists of a lecture in a presentation format or a kind of workshop that is delivered through the Internet with the aid of platforms such as Google Meet, the Zoom application, and/or Microsoft Teams (Shah et al., 2021). Webinars were already in use well before the COVID-19 pandemic. As Guanci discussed in 2010, they were a popular method for delivering knowledge remotely, allowing participants to attend without the need for physical presence (Guanci, 2010). Due to its flexibility, convenience, and cost-effectiveness, it has been used widely nowadays and has been implemented in some university curricula to fit with the current teaching and learning (Shah et al., 2021; Verma & Singh, 2010). In recent years, teaching and learning methods have increasingly incorporated e-learning systems, blending the traditional and modern approaches to educate newer generations of students. The e-learning system integrates the use of applications like Zoom (Carmi, 2024), which has been shown to be more user-friendly compared to platforms such as Skype and YouTube, particularly in terms of connectivity, enhanced privacy, and ease of use (Carmi, 2024). A study conducted on the effectiveness of webinars post COVID-19 revealed that most respondents favoured webinars due to their cost-effectiveness as well as their suitability for teaching both practical and skill-based subjects (Mohalik & Poddar, 2020).

MATERIALS AND METHOD

Study Design and Sampling Method

The participants for this study were drawn from the 388 individuals who attended the webinar. The webinar featured three speakers from Malaysia and Indonesia with their expertise on natural products and pharmapreneurship. To achieve the objective of the study evaluating the effectiveness of the webinar- participants' knowledge was assessed before and after the webinar session was conducted. A convenience sampling method was used to evaluate participants' knowledge using a set of simple questions. This approach was deemed appropriate, as the participants were easily accessible and represented the target audience (Golzar, 2022). However, this method presents certain limitations. Though convenience sampling offers advantages in terms of accessibility and practicality, it is prone to selection bias (Golzar, 2022), as some participants previously had initial knowledge of natural products and pharmapreneurship, which might limit the generalizability of the findings to the broader population.

Data Collection and Instrument

A pre-test consisting of a simple question was administered before the webinar. After the webinar concluded, participants completed a post-test, and responses were measured on a 5-point Likert scale, with 1 indicating the lowest level of agreement and 5 the highest one. The use of a 5-point Likert scale in this study is appropriate, as it has been successfully employed and adapted in previous studies (Carmi, 2024; Dev et al., 2022). The significant limitation of this methodology is that the simple design of the questions used in this study could limit its ability to fully capture the depth of participants' knowledge for the overall webinar. Furthermore, because the assessment was conducted immediately following the webinar, time constraints may have impacted the accuracy of participants' responses, reflecting more on short-term memory rather than their ability to apply the knowledge practically.

Data Analysis

The data were analysed using the Statistical Package for Social Sciences (SPSS) version 28.0, with results presented in tables and percentages. A Wilcoxon signed-rank test was conducted to determine the difference in knowledge before and after the webinar. The null hypothesis was established, that there is no significant difference between before and after -webinar knowledge, with statistical significance set at $p < 0.05$.

RESULTS AND DISCUSSION

Demographic of Participants

As shown in Table 1, a majority of the participants in this study are female ($n=333$, 85.8%). This finding might be a result of gender inequality that is dominant in places such as pharmaceuticals and healthcare, where women dominate the majority of the working class or as students in this field. In addition, several studies (Pathstream, 2022; Taryn Oesch, 2018) have shown that women are more likely to engage in continuing education and professional development activities compared to males, which could explain their higher participation rates in this webinar. These findings align with the recent data, which reported that more than 70% of participants in webinars conducted among teachers are female (Ramos, 2023). Interestingly, in another study conducted among physicians in India, revealed that the participants attending the webinars are almost equal for both genders, with the ratio of 51.5:48.5 (Annamalai Odayappan, et al, 2021).

Table 1: Demographic characteristics of participants

Demographic	Frequency (n)	Percentage (%)
Gender	Male	55
	Female	333
Webinar platform	YouTube	41
	Zoom	347

Next, about 89.4% (n=347) of participants attended the webinar through their preferred device using the Zoom application from their comfort place: home. The most contributing factors that led to this choice include interactive features offered by the Zoom application, such as chat, break-out rooms, and live video (Minhas et al., 2021). This user-friendly application was also able to occupy a larger number of participants at one time (Gunawan Guntur et al, 2021). These findings are in line with the study conducted by (Hassan et al., 2020) that reported most of the respondents' favour on the use of Zoom to communicate with their friends and lecturers in improving their academic performance. Contrary to the choice of YouTube, despite its advantages for post-event access and broader dissemination of knowledge, it has been in less demand due to its limited interaction during live sessions with the speakers (Dan Daemon, 2018). A research study conducted among practicing professional healthcare workers revealed that the majority of their attendees (~80%) attended the webinar sessions through the Zoom application and a lesser number through the YouTube application (Dev et al., 2022). This resonates with findings that highlight the Zoom application as a useful tool in teaching and learning, offering maximum flexibility particularly for future healthcare workers, such as the attendees of this webinar (Carmi, 2024).

Level of Knowledge Before and After the Webinar

About 37.9% of the participants (Figure 1) had mixed feelings (n=147) about the knowledge that they had before the webinar, compared to the responses that were collected after the webinar, with only 46 of them having neutral feelings. The neutrality of these participants before the webinar is likely due to their not having previous experience with the subject matter before the webinar in the context of their diverse backgrounds or differences. Furthermore, data shows that about 12.8% of participants (n=50) claimed that they did not have good knowledge of the topics presented, contrary to the findings after the webinars were conducted as there is a huge improvement resulting in 10% decrement in the number of participants (n=8) having low knowledge on the topics presented during the webinar. In addition, similar trends were observed in a study among Indonesian students and health professionals on the topic of nutrition, that showed a significant increase in knowledge after webinar session ($p < 0.001$) (Ratih et al, 2024). These findings could differ if pre-webinar materials or readings are distributed earlier to ensure that all participants have a basic understanding of the topics before the webinar begins. Notably, there is a small gap between participants who knew or had good knowledge before the webinar (n=191, 49.2%) and those who had mixed opinions on it (n=147, 37.9%). This kind of response was expected as some of the participants came from Indonesia, a country that is well established on the topics of natural products and pharmapreneurship.

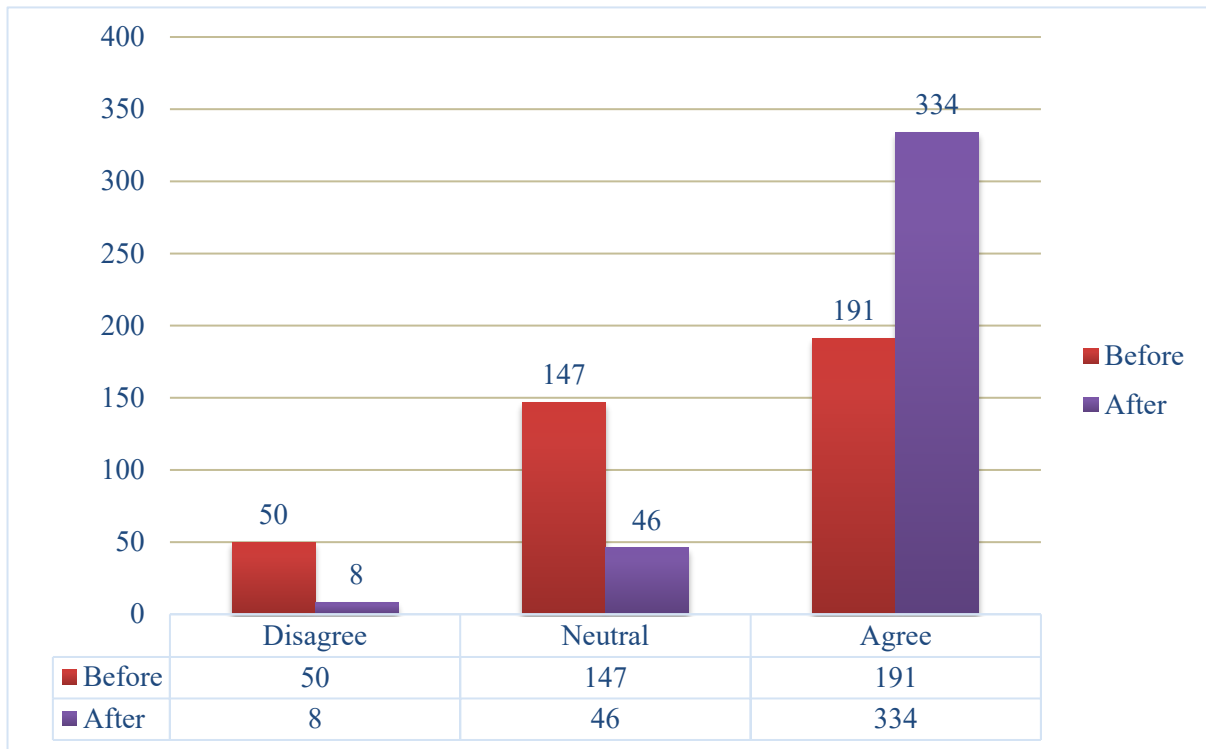


Figure 1: Level of knowledge before and after the webinar session

The intense shift from the pre-webinar data, where a significant portion of participants was neutral or disagreed about their knowledge, to the post-webinar data, where participants agreed that this webinar successfully transferred knowledge to them, underlines the webinar's role in bridging knowledge gaps. This finding aligns with educational research that emphasises the potential of webinars to facilitate learning by providing flexible, accessible, and interactive educational experiences (Raj et al., 2022).

Webinars as a Medium to Share Knowledge

After the webinar session concluded, participants provided valuable feedback that this webinar was indeed a good channel and intervention in delivering knowledge. Figure 2 summarises the responses from participants. About 90% (n= 351) of participants agreed that the webinar conducted helped to improve their knowledge on the topic of natural products and pharmapreneurship. These findings aligned with the most recent studies that discuss the use of online learning to improve knowledge and learn new things (Abdallah et al., 2023; Abdekhoda et al., 2023; Guilherme Couto et al., 2024). In addition, a survey conducted among radiotherapy attendees in e-learning programmes reported that 85% of the respondents agreed that webinars helps improve their knowledge on the topics presented (Guilherme Couto et al., 2024). Moreover, conducting a webinar not only focuses on the topics of interest but also highlights the effectiveness of the speakers in delivering the content, and as an effective presenter, the focus is not only on their expertise but also the skill in communicating complex information in a way that is engaging and understandable for their audience (Wilson, 2023).

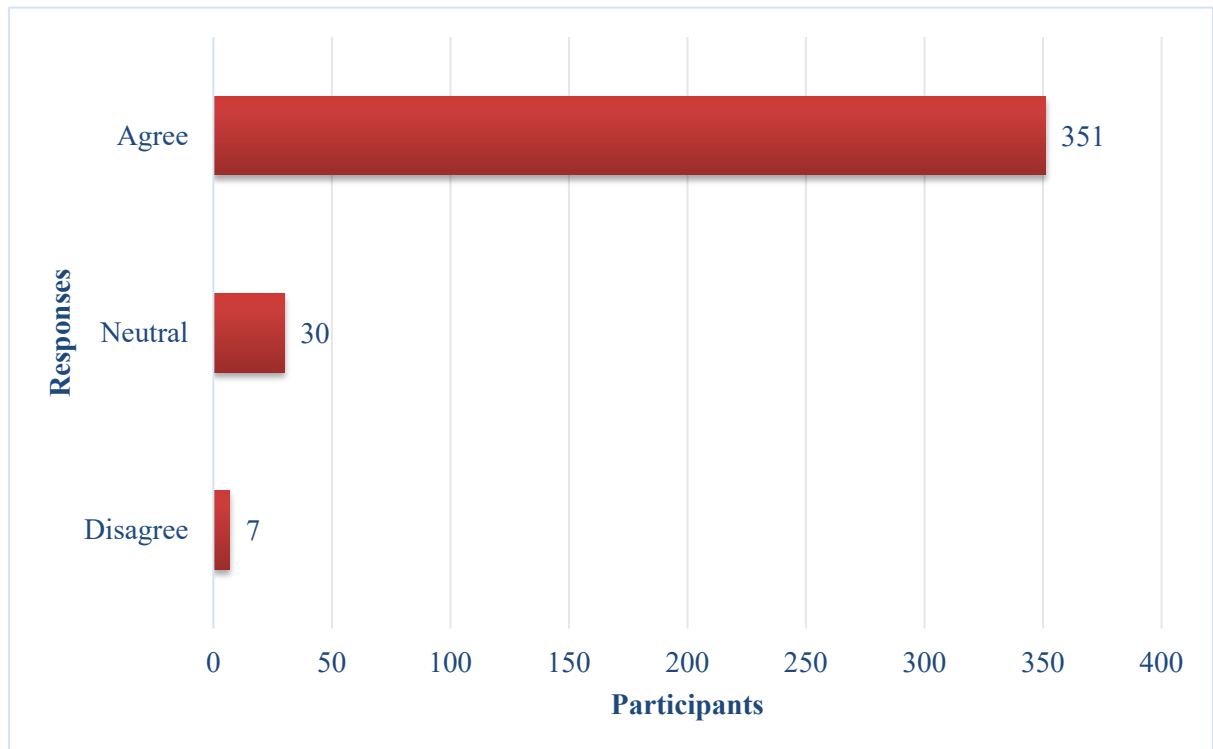


Figure 2: Responses after the webinar session

Knowledge Score Before and After the Webinar - The Wilcoxon Signed Rank Test

To strengthen the findings on the effectiveness of webinars in delivering knowledge, a Wilcoxon signed-rank test was conducted to evaluate the difference in the knowledge before and after the webinar. Table 2 shows a Wilcoxon signed-rank test result. The table shows that the knowledge score after the webinar ($M= 4.23$) was statistically significantly higher than before ($M=3.54$) the webinar ($Z=-10.98$, $p <0.001$). These outcomes parallel those reported by (Bivek Singh, 2023) which highlighted significant differences in knowledge scores before and after the webinar session, accompanied by encouraging remarks from attendees on how engaging and informative the session is. The increase in knowledge mean score after the webinar suggests that the webinar helped to improve participants' knowledge as participants gained a deeper understanding of the contents delivered, which are on natural products and pharmpreneurship (Guilherme Couto et al., 2024). These findings are in line with the study by (Salsabila Firdausi Rafidah et al., 2022), who reported that post-webinar knowledge is better than pre-webinars. In addition, these findings aligned with those reported by (Intan Permata Sari et al., 2022) who observed a significant difference in pre and post test scores (analysed using the Wilcoxon signed-rank test) following a webinar session on nutritional knowledge.

Table 2: Wilcoxon signed the rank test before and after the webinar

Variable	Pre-webinar, M (IQR)	Post webinar, M (IQR)	Z-statistics ^a	P value ^b
Knowledge score	3.54 (3)	4.23 (4)	-10.976	<0.001

^a Wilcoxon signed-rank test.

^b significant when $p < 0.00$

CONCLUSION

This study demonstrates the effectiveness of utilising webinars to enhance knowledge in natural

products and pharmapreneurship, showing a marked improvement in participants' understanding before and after the session. The findings suggest that the content was both relevant and beneficial for deepening participants' knowledge of natural products applications in the pharmaceutical industry and pharmapreneurship. Despite methodological limitations, such as the simplicity of questions and potential biases associated with convenience sampling, this study offers empirical support for webinars as valuable tools for knowledge-sharing. Additionally, it underscores the potential of webinars in continuous education, particularly in specialised fields like pharmapreneurship, where expertise remains limited. Future research should consider a more diverse sampling approach and include more detailed questions to gain further insight into participants' understanding. Ultimately, this study illustrates the expanding role of webinars as both accessible and flexible platforms for advancing professional knowledge and skills in pharmacy education and related fields.

ACKNOWLEDGEMENTS

The authors expressed their gratitude to all the participants for their valuable time and sincere efforts in sharing their thoughtful responses for this study.

FUNDING

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

AUTHORS' CONTRIBUTION

Ibrahim, N.A. contributed to the conceptualization and took the lead on writing manuscript, Mokhtar, N.A. in charge in methodology and data collection. Muhsain, S.N.F responsible for interpretation of result and tabulation of data. All authors provided critical feedback and helped shape the research, analysis and manuscript.

CONFLICT OF INTEREST DECLARATION

We certify that the article is the Authors' and Co-Authors' original work. The article has not received prior publication and is not under consideration for publication elsewhere. This research/manuscript has not been submitted for publication nor has it been published in whole or in part elsewhere. We testify to the fact that all Authors have contributed significantly to the work, validity and legitimacy of the data and its interpretation for submission to Jurnal Intelek.

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