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Designing an Appropriate Technology for Revitalising Traditional Craft Practice.

Study case: Indonesian Stitch Resist Dyeing

Bintan TITISARI[a*], Muriel RIGOUT[a], Tom CASSIDY[a] and Alice DALLABONA[a]

[a] School of Design, University of Leeds
*Corresponding author e-mail: sdbt@leeds.ac.uk

Abstract: This paper presents initial findings from an ongoing research project that explores possibilities for design and technology to contribute in revitalising traditional Indonesian stitch resist dyeing craft practices. The custom of Indonesian textile making has been mostly based on culture and tradition. In recent decades, the Indonesian traditional textile craft practices have transformed into producing commodity products and have shaped new culture of traditional craft practices. A case study method was conducted in three locations in Indonesia with ethnographic approach, then the findings was analysed with established revitalisation strategies taxonomy and appropriate technology frameworks. A simple and individual tool with a low cost multipurpose technology is recommended to improve the quality and consistency of the pattern as the main focus on revitalising the Indonesian stitch resist dyeing craft practice. Preserving the existing working culture will minimise the internal risk factor and also will be more sustainable in the long term.

Keywords: appropriate technology, craft industry, traditional textiles, stitch resist dyeing, Indonesia.

1. Introduction

Traditional craft practice has a strong relationship between humans and their historical, cultural and social contexts that should be preserved and revitalised (Tung, 2012). In the recent decade, the craft practices have experienced a major dynamic that shifts them from material culture into a commodity by the forces of modernisation and globalisation (Twigger Holroyd, Cassidy, Evans, & Walker, 2017). Many craft practices have shown their great ability and flexibility to continuously evolve and transform to modern society by adopting an industrial production and modern technologies that go beyond the conventional modes of production (Chutia & Sarma, 2016; Tung, 2012). However, the imprudent adaption of new technology can raise the risk of loosing of the culturally significant aspects from the traditional craft practice in the long term. Questions arise regarding how to determine a suitable framework for designing appropriate technology that will sustain, strengthen or revitalise current Indonesian stitch resist dyeing practices without losing their culturally significant aspects.

In this article, we explore the possibility for design and technology to contribute in revitalising traditional craft practice by examining the Indonesian stitch resist dyeing practices as a case study. The paper will discuss the commercialisation of craft products discourse, the issues in Indonesian craft practices and the taxonomy of revitalisation strategies to define the appropriate technology for traditional craft practice. We argue that with the appropriate technology, that consider not only the economic aspect but also other six important pillars, i.e. technical, environmental, social, cultural, judicial, and political aspects (Sianipar, Dowaki, Yudoko, & Adhiutama, 2013) the development of new technology in the craft practice can be more sustainable and feasible in the long term. This research is the interdisciplinary work in design, technology and culture where all authors with different background work in synergy. Titisari is the field researcher, designer and main author; Rigout focuses on dyeing techniques and laboratory works; Cassidy focuses on the application of the Design Routes taxonomy of design revitalisation strategies; Dallabona focuses on the sociology and cultural issue.

2. The commercialisation of Craft Products

Alfoldy (2007) classified crafts into three main groups: (i) traditional (conventional), (ii) contemporary and (iii) modern. Traditional crafts have a strong relationship with the multicultural history of certain societies, which is seen in the craft design forms, artefacts and practices (Alfoldy, 2007; Twigger Holroyd et al., 2017). Meanwhile, contemporary and modern crafts are more influenced by art and/or design – a combination of aesthetics, individuality, function, technology but at the same time also maintaining the political badge of handmade (Harrod, 1997 in Chudsari, 2011; Alfoldy, 2007). This study focuses on traditional craft practices with a cultural value that has been transformed into modern form by issues of modernisation and commercialisation.

The commercialisation of traditional craft products has arisen around the world, mostly in South and South East Asia (Chudasri, Walker, & Evans, 2012; Chutia & Sarma, 2016; Holroyd, Cassidy, Evans, Gifford, & Walker, 2015; Scrase, 2003). As society becomes modernised and industrialised, the ability of traditional craftspeople to continue working on the local scale is adversely affected (Holroyd et al., 2015). The craft industry is also challenged by mass-produced, standardised and cheap factory items which can replace craftsmanship (ibid.). Although at the same time, in a post-industrial culture, the interest in traditional craft practice has increased, especially for Third World craft goods. Scrase (2003) argued that this interest is related with the notion of western consumers ‘helping out' the struggling or marginalised crafts' people, or with the emergence of ‘ethnic chic' in fashion and interior style, although a substantive reason is still notably absent from the literature. These situations have forced artisans to commercialise and intersect traditional manufacturing practices with techniques of mass production to fulfil the demand as a socio-economic challenge and to take the craft from the rural to the urban market space (Chutia & Sarma, 2016). The commercialisation and global expansion of certain traditional craft industries simultaneously can lead to economic, societal and cultural effects (Scrase, 2003). Furthermore, traditional craft practice is also facing a manpower problem as younger people migrate to urban centres for work and the attraction of modern lifestyles (Chudasri et al., 2012). In summary, the rapid commercialisation of craft products can jeopardise the cultural and social values because usually the decisions are driven only by economic considerations. Thus, it is important to select an appropriate method to develop traditional techniques without losing their cultural aspects and to sustain the traditions of the

community (Brunn, 1996). Previous studies have examined revitalisation strategies to sustain or transform the existence of culturally significant products and practices to fit with contemporary society and for the future without losing their cultural significance (Cassidy, 2018; Evans, Holroyd, Walker, Cassidy, & Jung, 2018; A. Nugraha, 2012). Appropriate design technology could be adopted to revitalise techniques in a way that is socially appropriate, culturally meaningful and economically fair (Cassidy, 2018; Holroyd et al., 2015).

3. Emerging Markets for Indonesian Stitch Resist Dyeing Craft Practices

Indonesian textiles craft practices are also facing challenges from commercialisation and commodification of craft practices as in other countries. The traditional textile crafts in Indonesia are a complex visually splendid process and commonly are intertwined with social status and supernatural practices (Forshee, 2006). UNESCO declared Batik as an intangible cultural heritage of humanity that is intertwined with the cultural identity of the Indonesian people and the creativity and spirituality can be seen through the symbolic meanings of its colours and designs ("Indonesian Batik," 2009). The traditional technique used to produce textiles for ceremonial purposes and was worn in multiple ways: wrapping or draping with a belt, by men or women in many places, in a casual or formal occasion (Forshee, 2006). This custom has waned, as modern Indonesian people are starting to wear simpler readymade garments and special design fabrics are only worn for ceremonial purposes, namely marriage, pregnancy, death, and some art forms. Looking at the situation, Indonesian government established regulations to promote Indonesian local culture and preserve Indonesian cultural heritage and national identity, which is regulated in the cultural preservation programme ("Benda Cagar Budaya [Material Culture]," 1992). One of the implications from these regulations is an act to encourage the Indonesian government employees to wear clothes made using traditional Indonesian fabrics every Friday ("PERMENDAGRI," 2016). Thus, Indonesian people deliberately start to use traditional fabrics for their daily needs such as garments and household products, which in turn has had a significant impact in transforming traditional textiles from ceremonial purposes into commodity products. The majority of Indonesian people have started to use simpler pattern inspired from traditional textiles as garments on a daily basis and also as corporate wear on a weekly basis, which creates a new market for traditional textiles craft practices. This notion gave impact to many Indonesian textile makers, including the stitch resist dyeing crafts makers. The craft makers automatically have a high demand to provide corporate wear made by the stitch resist dyeing technique. Orders always come in relatively big quantities compared to retail, and to some extent, require to be uniform in design. The technique has become a livelihood for the craft communities who are manufacturing by hand a significant number of stitch resist dyed cloths per month.

4. Research Approach for Revitalising the Traditional Craft Practice

The project examines the possibilities for design and technology to contribute to revitalising traditional Indonesian stitch resist dyeing craft practice. There are two research aims: (i) to understand the techniques and cultural aspects employed in the current practices and (ii) to

determine a suitable framework in designing appropriate technology that will sustain, strengthen or revitalise the stitch resist dyeing craft in Indonesia. This research employed case study method with an ethnographic approach along with two established research methodologies: (i) chaine operatoire (Lemonnier, 1992; Torres, 2002) and (ii) soft systems methodology (Checkland & Scholes, 1990; Davies & Ledington, 1991; Patching, 1990). The findings were based on a literature review adjunct with primary data from a survey. The survey involved seventy-seven craft makers were involved in a survey across the three stitch resist dyeing locations: Yogyakarta, Palembang and Banjarmasin. The methods used in the survey were participation observations, questionnaires and semi-structured interviews. The key informant interviews were conducted among the craft enterprise owners, the craft makers, the local government, retailers and the customers. The data from three locations were then analysed and coded to establish the similarities and differences between each location on the cultural aspects and technical aspects. Main findings from the survey then being analysed with the Design Routes taxonomy to determine the appropriate revitalisation approach for the traditional craft practice.

4.1 Design Routes revitalisation strategy

The revitalisation is an attempt to sustain or transform the existence of culturally significant design, products, and practices (Cassidy, 2018). Revitalising and transforming process can be pursued by maintaining the tradition in its original form or creating a new form from a particular tradition to fit into contemporary lifestyles (A. Nugraha, 2018). The selection of revitalisation strategy becomes crucial as it will give maximum benefit to the society, in this case, the Indonesian stitch resist dyeing crafts makers. Up to now, a number of studies have established a variety of approaches applicable to culturally significant designs, product and processes. Considering the character and complexity of the case study, this study employs revitalisation strategy from Design Routes for analysing the required revitalisation strategy for traditional craft practices. The design routes approach suggests a preliminary study of creative ecology where the craft makers operate. The successful application of a revitalisation strategy relies on an in-depth understanding of the context and culture within which the culturally significant design, products and processes exist, which for this study, was accomplished from the survey in three locations.

The Design Routes approach has eight clusters of revitalisation strategies to reconnect traditions, values and beliefs with the needs of people in the modern world (Evans et al., 2018). Those eight clusters are identified as (i) Sustained through design: combined traditional making or use practice with new or reimagined design; (ii) Transpose tradition: take traditional design or making practice into a new context; (iii) Value of place: foreground the value of place and provenance; (iv) Production processes: employ appropriate and effective methods of making; (v) Skills: employ targeted approaches to embed and enhance skills; (vi) Promotion: spread awareness and appreciation via effective promotion; (vii) Enterprise: employ effective business, organisation, and finance models; and (viii) Research and education: learn about traditions, meanings, and contemporary relevance.

5. Case Study: Indonesian Stitch Resist Dyeing Craft Practices

Selected findings will be discussed in this section to build a deep understanding of the technique from cultural aspects and the technical aspects related to the design process of stitch resist dyeing in Indonesia. Stitch resist dyeing, as a particular form of resist dyeing technique, produces an authentic blurry pattern with multicolour and shade gradation. The stitch resist dyeing technique is defined as a resist technique that uses a running stitch to apply a thread into a woven cloth, then the thread is gathered and knotted to protect the area from the dyestuff (Belfer, 1972; Larsen, Bühler, & Solyom, 1976; Seiler-Baldinger, 1994; Singer & Spyrou, 1989), the stitches are cut away after dyeing to reveal the pattern (figure 1).

5.1 Cultural Aspects in Indonesian Stitch Resist Dyeing Craft Practices

The stitch resist dyeing technique has been used in some locations of Indonesia and each location produces different aesthetic results because the technique is part of different traditions that represent the culture and values shared by the local people. Stitch resist dyed textiles are called *Jumputan* in East Java, *Pelangi* in South Sumatra and *Sasirangan* in South Kalimantan; examples are presented in figure 2 (Gavin, 2010; Hitchcock, 1991; Seman, 2008). Individual stitch resist dyeing practice has existed in Indonesia for centuries as part of their culture, but the craft industry developed differently in the three locations. The currently organised stitch resist dyeing craft practices in Palembang started about 30 years ago and in Banjarmasin 20 years ago. Meanwhile, in Yogyakarta, the practice started not more than 5 years ago. Some of the craft makers are the first or third family generation of stitch resist dyeing makers, but most of them are second generation. The majority of craft makers in Banjarmasin and Palembang learnt the technique from their family, while craft makers in Yogyakarta learnt from courses. The courses are mostly provided by the Indonesian government or private companies as part of their Corporate Social Responsible (CSR) program.

(i) *(ii)* *(iii)* *(iv)* *(v)*

Figure 1. Photographing images of the stitch resist dyeing process illustrating its sequence: (i) drawing the design; (ii) applying running stitches; (iii) pulling and knotting the thread; (iv) colouring the cloth; (v) releasing the knot

(i) (ii) (iii)

Figure 2. Indonesian traditional cloths using stitch resist dyeing technique (i) Jumputan cloth; (ii) Pelangi cloth; (iii) Sasirangan cloth

A craft process usually relates to a delicate high craftsmanship skill between the creator and the product that produces a high-quality craft product (Risatti, 2007; Schaefer, 2013; Sennett, 2009), but craft industries in Indonesia differ, as they are strongly rooted in a community and mostly consists of communal work. Indonesian stitch resist dyeing craft makers are working collectively as small to medium size enterprises or cooperatives. The practice involves a number of people throughout the process of making each cloth which causes a low wage for each craft maker. Some of the craft makers could have two or more responsibilities throughout the process. The majority of the craft makers in Yogyakarta take this role as their second job, but the craft-makers in Banjarmasin and Palembang do this work as their main livelihood. The craft makers in Yogyakarta are predominantly females, while the number of female and male craft makers in Banjarmasin and Palembang is relatively equal. However, all the stitchers in the three locations are housewives and undertake this role in their spare time while managing their domestic matters. The practice commonly takes place in the craft makers' residences and merges with their domestic activities.

As communal work, there are five different organisational structures that are employed among Indonesian stitch resist dyeing craft makers. They show some similarities and minor differences at certain points but the biggest difference is the enterprise type (figure 4) versus cooperative type (figure 5). The enterprise type has an appropriate production line which gives the advantage of allowing the production of bigger quantities of goods but can result in a high possibility of producing lower or more inconsistent quality goods. The cooperative system in Yogyakarta has a greater chance to result in better quality because every member is involved in the entire process. Even though they are not in contact directly with the customer, the profit will be distributed equally among the members, thus each member has the same responsibility to deliver the best quality of work. This creates a more professional working environment among the craft makers but is still a type of teamwork. However, the cooperative type of craft maker in Yogyakarta features the lowest

level of experience compared to the other locations and this may cause a lower level of craftsmanship.

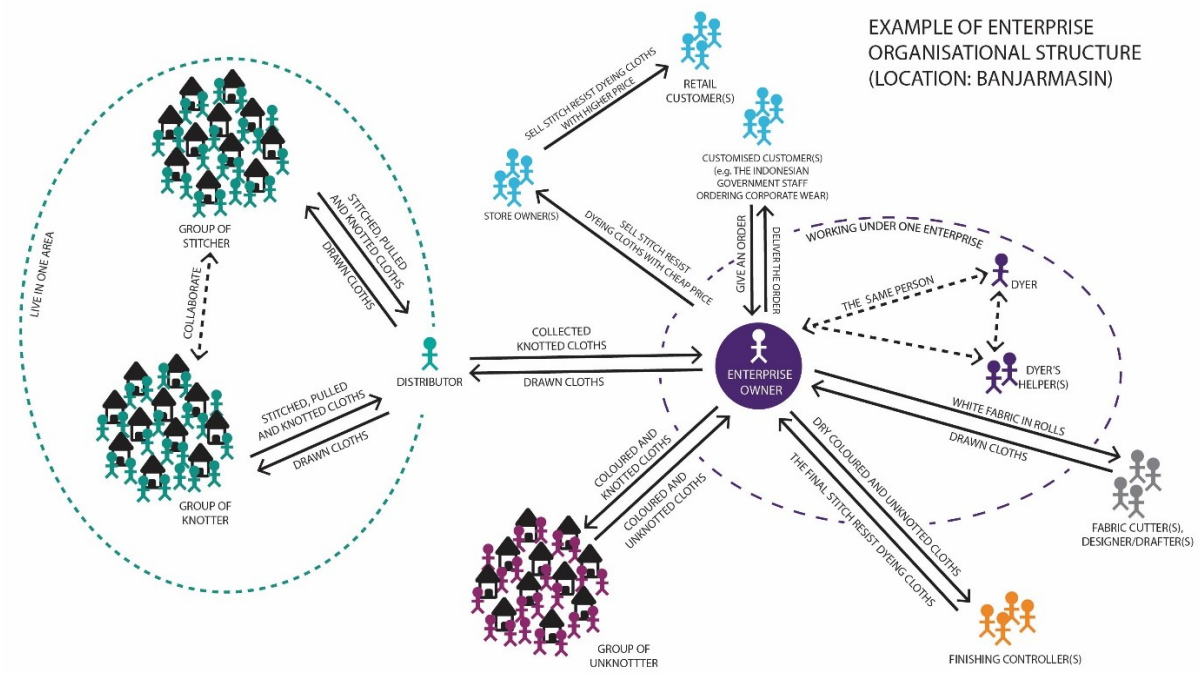


Figure 4. Enterprise type of organisational structure

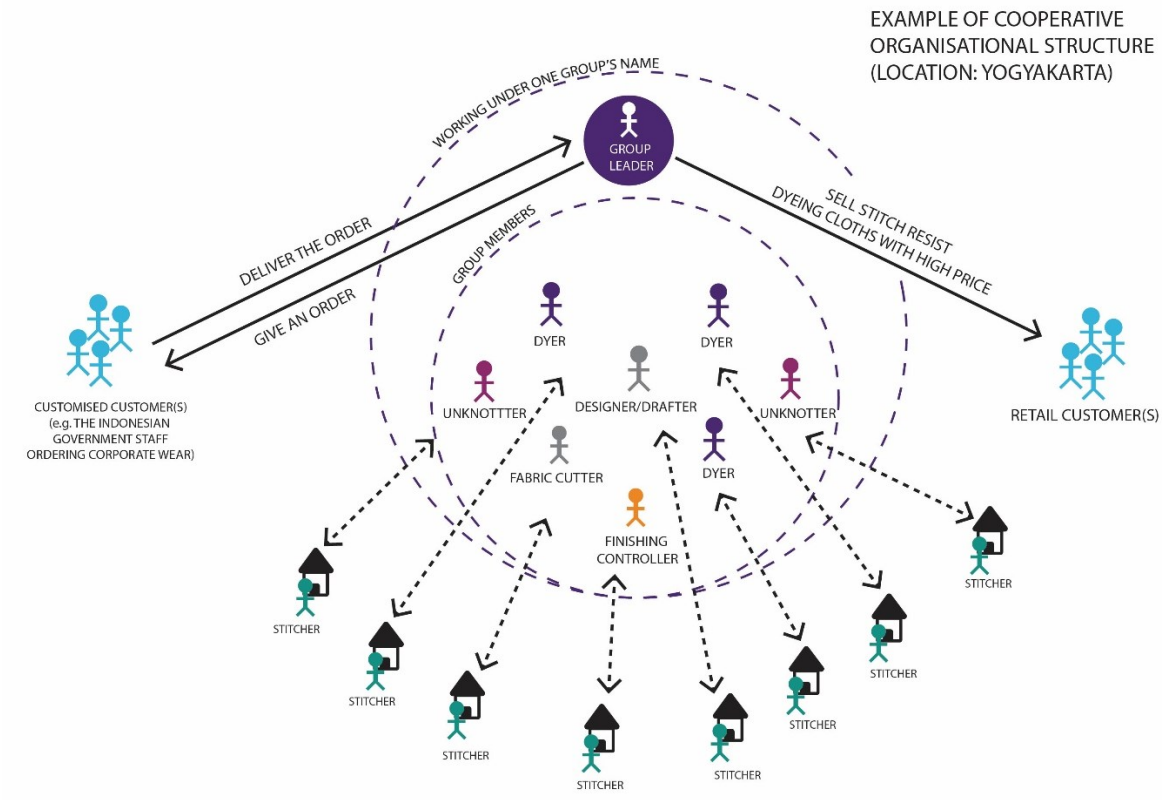


Figure 5. Cooperative type of organisational structure

5.2 Technical Aspects in Indonesian Stitch Resist Dyeing Craft Practices

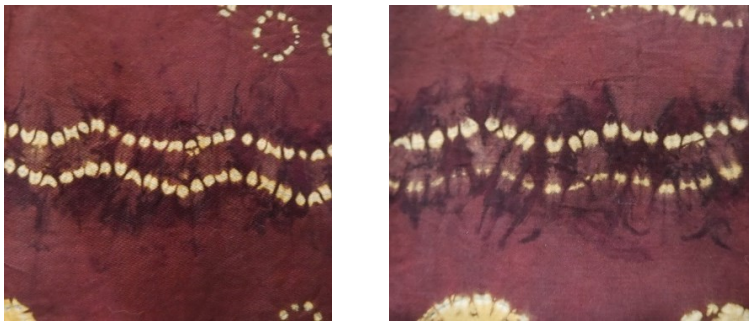
The craft makers' decisions to select the fabric and dyestuff is based on the desired pattern composition, skill/knowledge, customer preferences and material availability. Most of the orders in the three locations are placed from large organizations (mostly local Indonesian government and local companies) for their corporate wear with specific design requirements and targeted delivery time. The production capacity of each enterprise in each location is very diverse. Banjarmasin has the highest average production capacity per month (approx. 700 pieces/month) compared to the other two locations. The survey showed that each location uses different fabrics and dyestuff but every stitch resist dyed fabric is commonly produced in a similar size. The traditional Indonesian cloth is usually produced in unsewn 2 - 3 metre lengths and widths of 1.1 – 1.5 metres (Forshee, 2006).

Figure 6. The sequence of Indonesian stitch resist dyeing craft practices

Most of the respondents describe stitch resist dyeing processes in the same order as illustrated in figure 6. Some sequences in each location indicate different options concerning methods and tools. There is no standard procedure in the stitching process in terms of stitch length or distance. The regularity of stitch length is controlled only by sight. The colouring process on stitch resist dyeing can be applied by immersing the stitched cloths into a dyeing solution or applying the dyestuff with tools (e.g. brush, sprayer) to create different variations of patterns on the fabric. The resisting part and the colouring part are two primary stages of the stitch resist dyeing techniques that determine the resulting pattern. The resisting part in stitch resist dyeing has three steps; (i) stitching the thread on the fabric; (ii) pulling the thread; (iii) knotting the thread at the end (Larsen et al., 1976; Seiler-Baldinger, 1994). These parts are often done manually and require craftsmanship skill and are recognised by the craft makers as being time-consuming (figure 6B).

5.3 Issues emerging in the current Indonesian Stitch Resist Dyeing Craft Practices

Regarding the whole process, 57 enterprise owners from 77 respondents mentioned obstacles in producing textiles using the stitch resist dyeing technique. The process duration category is the issue most mentioned which relates to the manual process of the resist mechanism (stitching, pulling, and knotting) as it is considered as time-consuming. However, looking at the rich picture of organisational structures, the unpredictable time-taken by the worker also contributes to this issue. Especially for the female crafter, for whom the stitch resist dyeing role is their second occupation (namely stitcher; knotters; unknotters; members of the cooperative type structure), the work comes as a second priority after their main obligation as housewives. Domestic problems in their household can lead to the delay of the work. The family relation between employees also contributes to a high tolerance level that causes inconsistent quality or affects timely delivery. The issue, second in importance, is the lack of workers and the third issue of pattern inconsistency, though both have similar percentage levels. The lack of workers originates from the fact that younger generations have more interest in modern than traditional matters (Chudasri et al., 2012). Pattern inconsistency is defined as different pattern results that are caused by the ineffectiveness of the resist mechanism process due to the looseness of the knotted stitching thread (figure 7) and the torn fabric caused by errors in the revealing process. The respondents refered to the pattern inconsistency from the resist mechanism part as being particularly problematic due to a lack of quality control methods. This issue is considered very important and singled out as the main focus for revitalising the stitch resist dyeing technique because the largest demand for this practice is for corporate wear.



(i) (ii)

Figure 7. Example of pattern inconsistency caused by a loose knotting process (i) successful pattern; (ii) unsuccessful pattern

6. Discussion of Appropriate Technology for Revitalising Traditional Craft Practice

The craft practice in this context is the mass produced craft practice that provides the corporate wear made from traditional cloth, which to a certain extent, needs to be uniform in design without loosing their authentication. The practice has been experiencing a massive commodification which has tended to develop the technique sporadically to be relevant for the contemporary needs. The selection of revitalisation strategy becomes crucial as it will give maximum benefit to the society, in this case, the Indonesian stitch resist dyeing crafts makers.

The Design Routes approach has eight clusters of revitalisation strategies that are interconnected and interdependent which means they could be applied independently or dependently. There are five primary clusters for revitalising culturally significant design, products and processes and three supplementary clusters (i.e. promotion, enterprise, research and education) that can support and underpin how design can reconnect traditions, values and beliefs with modern lifestyle. Each cluster covers a wide group of strategies and is further divided into sub-clusters which address more specific strategies. This study will examine only the five primary clusters for the Indonesian stitch resist dyeing practice (table 1). The analysis of revitalisation strategies was based on the survey findings in three locations. Table 1 shows the existing initiatives carried out by craft makers or stakeholders that aim to reinvigorate the craft practices in each location. The indication of yes (√) and no (x) was based on the existence of each strategy in each craft practice based on the survey. The number of strategies existing in each craft practice can be more than one.

The table shows the lack of revitalisation strategies on production processes cluster (cluster four) on the three locations. Although some craft makers employ new tools to create different patterns or forms, those initiatives are related to revitalisation strategy from cluster one (sustain through design) and cluster two (transpose tradition). In addition, some tools are also adapted from similar techniques from a different area to enhance the skills of a beginner which refer to revitalisation strategy cluster five (skills). The production process cluster has three specific strategies. Any strategies that require new technology, either to make production process quicker and more efficient or to create better quality and more consistent products, must be appropriate to the context in which it is to be used (Evans et al., 2018). Improvement in the production processes will often have a strong link with the development of makers' skill. Craft skill and associated tacit knowledge may be lost if not handled sensitively (ibid).

This notion presents similarities with the appropriate technology movement that the initial idea was to make the technology more productive than the indigenous technology but low in price compared to the sophisticated technology used in modern industry (Schumacher, 1993). The challenge for appropriate technology studies is to understand the mechanisms underlying technology adoption; considering which technology is to be used, where and by whom (ibid). Appropriate technology is considered as pertinent for low-income countries where the technology is labour-intensive, simple to maintain and involves manufacturing products on a small scale with a minimally-harmful impact on the environment (Kaplinsky, 2011). However, these ideas have been developed into a broad definition of appropriateness in the past four decades which involves more aspects (Hollick, 1982; Pellegrini, 1979; Sianipar et al., 2013; Sianipar, Pamatang, Yudoko, Dowaki, & Adhiutama, 2014).

Table 1. Analysis of required revitalisation strategy for Indonesian stitch resist dyeing practices adapted from Design Routes revitalisation strategies (Evans et al., 2018)

Revitalisation Strategy Clusters		*Sasirangan* Craft Practices	*Pelangi* Craft Practices	*Jumputan* Craft Practices
1 Sustain Through Design	1. Remix design elements linked to traditional making practice	√	√	√
	2. Reintroduce design associated with traditional making practice	√	√	√
	3. Rework design to meet contemporary needs	√	√	√
	4. Mashup with "external" traditional design elements	√	√	√
	5. Introduce fresh aesthetic to traditional making practice	√	√	√
	6. Create a new product based on the traditional archetype	√	⊗	⊗
2 Transpose Tradition	1. Reinterpret traditional pattern using new making practice	√	√	√
	2. Reinterpret traditional form using new making practice	√	⊗	⊗
	3. Apply traditional making practice to new product type	√	⊗	⊗
	4. Transfer traditional making practice to a new material	√	√	√
3 Value Place	1. Introduce traditional making practice in a new place	⊗	⊗	√
	2. Reintroduce lost making practice in the relevant historical location	√	⊗	⊗
	3. Utilise local materials	⊗	⊗	√
4 Production Process	1. Develop production capability to increase output	⊗	⊗	⊗
	2. Improve quality and consistency production process	⊗	⊗	⊗
	3. Enchance production process using new technology	⊗	⊗	⊗
5 Skills	1. Transmit making skill from person to person	√	√	√
	2. Create and access enduring record of skilled making practices	√	⊗	⊗
	3. Design material, tool or kit to support development of making skill	√	⊗	⊗
	4. Develop the skill to complement making practice	√	√	√

Many studies on appropriate technology in developing countries have established some issues and also suitable frameworks (Akubue, 2000; Bowonder, 1979; Brunn, 1996; Wicklein, 1998). This study adapts methods by Wicklein (1998) in selecting appropriate technology for traditional craft practices, in this case, Indonesian stitch resist dyeing craft practices. There are seven categories that need to reconsidered beforehand whether a particular technology has the potential of being successful in this practice (Wicklein, 1998). Those categories, not in particular order, are: (i) systems

independence; (ii) individual technology versus collective technology; (iii) cost of technology; (iv) single-purpose or multi-purpose technology; (v) risk factors; (vi) evolutionary of capacity of technology; and (vii) image of modernity. Taking all the important points from the stitcher working culture into seven categories of appropriate technology in table 2.

The analysis of appropriate technology in the context of the Indonesian stitch resist dyeing craft practice is to find a key to improve the quality and consistency of resulting patterns. The issue of pattern inconsistency was being particularly problematic due to a lack of quality control methods in the resist mechanism part which involves stitching, pulling and knotting. The stitching process needs to be fast and consistency on the length. The knotting process needs to be consistently tight and it requires high craftsmanship skills. The lack of craftsmanship skills can cause a loose knot. The whole process is done by hand, using only thread and needle. Some tools are required as supporting tools, such as scissors, thimble or finger cover. This step is performed by the stitchers who mainly are housewives, working individually or gathering in a small group while doing the domestic works. The working culture performs in a casual circumstance by sitting on the floor without a desk or chair, usually at the stitcher's living room.

Table 2. Analysing the seven categories of designing an appropriate technology for the Indonesian stitch resist dyeing

The current situation in Indonesian stitch resist dyeing practices	Categories for appropriate technology (Wicklein, 1997)	Recommendation for Revitalising the traditional practice
Traditional way with a domestic tool	Systems independence	Simple without any support system required (system-independent)
The craft maker needs to work individually but they like to be in a group while doing their domestic chores.	Individual technology versus collective technology	The technological developments would be better in individual or single family unit
The whole process is done by hand, using only thread and needle. Some tools are required as supporting tools, such as scissors, thimble or finger cover.	Single-purpose and multi-purpose technology	This technological device is recommended to have multiple specific purposes that can be used in every step of resist mechanism (stitching, pulling, knotting, and unknotting). Need to be fast, consistence, and easy to use for knotting.
low pay labour, the under-rated price of the resulted textile	Cost of technology	Using a low cost material by observing local material, less sophisticated technology
The technique requires high craftsmanship skill that causes only limited people can master the technique very well.	Risk factor	The use of new tool needs to be similar with the way people conduct the technique at the moment.
The technique has the potential to be developed in	An evolutionary capacity of technology	The new tool needs to deliver the need to evolve in design creativity, quality, and quantity

The current situation in Indonesian stitch resist dyeing practices	Categories for appropriate technology (Wicklein, 1997)	Recommendation for Revitalising the traditional practice
design creativity, quality, and quantity		
People belittle the practice considering an old and traditional matter. A low number of young generation involve	Image of modernity	The new tool needs to show an image of modernity by using new material

Taking all the important points from the stitcher working culture into seven categories of appropriate technology, the improvement on the production process can be achieved by making a simple and individual tool with a low cost multipurpose technology without changing the existing working culture to minimise the internal risk factor. It means the technology should be portable (i.e. not required a desk or chair to perform) that has a similar mechanism with manual stitching and knotting. The low-cost technology needs to be affordable for the craft makers not only to purchase but also to run and maintain the manufacture in long term. The image of modernity will come as an effect of introducing the new tool with new material to society.

For further work, a more extensive study on resist mechanism is needed to create a new tool that has a similar procedure with an existing technique. Subsequently, the new proposed technology has to be tested by conducting a series of empirical experiment to examine an improvement on the consistency and quality of the resulted pattern. The positive result from the experiment need should be validated by the community. It can be accomplished by running a focus group discussion or an extensive workshop among the Indonesian stitch resist dyeing craft makers.

7. Conclusion and recommendations

The study provides a new understanding of craft practice in Indonesian stitch resist dyeing practice, in term of cultural value, process and market characteristic. Variations in the organisational structures and technological operations employed in the three regions studied. Despite the fact that each location has different cultural meaning, the long-established history background of the craft practice as a nation has shaped the similar character of craft practice in three locations. The modernisation and globalisation had given a major impact to the craft practice, involving many stakeholders. Each of the three locations of stitch resist dyeing practices in Indonesia has shown great initiatives in facing the commercialisation by developing the design based on market needs but lacks improvement in the production process that are related to production capacity and quality. The pattern inconsistency from the resist mechanism part as being particularly problematic due to a lack of quality control methods. This issue is considered very important and singled out as the main focus for revitalising the stitch resist dyeing technique because the largest demand for this practice is for corporate wear.

The study employs the design routes taxonomy of revitalisation strategies and an established framework for designing the appropriate technology for developing countries to determine a suitable recommendation in designing appropriate technology that will sustain, strengthen or

revitalise the stitch resist dyeing craft practice in Indonesia. With analysing the suitable revitalisation strategy can give a maximum benefit and minimise a negative effect, especially in cultural aspect, to the local society in a long term. Some key points had been discussed to improve the quality and consistency of the pattern as the main focus on revitalising the Indonesian stitch resist dyeing craft practice. A simple and individual tool with a low cost multipurpose technology is recommended as an appropriate technology for this craft practice without changing the existing working culture that will minimise the internal risk factor. Specifically for the Indonesian stitch resist dyeing practice, the new proposed technology should be portable (i.e. not required a desk or chair to perform) that has a similar mechanism with manual stitching and knotting. For future works, the appropriate technology framework based on these findings has to be proven scientifically by running an extensive experiment and validated by the community.

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About the Authors:

Bintan Titisari is a designer, maker, and researcher with expertise in craft design especially in textile field. Her current work is focus on revitalizing traditional craft practice with an appropriate technology.

Muriel Rigout is an associate professor in Textile Printing and Design at the University of Leeds and part of the board and the committee of the Society of Dyers and Colourists. Her research expertise is on textile coloration and finishing.

Professor Tom Cassidy holds the chair in design at the University of Leeds and is a fellow of the Design Research Society (FRDS). He has held major grants from UK Research Councils for projects in textile design technology and strategic design.

Dr Alice Dallabona is a lecturer in Fashion Marketing at the University of Leeds (UK). In her research, she has explored the relationship between culture and fashion, with a particular interest in national identity, luxury, and the Italian fashion industry.

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