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# THE CHANGING ROLE OF THE INDUSTRIAL DESIGNER WITH THE GROWING SUSTAINABILITY IMPERATIVE

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**ABSTRACT**
How does the role of the industrial designer change in response to the sustainability imperative? In practical terms, how does sustainability affect what the designer does and the outcomes that can be expected? What new skills and approaches should educators be teaching to help their graduates meet the new challenges involved?
This paper is based on the outcomes of a study that suggests a changing role for the designer, in the face of differences in approach and innovations in production, to initiate sustainable practice. Within this context it provides an industrial designer's response to the issues and specific problems raised by a project set by the hardwood timber industry in south east Queensland, Australia. The research is located primarily in the construction and manufacturing industries in south east Queensland and northern New South Wales but also in the development of design practice in response to the global sustainability imperative that was a significant driver for the project. The work provides design educators with an indication of how designers can assess the brief they are set and influence the outcomes of their projects to provide their clients with the financial benefits of long term, triple bottom line based thinking, and the rest of us with environmentally and socially responsible products.

*Keywords: Sustainability, role of the designer, manufacturing, forestry, practical example*

## 1 THEORY INTO PRACTICE

Sustainable design practice, as established by design research (e.g. Cherkasky, T [1]. McDonough, W, Braungart, M [2]. Ryan, C [3]. Tatum, J [4]), has moved the emphasis for the industrial designer from designing products for a single client manufacturer (with a focus of designing for the capabilities and product range of that particular client), to designing with the needs of all stakeholders affected by any aspect of the supply chain for that design taken into account. In addition, designers must consider the impact of all aspects of the life cycle of their product on the environment, with a responsibility not just for this generation, but for future generations. Design methodologies, such as eco-pluralism suggested by Fuad-Luke in 2004[5], demand a complex consideration of the brief and subsequent design decisions. The full life cycle of the product must be evaluated to the level, for example, of the social and environmental impacts on the indigenous population, and even on the global forestry heritage, of specifying a particular timber from Indonesia as a raw material for a design.
The implications for how we teach, and what we teach, are daunting. In order for design research to be effective, the findings not only need to be disseminated, but translated into practical strategies for teaching that influence the industrial designers of the future. The significant shift in attitudes and action required for the move into sustainable design practice requires an equally significant re-assessment of how we teach industrial design and the range of skills we foster. What needs to be taken into account also, is that there will be a transition period when clients will not necessarily be well informed or committed to a sustainable design focus. Graduates will therefore need to have the knowledge and experience that will provide them with the confidence to take sustainable design theory into the work place. However, before we can train our students, we need to experience the reality of this change in practice for ourselves.
A PhD study with the Centre for Co-operative Research (wood innovations) in Australia provided an opportunity to attempt to apply sustainable design practice in a 'real world research project' (Robson [6]). The brief was set by the Innovative Forest Products division of the Australian Government's

Department of Primary Industries and Fisheries in Brisbane. It was initially titled 'designing value added products from small and / or narrow pieces of timber'. In 2004 Tatum underlined the importance of global thinking for even the smallest of product design projects, for even the physically smallest, seemingly most environmentally and socially harmless of products. He argued that designing products in isolation, using a client-focused, one product-at-a-time approach allowed for 'negative synergisms' to be ignored. These would build up, unknown to the individual responsible for the design decisions that caused them, and have significant consequences. However, to try to think globally about the very narrow brief set for this project was at first a challenge, bringing home the problems of addressing each individual project, however small, or seemingly innocuous, as globally significant. As part of the transition phase of thinking, it was only possible to do this because of the academic funding for the project. To follow it up with projects set by manufacturers without the backing of academia would currently require not only a change in approach, but a level of confidence to justify the potentially increased funding needed and gain the understanding and co-operation of the client.

*Figures 1 & 2. Timber samples at Salisbury facility (photos by Loy 2004)*

The batches of timber shown in figures 1 & 2 were part of the initial briefing. The marks and apparent damage to the timber in figure 1 were described as 'natural faults' that would need to be cut out, or 'docked'. The timber lengths shown in figure 2 were marked for docking, then the faults cut out and the pieces left over measured. Many were shorter than a metre. Lengths of timber that are under 1 metre are generally not used in products for manufacturing as the machinery is built to cope with longer lengths only. As a result there were a great many short lengths of good quality hardwood left over that would not be used in production and wasted. The waste at this point in production was estimated as 10%.

The Innovative Forest Products section, Brisbane, was essentially a government testing laboratory supporting forestry in Queensland, not a manufacturing business, so it was necessary to understand why this issue was important to the organization. The answer was linked to changes in the timber supply that will be brought about by changes in government forestry policy. By 2024 the majority of the hardwood supply in south east Queensland will be sourced from plantations instead of natural forests. The trees harvested will be younger than is ideal for timber production and this will result in more juvenile wood, and less mature wood in the supply. Harvesting juvenile wood, because of its structure, will result in more natural faults and a supply that contains a greater proportion of short lengths. There is also an expected shortfall in the overall quantity to be supplied to manufacturers.

For a proximate designer, the brief sets a straight forward project that identifies manufacturing sectors, such as flooring, furniture and construction products, and produces designs that can be constructed from short lengths. For the sustainable design practitioner, before any design work could begin a complex level of understanding of the timber industry was required in order that the impact of design decisions could be genuinely understood. From an education and consultancy point of view, this primarily suggested that individual designers in the future might be more likely to work in teams of specialists for an industry, rather than as individuals having a broader base of industrial design knowledge. Taking this approach further, and with the growing recognition of the value of interdisciplinary thinking, trans-disciplinary courses could be envisaged in the future as specialist to an area of industry, business or public works, such as education or aged care, rather than being organized in traditional disciplines, such as Interior Design and Industrial Design.

Initial research illustrated how the Queensland timber industry had developed through an era of assumed abundance of natural resources, and practices have been based on that assumption. 34 % of Australia's natural forest is in Queensland, but Government plantations have now also been developed in Queensland so that by the time this study began, 216,500 hectares [7] of pine plantation provided around 76% of the softwood log timber input for primary processing at sawmills. However, the

hardwood plantation industry is still in its infancy in Queensland. Unlike other countries, such as America, private forests have rarely been fostered over generations to supplement farming. Land clearing for agriculture, a widespread practice which has caused problems with soil salinity, acidity and erosion, has also resulted in a lack of private forestry, which the government is trying to rectify with subsidies (until the 1980s state and federal governments linked Crown grants and leases to enforced land clearing, now grants are provided to plant trees on private land [8]).
An in-depth, four-year study (begun in 2005) mapped the relationships of individual manufacturers, their suppliers and their customers, providing an overview of the workings of the hardwood timber industry supply chain for the area. The growth, harvesting, conversion and use of wood were then tracked. This tracking involved case studies in manufacturing and for the specification, installation and disposal of timber.

*Table 1 Old and Suggested New Paradigm*

| | Old paradigm based on abundant, relatively cheap supply | New paradigm for beyond 2009 based on limited supply, valuing raw material. |
|---|---|---|
| Forestry | Crown owned and private hardwood resources, subsidised softwood plantation timber, thinnings not utilised | Key tree felling, plantation sources (preferably agro forestry). Trees strength tested in the ground and after logged to maximise potential of each tree<br>Thinnings utilised |
| Conversion | Large cutters, conversion of large, straight logs only. | Small diameter log processing<br>Scanners to maximise recovery<br>Multiple, small cutters to maximise recovery |
| Processing | Cut lengths<br>Docked defects<br>Off cuts burnt | Value added products<br>Value adding processes<br>Niche products (CNC)<br>Off cuts re-use as pre-consumer waste |
| Specification and installation | Select grade<br>Over engineered<br>On-site installation | Feature grade (plus new, lower grades e.g reject)<br>Pre-prepared product to length to reduce waste during installation |
| End of life | Landfill<br>Burning | Resource recovery |
| Operations | Supply chain, over the wall manufacturing system, little communication | Value chain based operations.<br>Communication between stakeholders<br>Co-operation and clustering for the use of investment technology |

From this study, the above table [Table1] illustrating the old paradigm and a suggested new paradigm, based on sustainable practice strategies, was drawn up. Each section of the supply chain was then reviewed in relation to the new paradigm. One of the conclusions at this point of the study was that as the brief had been set in response to a political move that would close off former supplies of timber from crown land, the driver for the brief was actually the need to maximize the wood supply, rather than solely the need for new designs. Off cuts from production and installation and the levels of waste in conversion were a concern in terms of both supply and industry image. If the intention behind the brief was to maximize the resource, then the new approach of considering the full context and implications of the brief to provide outcomes that demonstrated that integration with global considerations could be particularly appropriate, but would significantly alter the designer's traditional role.
For this project, creating and applying a sustainability paradigm to the industry that provided the context for the initial brief led to a change in thinking for the designer from products to organization and practices within the whole supply chain. Although designed products were still part of the final outcome of the project, the project became about supporting an integrated value chain that would help to maximize the raw material, reducing waste throughout the different processes and include recycling the timber and reducing landfill. Building on these conclusions and with consideration of the drivers

and parameters involved, the title for the project was changed from 'value added products from small and or narrow pieces of timber' to 'To increase the proportion of wood used for value added applications by addressing the issue of using small and or narrow pieces of timber.' The basis being that it would be of greater economic and environmental value to all stakeholders concerned if more of the wood could be used in the applications already being produced, rather than trying to use the left over pieces once they were cut.

The outcomes of the project included not only the traditional industrial designer outcomes of designs for value added products but also direction on how the hardwood timber industry could change practices along the supply chain to improve the recovery rates for timber at each stage. Although there would be significant costs involved, and the recovery in economic terms not significantly beneficial (at least until supply shortages drove up the cost of the raw material), these changes in practice would demonstrate a commitment to sustainable practices that would be of more significant benefit to the industry when competing with other building and manufacturing materials. This work included a review of advances in technology worldwide that was relevant to the Australian hardwood timber industry, and briefs for the development of equipment to aid the construction of value added products.

The thoroughness, and cost, of this approach was dependent on a commitment by the clients and co-operation by all stakeholders in the supply chain. In reality, this was probably only possible during this transition period because the study was funded as a PhD by a national research body in conjunction with a government department. However, the results demonstrate that correspondingly thorough outcomes with the potential for significant benefits to the industry as a whole, as well as the individual manufacturer, can be produced by this depth of approach. Sustainable design practice has emerged in response to our growing understanding of the interconnectedness of everything and everyone, translating that into persuading manufacturers to co-operate and for suppliers to willingly become part of a value chain working towards life cycle inventory benefits for the whole of the industry will take more publications that promote sustainable design practice as good for business, as in Natural Capitalism [9].

The key lessons for future designers if a fully researched sustainability approach is to become a reality for every product design is that team work would become even more important than we already know it is, and that the ability to research a manufacturer beyond the traditional approach to the design of products to look at the possibility of, for example product service systems. Industrial design as a discipline would change. For the educator, transferable skills, such as group working and the ability to plan a research project will need to be inculcated as early as possible into learning. More of a challenge, providing students with the opportunities to practice taking a narrow initial brief and develop a return brief that looks far beyond the needs of the immediate client to its full lifecycle implications. Practice in building an understanding of the lifecycle of products is essential, with associated tracking, interviewing, mapping and evaluating skills.

Ramirez [10] found only fragmented ideas on teaching methodologies that took into account the consequences of design decisions outside those on the immediate client. Sustainable design practice is still very new, and how the theory translates to practice is still being explored. For design students, it is important that their education grows and changes with our changed understanding. They need to be provided with practical examples, such as this project, of how a brief can be interpreted and approached within the growing sustainability imperative. They then need to be given practical opportunities to work in teams to tackle design projects to develop the confidence to influence the outcomes of their projects (including possible outcomes such as product service systems and temporary products) to ensure that not only do their clients benefit economically, but the wider community benefits from a thorough, responsible approach to long term, triple bottom-line based design thinking.

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