

Global communication part 2: the use of apparel product data management technology

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Abstract: Improving IT communication systems, through the evolution of future PDM applications, is a theme that has received attention due to its perceived benefits in developing global supply chain success factors. This paper discusses the developments and capabilities of such systems, found within global fashion supply chain relationships and environments. Major characteristics identified within the data suggest that PDM technology appears to be improving the speed of data transfer; however, evidence also suggest that the technologies are evolving quicker than consumer understanding, and arguably cost more to implement, train staff and maintain. Nevertheless, PDM technology increases communication efficiency and helps to enhance social economic and corporate development. The article discusses the findings and also presents the issues regarding human interaction; iconography, infrastructure necessity and individual communication enhancements using a variety of technology processes. PDM technology adoption is still a prevalent topic for the long-term developments of global strategy and communication amalgamation.

Keywords: communication; product data management; fashion; information technology; supply-chain.

1. Introduction

In most corporate arenas' and their subsequent professional environments, it is essential to envisage that, we are all considered to be in the business of communication. Subsequently, this research article follows a similar theme to its predecessor: '*Global communication Part 1: the use of apparel CAD technology*'; allowing this part of the study to concurrently critically evaluate, analyse, and identify the interactive relationships of clothing industry practices, identifying the trends needed for improved communication through the development of future PDM applications. Key points to be considered are those referring to business relationships, present communication concerns, inherent cultural issues and any adversarial implications that may result on company performance. The research seeks to evaluate issues which contribute towards improving company performance, business relationships, along with global communication, found within the global apparel manufacturing industry.

Park & Stoel (2005) suggested that the traditional supply chains of the apparel business environment in the past have been aligned so that manufacturers created products and retailers sourced and sold products. However, it is said that in today's global apparel business functions, this distinction has become more widespread and complex (Park & Stoel, 2005). In 2001 mainland China became a member of the World Trade Organisation, which saw the removal of trade barriers (Chen *et al*, 2007). This transition allowed the sourcing of direct goods to become more accessible to Western countries, such as the UK and our European counterparts (Chen *et al*, 2007). In light of such developments within the clothing industry, supply chain management, organisation and flexibility between retailers and

manufacturers has never been so important, (Verdict, 2008). Hence, it is also valuable to note that no singular construct of the current apparel industry can remain unaffected by the development of various product data management (PDM) systems. Thus, within such a diverse multi-faceted environment, in which a desire for quick response is suitably necessary, any technology that can progress the supply chain components, quicker, simpler and of course cheaper, will always be considered for an appropriate adoption strategy. (Chase, 1997)

2. Background

The shift and need for global supply has appeared due to an increasing pressure to achieve competitive advantage, lower costs, diversification within the market demands, improve higher quality, enhance technology access, create reliable delivery schedules / quick responses, and ultimately attempt to meet consumer expectations for flexibility and individuality (Verdict, 2008; Su & Richter, 2005; Jin 2005).

The choice to globally source products could be considered as creating some form of competitive advantage; whether it is through cost, quality, or the collaboration of individual sourcing experiences (Jin, 2005). In other words, it can be said that a company's use of global sourcing, as opposed to domestic sourcing, is therefore a strategy for formulating competitive advantage within a market sector, rather than just minimising costs. Jin (2005) further affirmed that issues within competitive advantage are those of human factors, organisations, brand names, skill co-ordination, superior technology adoption and enhanced quality; which are seen to add value within organisational structures, giving individual competitors their subsequent advantages. Global sourcing therefore, has become a topic and concern for retailers trying to fine-tune their business strategies, balance their extensive considerations of economic trade, the environment and competitive factors affecting their markets (Su & Richter, 2005). Thus, communication issues are a valuable topic with respect to developing effective trade relations and suitable technology platforms to enable quicker responses to global business functions.

Tam *et al* (2007) said that, the size of the supplier can affect the suitability for the buyer and in turn, the relationship held between both parties. This view is seen because; smaller companies have increased flexibility, allowing them to potentially achieve greater levels of efficiency. Smaller suppliers are said to be more innovative and not bound by complicated organisational structures; however, smaller suppliers are inherently limited by their lack of development funding, restricted human resources, and their power to negotiate with large retail organisations. On the other hand, larger suppliers enjoy the benefits of sizeable business volumes, and receive preferential prices from their suppliers. Nevertheless, larger suppliers are seen to manage quality control better and have a greater power when handling external environments and large retail organisations. Furthermore, Tam *et al* (2007) suggest that to achieve any of this, retailer networks need the ability to guarantee factories with constant work, resulting in best factory and product range collaborations. This allows larger suppliers to have greater recognition, credibility, stability and increased funds for research in product development and technology progression (Tam *et al*, 2007).

Nonetheless, Doyle (2006) suggested that once the establishment of strong strategic relationships are in place, the benefits can be one of agility, integrated problem solving, mutual trust, the dispersing of risk factors and optimisation of output capabilities; areas for concern are highlighted as a need for openness, individual company policy/practice reviews, and adaptation of supplier procurement strategies. Supply chain management is a topic which is frequently researched and pondered over by numerous academics; however, presently there is little evidence of a quantitative measuring tool to effectively measure supply chain organisations in context with each other's behavioural processes (Jana *et al*, 2007).

2.1 Apparel product data management (PDM) technology.

Consolidating technology, in the form of Product Data Management systems (PDM), are a mode of information control, critical path development and supply chain communication, allowing '*quick response communication*' (Beazley & Bond, 2003). In recent years the adaptation of the internet, has allowed PDM systems to become extensively web-based in their application and are now seen to be working alongside current forms of retailer and supplier sales portals, or more commonly known as websites (Beck, 2004). However, Beazley & Bond (2003) also recognise that numerous software versions exist and thus, PDM systems are considered to aid the development of collaborative communication effectiveness, enabling speed in the co-ordination of a products development lifecycle and their subsequent sale. These forms of PDM systems therefore, allow '*real time*' electronic data transfer across continents and supply chains, recognising information in the form of visual, numerical and text formats, (Beazley & Bond, 2003). Although, in recent year's software developers such as Gerber have moved away from PDM with a preference to calling the technology: Product Lifecycle Management (PLM). Regardless of the name, these IT systems are considered to be a result of a '*paperless office*' which has been prevalent since the 1990's; therefore, the intention of PDM system formation was, to reduce paper waste, speed up the administration of individuals tasks and increase productivity (Beazley & Bond, 2003).

3. Methodology

It is important to note that this methodology is consistent with the previous paper '*Global communication Part 1: the use of apparel CAD technology*'. Therefore, due to the expected values aligned with communication engagement, no single organisation was targeted, or considered more relevant from which to gather data. A triangulation of research orientations maintained the need for the analysis of individual supply chain employment sectors, rather than a singular company evaluation through a case study. A focus group of designers', consisting of five members; and four corporate constructed semi-structured interviews were used as the methods of qualitative and quantitative data collection.

Respondents from the clothing retailers covered a range of business organisations, including director and design employment levels found within; current successful global supermarket corporations; a highly regarded high street retailer; an Indian owned footwear supplier; and a high street fashion design freelance firm. All retail companies encountered, performed apparel production techniques in various locations; although China and India were considered to be their main manufacturing bases.

The supermarket retailers were considered '*lean and mean*' in their strategic approach, whereas the high street retailers regarded quality to be paramount in their global operational philosophy. Additionally, the footwear consultant's background was addressed, which had encountered prolific involvement in the buying and supply of footwear, to the value and high street market segments. Consequently, some respondents had benefited from lengthy careers which had covered all aspects of the global apparel trade, and over a period of significant technological development. In contrast, the focus group participants had more direct involvement in apparel technology developments over the past decade. Simultaneously, a former PDM consultant was recruited for the study. The participant had previously dealt with the USA and European countries, and had experience of technology implementation strategies. Furthermore, a managing partner within an international digital marketing agency was interviewed, which allowed the synthesis of the in-depth current technology knowledge to be collected with transparency and triangulation in mind. The participant had extensive knowledge of digital marketing; and currently advises and promotes international global

brands using online technology formatting. The focus group consisting of five retail designers, from various apparel and other relevant organisations were interviewed simultaneously, in a secure closed environment for comfort of all participants.

Feasibility, time, practicality and resources were all complex issues for the research processes, and these issues were noted when writing up the results (Bryman, 2008). However, it should also be noted that although few radical outcomes were identified, the research approach remained consistent and systematic throughout, allowing the variable forms of beliefs, views and opinions to be gathered, and which were considered of great importance to the overall qualitative, cross-sectional, empirical research design.

Six sets of variables were identified with respect to the cause and effect relationships, found within the fashion retail and technology sectors (Bryman, 2008), and these were:

- Apparel retail management
- Apparel retail buying
- Apparel retail supply
- Retail design (using CAD)
- Retail digital marketing (using internet and TV outputs)
- Corporate Information technology (PDM)

These six sets of participant variables were aligned so that potential conflicting, and/or similar opinions could be extensively evaluated and analysed using post-coding techniques, to establish the predominant themes found within the data collection. The focus group and interviews extracted informed background information regarding, behaviour and experiences, opinions and values, interviewee feelings, knowledge on the subject, sensory information and demographical perceptions (Bryman, 2008). Subsequently, the focus group and interviews were arranged for between thirty minutes and one hour, although most exceeded this. Attempts were made to avoid extensive co-participant behaviour and non-intentional bias (Bryman, 2008). All interviews were semi-structured, and both interviews and the focus group were conducted in a location and at a time suited to the participants that was also acceptable to the interviewer. Results were audio tape recorded, and participant anonymity was protected ensuring that ethical issues were upheld. Respondents were unable to see the interview questions prior to commencement, although the general subject was addressed in a previous un-recorded conversation. Participants were told that their answers needed to cover the topics underpinning their professional and own opinions and beliefs on:

- Communication concerns and benefits
- Computer aided design (CAD)
- Computer aided management systems (CAM)
- Product data and lifecycle management systems (PDM) / (PLM)
- Information technology administration operating systems
- 2D & 3D CAD technology
- Internet sites and social networks
- Global supply chain management
- Buyer-supplier relationships
- Digital marketing
- Digital presentation techniques

In doing so, this prevented participants from conducting research or formulating precise answers prior to the event (Bryman, 2008). Therefore, the direct responses were spontaneous, and based on the participants' own experiences, opinions and beliefs within

their professional backgrounds, rather than those considered or adopted through other means. Due to the small scale of interview data collection, and the diversity within the focus group, a less formal structure was devised in order to develop the constructed semi-structured interview questions (Bryman, 2008). Lists of questions were constructed for each individual participant, in anticipation that some interviewees would not have a deep understanding within certain subject areas, due to their specific professional experiences. The focus group was conducted after the individual interviews had taken place. Thus, a list of questions was constructed for them, to reflect the entire list of questions given respectively to each of the individual interviewee, enabling the development of an arrogant set. Participant memories towards the development cycle of technology were important, thus, the triangulated data comparisons presented herein, suggests indications of a clearer picture, of past and present behaviour towards communication technology development, found within the apparel retail and supply sector. The qualitative data was analysed using a quantitative coding technique, which identified the contribution, importance, and the number of times different respondents considered each of the specific research questions to be significant, in accordance with the relevance to PDM capabilities. In doing so, the results are set out below in the three areas: business relationships; company performance and global communication.

4. Results

The results identify current clothing industry business relationships, communication concerns, with the consideration of adversarial and beneficial implications on company performance, through the implementation of PDM adoption.

Firstly, due to some participants giving an acknowledgement that they did not fully understand PDM technologies, in any great depth, questions relating to PDM specifics, were only fully explored by the technology experts and not all participants. This is significant because the lack of understanding highlights the need for further information, on the subject of PDM, to become more widespread within the apparel sector. Nevertheless, the results are consistent with the methodology and the main points are laid out below. All being said, the prominent themes uncovered were that multiple-software packages are still needed in their correct contexts and that no singular system currently pleases all factions:

“...PDM is about the holding of information, it’s about processing and communication of the information...” (I3P1; N 4)

4.1 Business relationships

Observed was a drive towards strengthening existing relationships; trust seemed to be an issue for all respondents, along with how professional relationship practices were conducted. However the underlying factors suggested that relationships were more important than technology usage, although technology was still noted as being able to speed up the relationship processes:

“...we group our suppliers into collaborative, strategic and tactical. Overall, we try to reduce our supply base, not because we are doing less business, because we are doing more business; but because we want to get better relationships with fewer factories.....” (I1P1; U 4-8)

“...for us to have stronger relationships with fewer suppliers it is really important. If you said that for every supplier; you take the amount of time, buyers and technical staff to interact with them; then they all only have a certain amount of time in the day. If we are not careful we are dealing with somebody for £100,000 worth of

business, which actually costs us more than we make from that relationship. So, we are undergoing a big piece of work, where we are launching this sort of grading or grouping of factories... We don't want to miss the opportunities; but we do want to be able to control the time we have got to rationalise our supply base..." (I1P1; U 15-25)

"...you're more likely to take a risk with somebody that you have got a good relationship with, than you are with someone who comes in stone cold..." (I2P1; I 74-76)

"...most of the relationships that I deal with are strategic, professional, open, honest, etc; but working in the area that I do; unfortunately not all of them are like that, and that is about people not understanding..." (I3P1; P 2-5)

When considering whether retailers and suppliers can truly open up their information sharing capabilities, it was noted that this would touch on competitive advantage issues and functional conflict. Nevertheless the below responses had the most value in considering if it was at all possible:

"...Miss Selfridge, have an internet site that you can go into as a supplier and look at all of the things that they require. They can go in and look at what we are doing; they can look into the systems and see where we have updated the deliveries and that sort of thing. Everyone knows the full up-to-date situation. So there is a bit of connectivity in the industry, it's been driven by, well I suppose, people like the Arcadia Group? ..." (I2P1; N 12-19)

"...Dupont as it was, but are now Envista, created an open pocket database, so that all suppliers could load up their fabric information and people could source directly from it; but 6/7 years ago, people thought it was going to be the global sourcing place, but it can't happen because people don't culturally work like that. They might use it as a supporting tool, but they won't use it as a single tool..." (I4P1; Q 12-18)

"...I used to work for a manufacturer and they had about 12 retailers that they supplied to. Each piece of information that they had to give to the retailer was pretty much the same information, but had to be in different format for each individual retailer. Therefore, which retailer would want to share their format with another retailer? Because that could be part of their competitive advantage; likewise with the manufacturers and fabric suppliers. So to get the whole supply chain together would prove very difficult indeed; it would be nice to think we could do that, but I don't think we will ever get there..." (I4P1; Q 18-27)

Respondents collectively took the view that technology is a place to interact, whilst simultaneously reducing the interaction time, within relationship and administration cycles.

4.2 Global communication

Ease of user handling by consumers was noted as being imperative towards PDM technology and effective communication success. All participants were in agreement that technology needs to be simplified for consumer use; significantly suggesting that the best ways to simplify complicated technology processes; was to develop key visual icons, allowing consumers to understand complex IT functions on a basic need to know basis:

“...if you take into account that people take in information in three different ways: visually, audio/orally, and kinaesthetic; then technology needs to fit all those people who use it in different ways...” (I4P1; U 1-6)

“...it is definitely more about iconography, such as how do people know which parts of a website are clickable - they tend to be in blue and or underlined. Or like the padlock symbol on the browser, and not many people know what that actually means: SSL Secure Socket Layout 128 bit sphere inscription - is what it means. Yet, if people see the padlock symbol, then they basically understand they are browsing in a safe environment, because for them, that's all they need to know...” So IT simplification does tend to be more icons based than anything else...” (I3P1; U 3-13)

In comparison to the technology experts, other participants talked about technology improvements with regard to the speed of communication over a period of time, specifically suggesting the benefits adhered to the quality of the communication technology:

“...With computer systems in our business they are quite basic, its literally; obviously email system, which is an incredible thing - because the things that historically you would have had to send by post, or by fax, or whatever, you see within seconds now...Also from the view point of specifications, if we order samples, we put them onto an Excel spread sheet so that the information is there and everything can be updated quickly..” (I2P1 G 1-4 & 13-17)

4.3 Company performance

When considering which software packages were considered the most successfully used in and out of the business environment; (I1P1) felt uncomfortable suggesting reasons for brand name success, which may have been due to their retail position, organisational code of conduct and / or knowledge on the subject. Nevertheless, (I3P1) and (I4P1) were more comfortable and referred specifically to:

“...Sage Epiphany data management, Office software – because they are necessarily complicated but not overly complex, they are complicated as they need to be without trying to be too clever...” (I3P1; O 3-6)

“...It's not down to the package; I truly believe it's down to the implementation. So I would say there is not one particularly successful package....Mainly because the users aren't using them properly, because they are not implemented properly also...The ones that don't do very well are the ones that underestimate the amount of time it takes to implement systems. So all people literally want to do is what Excel or Word does. Sit there and if you want to use it, use it. Most people know probably about 5% of a software product, instead of using its full capabilities....” (I4P1; M 3-5, 8-9 & 23-27)

As anticipated the technology experts considered the pros and cons of packages rather than identifying specifics:

“...the most successful ones are the ones that do it right the first time round, and then continue to be implemented and improved, it's like fashion development really...” (I4P1; M 19-22)

Participants were also asked about their current use of available business technologies and their views were noted as being:

“...the companies that do have integrated systems aren’t necessarily happy with those, because to a certain extent they are not flexible enough...” (I1P1 M 5-7)

“...Administration tools and processes are there to facilitate only one thing, and that’s to make things easier... though there is no understanding with what that process is trying to achieve, each company and process needs to be considered independently before adoption can be implemented successfully...” (I3P1 M 2-3 & 10)

All the respondents agreed to disagree on the usefulness and effectiveness of PDM technology and therefore, each system can be described as only being of use if it is seen in that manner by the user.

However, no matter how technology is used or seen as being beneficial, the most significant view is in-line with the “*Garbage in Garbage out*” theory; whereby Pountain (2001) reminds us that technology can only be as effective as its user handler:

“...I actually think that with PDM technology, you just can’t sit it on its own. It’s got to be: People, Organisation, Process and Technology together. It’s not the computer; you can’t just expect the computer software to work on its own. Or any sort of technology to work on its own. It’s got to be used properly...” (I4P1; F 1-8)

For future developers of technology, it seemed appropriate to consider where technology is consumed and, for what reasons has the technology been adopted by those people and/or cultures. Interestingly all parties seemed to agree on the specific countries and offered some insights as to this area:

“...China is particularly strong and factories in other countries that have a strong Chinese link. I’d say Bangladesh is the worst and Sri-Lanka and India fall somewhere in the middle. It’s China we sort of see as being the early adopter. But, actually, outside the metropolis cities of India which is where we make most of our garments, they are less sophisticated with IT adoption...” (I1P1; R 2-9)

“...the whole global world should have access to IT systems, but it’s whether the political side of things, or the infrastructure, energy supply, retailer investment, can support it?...” (I2P1; O 2-4)

5. Conclusions

The findings gathered in this paper were established through a small high-profile sample group, and the analysis of interactive clothing industry relationship practices within global retail environments. Furthermore, an examination of business relationships, communication concerns and implications of company performance, all aligned with PDM technology development; such as effective hardware/software system combinations, presentation techniques, iconography, and consumer handling of present technologies. The results give an indication of the practice theory and the identifiable trends needed for improving communication, through the evolution of future PDM applications.

The significance of this research therefore, was to address some of the current issues encountered by industry professionals, working within the specified sectors; which allowed the extraction of perceived beliefs, opinions and views, on the subject of PDM adoption and advancement, over a significant period of technology development. The new knowledge uncovered in this research relates to PDM implications within the three research areas identified throughout this article, these being:

- Business relationships
- Global communication
- Company performance

Considerations on how best to apply this new knowledge has been summarised for academic, technology and apparel industry professionals, in the recommendations section of this research paper.

5.1 Business relationships

Uncovered within the research findings there was a clear desire for *relationship pruning*, staff performance reviews and supplier scrutiny, which could be helped by effective PDM implementation strategies. Current marketing issues appear to becoming more focussed on retailer-consumer relationships (Gilbert & Summer, 2004). Whilst simultaneously, buyer-supplier relationships are becoming more focussed on strategic engagement and are now considered a type of corporate strategy and an influential tactic for improving retail companies sourcing activities (Tam *et al*, 2007).

Global sourcing has transpired into the norm for the majority of current retail players (Su *et al*, 2005; Verdict, 2008; Jin, 2005). Consequently, the data collected from the focus group, further suggest that sourcing activities create different levels of competitive advantage and therefore, retailers must appreciate the inherent nature of each individual connection made. An increased relationship lifecycle through performance reviews will inevitably allow communication management to remain essential to global industry advancement. Therefore, the nature of '*strategic networks*' and these new, '*tactical relationship*' and '*collaborative relationship*' combinations, will continually encourage improved communication and increased profits through the relationship strength. Interview data noted that fewer '*relationships*' help create more available time for buyer-designer development and range building enterprises.

5.2 Global communication

Research by Chen *et al* (2007) suggested that individual personal performance, competence and attitudes towards IT potentially hinder communication effectiveness. However, it is clear from the data, that human error and the influences of culture are unavoidable, although efforts should be made for increased training on IT specifics and '*target rewards*' for employee IT system competence. The communication of design and administration tasks has become of great importance to future supply chain management strategies. Research data gathered suggested that individual personal performance, competence and varied attitudes towards IT potentially hinder communication effectiveness. Thus, PDM technology systems that can ease consumer adoption, by using simplification strategies, which through speed of operation handling will consistently, enable the consideration for an appropriate end use.

Within the global market place simplification of 'interaction points' was seen as being essential for improving communication efficiencies, due to its benefits of accommodating the various language and cultural barriers that already exist within the sector. Iconography development therefore, was suggested as an area for improvement in order to compile a global consistency level for communication symbolism.

Technology had however, over a significant period of development, enabled a more efficient yet more complex way in which to send and receive data/specifications across continents. Previously this information needed to be sent via fax or in written form, which also had to be duplicated via the receiving and sending parties; causing extra costs and lost

time in administration cycles. Although IT can help to eliminate these previously seen problems in administration, they themselves can also be costly to implement, maintain, train staff on, and update the necessary software on a regular basis.

5.3 *Company performance*

The current retail environment is widely shown to directly affect the performance of business structures. Recent literature refers to rising global inflation costs, a struggling housing market, high interest rates and restricted consumer credit, to have played an influential part in many retailers' demises (Verdict, 2008). However, the primary research data suggests, culture and infrastructure within such environments are seen to be the main variables that affect the current retail markets and technology adoption rates. Consumer culture and consumer expectations are also evidently changing and reflect dramatically altered desires and perceptions of lifestyle over the period (Mintel, 2009). Therefore, global political issues are uncontrollable and organisations must allow for unexpected complications as previously seen. Nevertheless, the culture shift would confirm on the whole, that the successful retailers/companies are those who target larger ranging consumer groups, create effective margins, have multiple product offerings and precisely engage with niche markets (Verdict, 2008). Evans (2005) said that the bottom line is simply that organisations cannot expect a stable global business environment and should plan for uncertainty within the supply chain. In order to achieve this, relevant areas of engagement were found to be: conservative inventory management, controlled merchandising practices, price flexibility, communication management, correct adoption of necessary technologies, enrichment of retail processes and the recommended advancement in business operations (Evans, 2005). Social economics under this present global network include influences such as: diverse local communities and older children staying at home longer. Such influences affect the complexity of a modern society in which retailers circulate business strategies (Verdict, 2008). This evidence suggests that '*fast-fashion*' tactics are now needed for a sustained retailer competitive advantage and in order to maintain an ever changing market segment (Haynes & Jones, 2006). From the data, clear indications that new strategies of '*strategic networks*' and move towards '*tactical*' and '*collaborative*' relationship building, seemingly allow for new avenues of '*fast fashion*' tactics. However, their success factors rely heavily on the combined use of effective PDM systems.

Issues regarding sustainability, namely the '*carbon footprint*' of the retail industry, see businesses progressing with caution. Retailers are urged to consider committing to sustainable development, and it has been said that the need to communicate this to their stakeholders is imperative (Jones *et al*, 2005). In terms of ecological issues, improved consumer loyalty, media influence and a reduction in operating costs are all considered key benefits in the need to progress '*sustainability advantages*' (Verdict, 2008). However, primary research was inconclusive on the subject, only suggesting that sustainability implementation plans and set up/running costs are still an uncertain area, especially with respect to competitive advantage. Although, there were suggestions that certain countries lacked the infrastructure needed to maintain the desired level of IT support required. Therefore, retail direction under this UK Government will continue to rely on extensive competent guidance proposals, which include advice on: improving environmental performance, managing environmental issues, design and implementation of sustainability plans, pollution control, waste, energy supply, and hazardous substances (UK Government, 2009).

5.4 PDM Summary

PDM systems have become extensively web-based in their application in recent years, allowing for global interaction of suppliers and retailers, which is evident from the individual interviews and focus group findings. However, it is clear that retailers and suppliers are still reluctant to take on board, or fully understand the capabilities of all forms of PDM technology. This was suggested due to the software's inflexibility under the apparently ever changing retail environment. Furthermore, many interviewees debated whether the extra costs of implementing and maintaining the technology would outweigh the potential benefits. Nevertheless, PDM systems are seen to allow '*real time*' electronic data transfer across continents and supply chains, recognising information processing and data collection in the form of numerical, visual and text formats.

Suggestion made by Gilbert & Summer (2004) was the retail adoption need for consumer relationship management (CRM) technology systems. However, no evidence in CRM technology was observed by any of the participants, which could suggest such systems are still in early development, or that the extensive terminologies, such as (PDM), (PLM), (CRM), (CAD), (CAM), etc, are becoming themselves, lost in translation. Evidence of this, is seen within Gerber® Technology (2009) who have swapped their '*Product Data Management*' systems (PDM) for '*Product Lifecycle Management*' systems (PLM). The fact that some participants did not entirely understand PDM technology can be seen as being indicative of the need for more widespread information, within the apparel sector.

Furthermore, observed with the participant groups there was a clear divide when it came to the age of an IT adopter; with the younger generations having a far more intuitive understanding of IT capabilities and operating constraints, than seen within their peers. This division is becoming more apparent as the younger generations are becoming unaware of a period without IT systems, which cannot be said for the older professionals; making IT systems, for the youth, a standard method of communication.

6. Recommendations

Technology adopters should therefore, maintain the need for individual specific software and consistently, identify the individual technological needs within their organisation and evaluate the need for any further available technologies before implementation. Conclusively, the comparison between the primary and secondary data collected, within the focused literature review suggested that technology development is based around technology capabilities, infrastructure capacity, consumer acceptance, cultural interactions and organisational usage, with human IT performance being the key to any technological success, no matter how simple the IT system is to use. Further research is evidently needed into *iconography* development, to accommodate ease of use factors, across the various culture zones. These forms of understandable and acceptable *interaction points* within the software programs would benefit further examination, which may help form new standardised developments in global IT communication techniques. Simultaneously, research into clothing and footwear terminology, to allow a consistent usage across different cultures could also benefit cross continental communications, thus giving increased understanding and therefore further, increase speed efficiencies to the required processes. Ultimately PDM applications can, in varying degrees and if they are implemented and used correctly, improve the speed of data transfer and benefit the quality of fashion communication, within an ever changing global industry. However, there were implications found that considered the costs to implement and train staff on such systems, can in some cases outweigh any potential savings and hinder the processes that they are trying to support.

The point made by Jana *et al*, (2007), is interesting in that they stated that presently

there is little evidence of a quantitative measuring tool to effectively measure supply chain organisations in context with each other's behavioural processes; which identifies that there is a gap for a technology system to gather more precise data on global supply chain efficiencies. Added to this, the need for more information on PDM technologies is evidently required. The apparel industry needs to obtain a greater understanding of available technologies and their full capabilities; whilst simultaneously technology creators should also consider gaining a greater understanding of apparel business functions, in order to develop more suitable global operating and data management systems. The inadequacies of knowledge found within each sector's functionality, leaves large gaps in both expansion and development, ultimately limiting capacity and enhancement of global communication technologies for all.

The most significant underlying findings were that PDM technologies are seen as a place to interact and catalogue data for future use, and further distribution. There were significant beliefs, within the professional environments, that technology was simply an aid to speed up processes and should not be considered a complete removal of fundamental communication forms; such as direct physical, verbal and visual communication. These forms of face-to-face contact were considered essential to business relationships; although expensive in their performance value on a global scale, yet necessary for global communication success; with PDM technologies being considered as a new helpful companion in delivering timely correspondence and the collation of numerous data sources.

Finally, it can be said that even the simplest PDM technologies will still have a while to go, until they can be suitably conceived, and fully accepted, by a generation that are capable of understanding it, accommodating it, and adept at handling it with due diligence.

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