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Quality Function Deployment And Proactive Quality Techniques Applied to University Lectures to Improve Student Feedback

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ABSTRACT: Lecturing and instruction to students at university has traditionally been based on qualifications, experience and position of academics within ones department or college. The higher the level and more advanced the subject then the most experienced lecturers are traditionally selected for that task. Visiting lecturers are never asked to teach basic mathematics or science, they are to share their experience and enlighten the students from a vast knowledge and history. This paper reviews and discusses Kano's model with Quality Function Deployment related to customer satisfaction and compares if the traditional approach is in keeping with university practice. Furthermore, it argues that industry has concepts and ideas that can be more proactive if applied to an educational environment where students' demands are ever increasing and their expectations are becoming higher. If universities are to improve student-learning experiences then novel and successful techniques are needed. One such approach is discussed in this research paper to find better ways to improve student satisfaction.

Keywords: Kano's model, student satisfaction, student feedback.

I. INTRODUCTION

Universities have been in existence within Europe in their current style since the founding of Oxford University over 800 years ago. They were originally learned places for the noble and rich to teach the seven classic subjects of classical Greece and Rome. Class sizes were small, frequently on a one-to-one basis where the Master and pupil were known closely for the entire time of study [1]. Lecturers then were learned men and may have been appointed through fiefdom or connections. Likewise, they also had many clergy to ensure the moral fabric of a young man was maintained. This has not just been applied to Universities, but colleges and schools across the whole sector. It can be argued that the higher level subjects, highest achieving students and most difficult subjects are traditionally taught by academics with the greatest experiences of teaching and learning. Professors are seldom involved with the foundation classes and lower level theory.

The current teaching and appointment of academics has changed little in the past 800 years. Junior positions are made available to newly qualified people and the progress can be slow and even non-existent for some through the lack of opportunities. What is not clear is if this approach is as good today as when conceived. Mathematicians usually complete their seminal and pioneering work before their 27^{th} birthday [2]. Does that mean a mature and experienced academic is only 28 and not 58? Benchmarking is a current approach used extensively in industry between sectors with little or no parallels. However, there can be much to be found when comparing needs and demands. For example, car companies can learn for how major food outlets distributes food nationwide as they need to ensure their spare parts are distributed without large warehouses in many situations. Within Europe there is normally only one central storage point, in America state wise. Previously there would have been many [3]. To summarize, industry offers many ways to share practices and approaches. Are these of use in education is where the answer is not known.

II. CUSTOMER FOCUS DESIGNS

In the mid-1950s the Ford Motor Company became shareholder driven and the original Ford familyno longer held the final vote or view [4]. The board was persuaded to agree on a new strategy that would invigorate their product range and sales. A new model was needed that would be a focus of the successful part of regaining sales from the competition. This warranted a new division that was to be named the E Division – after Experimental.

Their focus was to make a car the customer demanded and would buy. However, they never consulted the customer, assuming they knew what was best and let the engineers design the car. Additions were made; for example, the horse collar on the grill was assumed the engine would over heat without the extra air-flow (no testing undertaken). Below, in figure 1, is the Ford Edsel, in its classic format. It was the

first mass produced car to have a handbrake on warning light, low oil light and a global speedometer. The sales were poor to start and became even worse [5]. Nowadays, it is a frequently used example about ignoring thecustomers' demands. In less than two years production was stopped, with sales that affected the profit for several years. Knowing what you believe customers want and those actually needed can be poles apart.

Figure 1: Ford Edsel car of 1958.

In the wake of this disaster, the car industry started trying ways to establish with confidence what customers wanted. Market surveys, pre-launches, customer satisfaction surveys and many more we take for granted now were started, and pioneered, to prevent such a problem again [6]. That is not to say that these mistakes never happen, they are generally less of a disaster or arecancelled prior to launch. Needless to say, a recent failure happened to Coke-Cola. They launched Diet Coke in Serbia, a country where most live on low wages and do manual jobs. It has less than 1% of the population that are overweight. Sales stalled immediately and the product was withdrawn[7].

In the 1980s Professor N. Kano proposed a novel approach to customer needs [8] and in figure 2 below, it shows the philosophy of the model and approach. The vertical axis is the customer satisfaction level, from high at the top, to ambivalent at the axis intersection and then dis-satisfied at the bottom. This had been previously considered one-dimensional, here it is not and the detail depends on other factors. The horizontal axis is an indication of the design and use. On the far left is the where the design is ineffective, useless or does not do the basic task required. The axis intersection is neither good-or-bad but acceptable [9]. Whilst the right hand side is an excellent design. This creates a two-dimensional way of evaluating three types of design: innovation, performance and basic function.

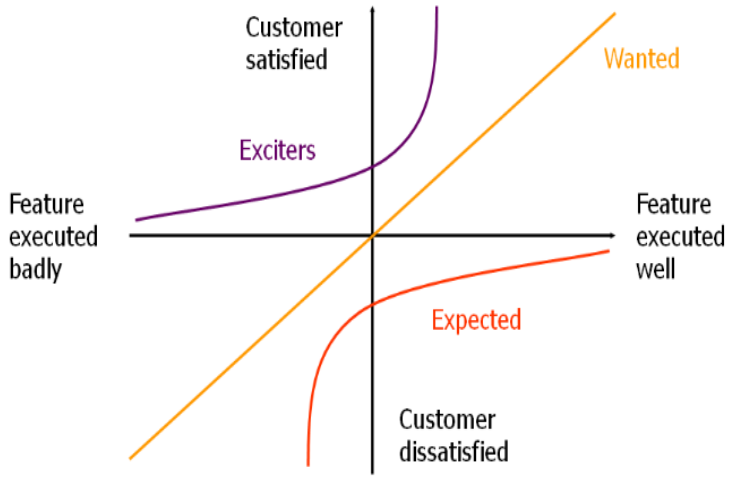

Figure 2: Professor Kano's two-dimension analysis model for designs.

Kano's model considers three-design features. First, an innovative feature. This could be a unique or novel design. When the iPhone was first released it was described in this way; it offered exciting features not

known before. Its effectiveness is not critical, it may be a bad design but offers something different that people like [10]. An excitement feature does not stay an excitement feature for long, soon it becomes a performancefeature. Various iPhone launches sincehave disappointed as non-innovative; its performance is reviewed and customers make their new opinion. Finally, it becomes a basic feature that cannot improve customer interest[11].

One example of this progress is the TV remote control. In the 1960s if people had a remote control it was probably attached to the set by a wire that had to be plugged in. In the figure 3, below, shows a very early remote control with only two buttons. One is for the volume and the other to change the channel. Each time a new channel is wanted, you had to scroll through the list one-by-one. It was, according to Kano, a poor design but the customer had an excitement because the feature was not previously available [12]. It worked on high frequency sound waves that were reported to affect dogs and cats, which did not matter. Today, it would be a disaster, as a new and innovate feature it was producing good customer satisfaction feedback regardless of the design. If this design was analyzed solely upon technical merit it would meet with approval, but customers did and that must be remembered as the focus [13].

Figure 3: An early TV remote control.

The remote control soon lost its innovate feature, and became a performance feature. Below in figure 4, is a remote control where the focus was to give the user all the options possible in order that they never need to move from their seated position. The manual for this is thicker than the remote and it became complex beyond satisfactory performance. This could be considered a bad design, and customer satisfaction would be low, even though the effort and detail in the design with be great. There is nothing novel or possibly intuitive in the application. Any systems engineer that believes that it is easy to remember all these procedures on the remote shown in figure 4 is not appreciating the skill level of a typical customer. Some designs even tried voice recognition, which today is questionable in success.

Figure 4:A performance feature remote control.

As TVs became more advanced, more complex in application and use, the remote control has had to keep pace

with customer demands. Figure 5, below, shows that of a current design where it is balanced to perform and achieve the demands of the user.

Figure 5: Modern TV remote control handset.

This is a design that works and is clear to most people on how to use as it is very similar to most that are supplied by all manufacturers. It is certainly a basic function and is designed to a level expected to be classified as a good design. Using Kano's model, this is, at best, not going to be reviewed as acceptable or even no thought given at all. Regardless of the design, it is not innovate, performance and not approaching a level were positive feedback given or thought. Who compliments a remote design now?

A design evaluation model allows for an in-depth and critical review of a design [14]. It is customer centric and focused fully. It can be argued that a reverse philosophy is needed to design components and systems for the type of role they have in a customer's mind. Consider the next stage of design processes for customers. Figure 6, below is the classic House of Quality format used in Quality Function Deployment, QFD. This is a matrix design to start with customers' needs to set specifications (tolerances). On the left-hand side is where customer needs are identified. How those needs are met, depends on the product, timing, funds and commitment. Large multi-nationals commit resources to ensure that a repeat of the Ford Edsel is prevented. On the upper central part of Figure 6 is the technical specifications. With these two the Matrix is undertaken to determine if there is any relationship between them, either negative or positive. The focus it to identify the most critical specifications for the customer needs [15]. For example, if the customer aim is for a lightweight device, then the material selection needs to be focused on weight rather than cost. Alternatively, if the aim is looks and feel, then surface finishing is critical. All too often, designs are produced by a non-user, with negative consequences.

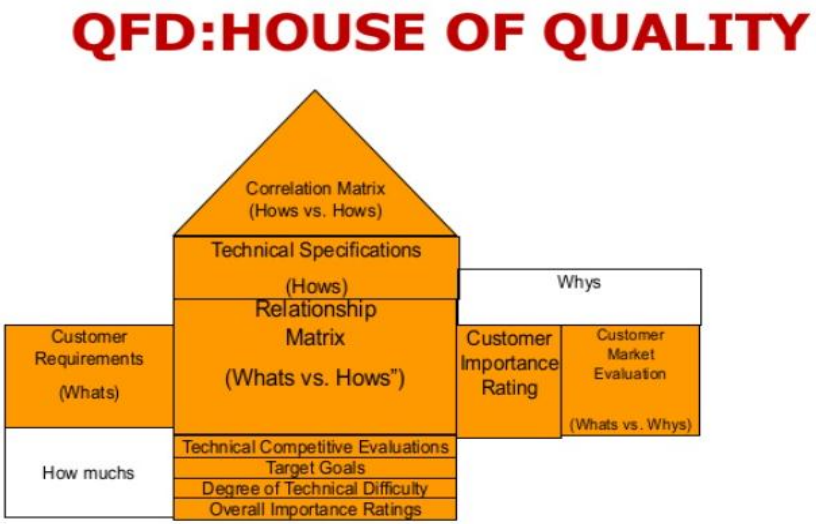

Figure 6: Quality Function Deployment.

QFD is another dimesion in examing customer needs. It has many successes and examples where designs were changed early to reduce costs and offer product, and customer, satisfaction. It might be arged that

all designs are made with the customer in mind; but who is the customer has to be argued first. A seat for an aircraft might have several claims to who is the customer. Who is this customer needs clarifying for the designer? The airline that wants maximum occupance within the cabin? The flyer who wants comforrt? The flyer who wants a cheap ticket? The tall person? Ergonomics can answer these, but the designers needs to know where to focus the detail in design. Additionally, is it an innovate, performance or basic function?

Traditionally, all basic functions were designed by junior personnel as the innovative and interesting designs were monolopoised by the senior designers. What does this result in overall? First, basic designs are more likely to make a customer dis-satisfied. Secondly, the skill to innovate would make customers happy regardless of the finished detail [16]. Finally, who should design the performance feature? These questions have been considered by companies and changed the way designers are allocated. In simple term, the most experienced should design basic functions, as an optium design needed to prevent customer dis-satisfaction. New or junior to design innovative feature as they will, by defalut, make a customer satisfied..

Industry offers an insight to an alternative approach of skills, experiences and tasks. In the following section this is compared with education.

III. Allocation of Teaching Faculty

As discussed previously, the classic manner in which teaching faculty are assigned to teach usually depends upon seniority within a university of the teaching institution. The higher level and interesting subjects are usually taught by the same people each year, whilst junior members are assigned the basic theory courses at lower levels. There are parallels here with Kano's model. First, customer satisfaction is the same as student feedback and approval [17]. There are drives to improve the student learning experience and institutions boast when their rankings improve; likewise, there is pressure on the faculty when student satisfaction reduces. Students have a desire to pass assessments, progress, and graduate. Student satisfaction cannot be measured directly with individual teaching or a class results. There are subjects, foundations material, whichwill be taught in a large lecture room, as shown below in figure 7.

Many might argue that it is a skill and technique needed to plan, manage and execute a lecture to an audience of over 250 students [18]. This basic function can be evaluated by customer satisfaction and its application to judge if delivered fully and helpful to assist in passing an exam. Alternatively, higher level and specialized classes are more innovative in material, use of labs and equipment to be seen different from the large lecture studies that happen. A junior lecturer would struggle more with teaching, controlling and fully supporting a class that has a larger number of students than they would normally experience without the detailed knowledge and teaching application [19]. In effect, the basic function will be seen as not meeting the minimum expectation for quality and perceived satisfaction.

Figure 7: Large lecture theatre.

Where higher level subjects that are more specific to a student's study are covered they are frequently in smaller class sizes and where an experienced professor with a wealth of background knowledge and teaching experience is used [20]. Their skill set and the subject matter will more likely be seen as innovate from a student's perspective. From Kano's model, even if the learning experience is not at its potential, the student (customer) satisfaction is still likely to be positive and even high. This is in contrast to how teaching assignments are normally covered.

Figure 8: Specialized lecture to a smaller class size.

IV. COMPARISON AND IMPLICATIONS OF KANO'S MODEL

Academia has for many centuries led industry with new science and knowledge to enable products that enhance, improve and benefit mankind [21]. What has been today's research is tomorrow's science and the future products of a modern world. The seniority of academics to dictate their work and teaching has followed a time old pattern of seniority and influence. It has always been assumed that the lecturer knows best, what is needed and how to teach it. Indeed, the lecturer writes the syllabus, has it concurred by other lecturers and it is then applied with no involvement from students until after the first year of teaching. Many universities are developing links with industry to have Industrial Training Boards to complement the development; however, these are suitable for subject inclusion and not how to teach [22]. It is still the dictate of the university of how. Student satisfaction has not been high of the list of reflections until recently. Efforts to address student dissatisfaction does exist in non-specific ways, for example, meetings to allow concerns to be discussed or course evaluations. Again, a student is unlikely to be sufficiently knowledgeable to critique a lesson and its plan other than superficially. Students know a good lecture, but cannot quantify an average or weak one.

The focus of a student satisfaction can be paralleled to Kano's customer satisfaction. The satisfaction and effectiveness of the lecture (2-axis) is the foundation for this comparison. Basic functions in a design are in effect, the standard preparatory lessons that the foundation is built upon. The most skilled, knowledgeable should be those selected to teach these. There may be no opportunity for receiving high feedback result. They will avoid lower feedback if junior or less skilled used. A shift in thought, expectations and approach is needed to have student satisfaction at the centre of universities. It must be addressed that students are the priority and meeting this can be enhanced if the lessons learned from industry are used. It is in no doubt that Kano's model offers solutions in industry, the argument that it can in academia is what is now outstanding.

V. CONCLUSION

The history of universities have created many customs and practices that have evolved from social and other non-educational practices that are not challenged but accepted. Perhaps one of the most influential is that experienced and long-serving academics are those that teach the higher level subjects. Industries and companies that focus on customer needs adopt variations of Kano's model that uses a two-dimensional model to evaluate three levels of features. As customer (student) satisfaction is a principal driving force then there are lessons to be learned and applied to education, in particular, university teaching. Student satisfaction is becoming very important. Using academics to ensure the students' needs are met must become a core part of any planning and implementation, and not allowing longevity or preferences to be a driving force.

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