A *Kansei* approach to passenger terminal design

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Abstract: Current approaches to passenger terminal design are based on a direct relationship between the number of travelers and the size of the passenger terminal building: as one increases, so does the other. Over the next several decades, it is believed that the number of travelers worldwide will increase significantly. It follows, therefore, that in order to process these additional passengers, airports will need to build larger terminal facilities. Unfortunately, this is not a viable option for many airports due to financial, economic, operational and general space constraints.

In this paper, we explore a new way of approaching terminal design based on a passenger oriented perspective. In doing so, we extend an interpretation of the Kansei design concept and show how it may be applicable towards the creation of new design paradigms in aviation. Our results are based on data collected *in-situ* at a major international terminal during 2012.

Key words: Terminal design, passenger experience, airport, Kansei

1. Introduction

Aviation is a complex industry that has undergone a significant number of changes since the early days of commercial travel. In this time, the effects of deregulation, the introduction of low cost carriers, and the impacts of global economic, environmental and regulatory effects have all contributed to shape the landscape of modern air-travel [22].

Although the industry is complex, and the variables many, the effects of the proliferation of air-travel on the general public can be abstracted quite simply. Viewed from the perspective of passengers, the aviation industry can be characterized as, on average, expanding at a steady pace [10, 24]. As the price of air travel has declined [5, 25], its uptake by the public has gone up at an approximately linear rate of growth (Figure 1).

In order to process the growing number of passengers, the size of passenger terminal buildings has also increased. Indeed, the size of passenger terminal buildings is based on predictions of the number of passengers travelling though the airport each year. This measure of recommended building size is determined in part on the industry metrics known as “Level of Service” [9, 10].

The exact space allocation, or square meters per person, defined by the Level of Service metrics varies depending on the input factors considered [3]. The important point to note is that, under the current paradigm for terminal design based on these Level of Service metrics, there is a linear relationship between the number of passengers and the size of the terminal building: as the number of passengers increases, so too does the size of the terminal building [3, 10].

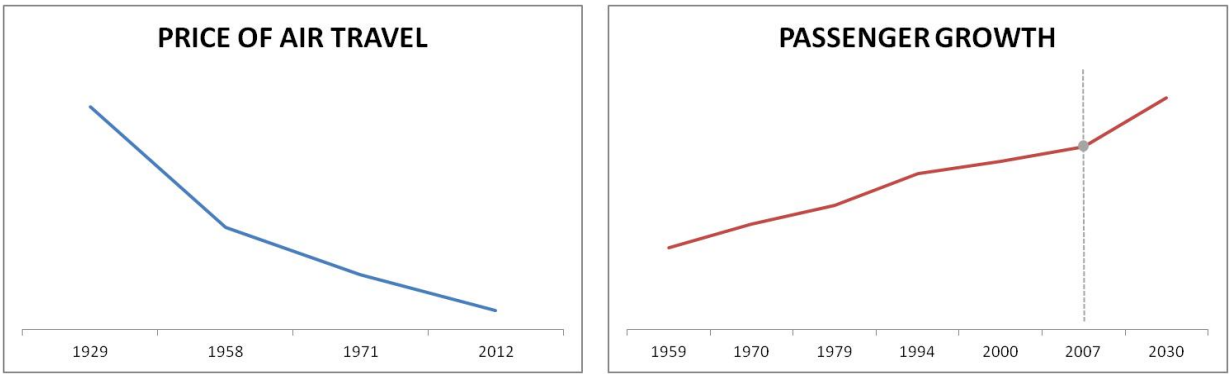

Figure 1: Comparison of the trends in (a) price of air travel and (b) passenger growth

Sources: "The experience economy" by B. Pine and J. Gilmore, 2011; Research and Innovative Technology Administration Bureau of Transportation Statistics, 2012; U.S Centennial of Flight Commission, 2011; IATA, 2004; "The inflation calculator" by S. Friedman, 2010; Correia et al, 2008; Jager and Ofner, 2012.

Given the projected passenger growth for the next several decades, the industry has recognized that current approaches to terminal design are not sustainable [11]. The size of terminal buildings cannot continue to grow indefinitely. In many cities, the lack of available land for terminal expansion is a limiting factor. However, even in places where land is physically available, it is acknowledged that the costs associated with the creation and operation of exponentially larger terminal buildings are not feasible [11]. In order to meet predicted passenger loads, the industry recognises that new paradigms for the design of terminal buildings must be developed [11].

On the basis of results from a field study conducted at a major international terminal in 2012, we explore a new way of approaching terminal design based on the core values of the passenger. As a corollary to our primary research contributions, we propose an interpretation of the Kansei design philosophy and show how it can be applied to support new paradigms for airport design.

2. Kansei Design

As yet, there is no universally accepted Western definition of the Japanese design philosophy *Kansei* [14]. A key part of the reason for this is that the word Kansei has no corresponding singular word in the English language. This of course means that any attempt at translating Kansei will be inaccurate. Thus, rather than focusing on the meaning of Kansei itself, an alternate approach is to focus on the characteristics present in Kansei designs [7, 13, 14, 18, 19].

Designs rich in Kansei speak to the core values of the target customer, reflecting minimal, authentic values of the end user [13]. If we assume this interpretation of Kansei design, it follows that in order to produce designs that embody Kansei, it is necessary to have an intimate understanding of what the authentic values of the target customer are. Hence, in this paper, we will use the following interpretation of Kansei design:

A Kansei design is a design that reflects the minimal, authentic values of the end user

If we adopt the above interpretation of Kansei design, we can leverage some of the ideas that have been developed in the closely related field of user-centered design. In this body of work, the factors required to design a great customer experience are well understood. Usability experts like Nielsen, Norman and Tognazzini [20] and

product visionaries like Steve Jobs have based their success on the ability to understand the factors that create an "insanely great" design or experience [6]. At the heart of their success is the observation that in order to design something really well, the design process should *begin* with the customer experience, not with the ultimate product or technology. From this perspective, great, customer oriented design is synonymous with Kansei design.

In order to design to the minimal, authentic values of the end user, it is essential to know your customer [17]. Although the topic of "passenger experience" is generally regarded as one of the key areas of investigation in aviation today [9, 11], it is neither well understood [23], nor directly included as a factor in the terminal design process [22, 26].

3. Research Methodology

The main goal of this research was to perform exploratory inquiry into the core values which constitute passenger experience. As we were interested in generating as yet unknown hypotheses, we used an adapted version of the direct observation techniques developed by Popovic et al [12, 15].

The data collected for this research was collected *in-situ* at Brisbane International Airport during February and March 2012. In this time, a set of 67 opportunistically selected passenger groups (168 passengers) were interviewed in the departures section of the passenger terminal. In the context of this research, the departures process consisted of four steps: check-in, security, customs and boarding [12].

The passengers were initially asked only one question, namely, "How was your airport experience today?". The question asked of the participants was deliberately simple, and minimally pre-emptive, so as not to influence their responses.

The passenger interviews and field notes were recorded using AudioNote on an iPhone [16]. The audio files were transcribed and coded using Atlas.ti [2]. The transcripts were coded against the four factors that influence passenger experience, as defined in our earlier work [9]:

> *In the context of terminal design therefore, the passenger experience is a relationship between passengers and the airport (operators) which is formed over **time** through a series of activities or interactions between the passenger and the airport … Each activity represents an interaction between a passenger and/or a **service**, and/or an **artifact**, and/or the terminal building (**environment**).*

The coding of the 67 interview transcripts was carried out by the primary researcher and involved two stages. In the first stage, the transcripts were coded against the four factors of time, service, artifact and environment. In the second stage, the coded segments within each category were analysed for the presence of themes.

4. Results

The interview transcripts were coded against the four factors that influence passenger experience, namely time, service, environment and artifact. A total of 1212 segments were coded in this phase. The distribution of coded segments in each of the four categories is shown in Figure 2. From this initial coding, time emerged as the primary factor of influence in passenger experience (37%); followed by service (26%), environment (20%) and artifact (17%).

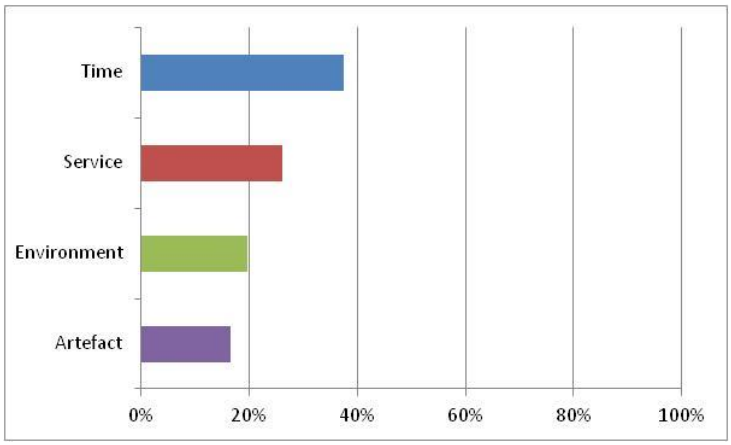

Figure 2: Distribution of coded segments across each of the four factors of passenger experience

The importance of time as a factor became even more apparent when we looked at the co-occurrence between time and each of the other three factors. During the initial coding, it was noted that often, when passengers spoke of service, they spoke of it in terms of its impact on their airport time. As an example, consider the following representative quote from passenger 62:

[check-in] it was good … it did not take long, it was quick. The guy was nice. [PAX62]

It is clear from the above quote that in the reference to good service, passenger 62 assumes that good service is synonymous with fast service.

In the initial coding, the above interview segment was coded as both "time" and "service". Thus, to reflect a more accurate picture of the importance of the factor "time", we performed a co-occurrence analysis on the initial coding results. The coded segments in each of the secondary categories, namely, service, environment and artifact, were analysed for co-occurrence with time. The results of this analysis are shown in Table 1. From this data, we can see that of the 317 coded segments under service, 127 of them were in fact implicit references to time (as illustrated by passenger 62's quote above). Similarly, 93 of the 239 coded references to the environment, and 33 of the 202 coded references to artifacts, also contained implicit references to time.

Table 1: Co-occurrence between Time and Service, Environment and Artifact coded segments

	Number of Coded Segments	Co-occurrence with TIME	Adjusted Value
SERVICE	317	127	190
ENVIRONMENT	239	93	146
ARTIFACT	202	33	169

The last column in Table 1, adjusted value, shows the difference between the number of coded segments and the number of co-occurrence segments, i.e. we assume that where passengers refer to time and service, that time is the primary factor and service a secondary, or consequential factor. If we adjust the initial distribution of codes

from Figure 2, and align co-occurring codes against the primary code, time, the coding distribution changes to that shown in Figure 3. Thus, the cumulative importance of time as a factor changes from 37% to 58%, while the relative importance of the secondary factors is reduced to 16% (service), 12% (environment) and 14% (artifact).

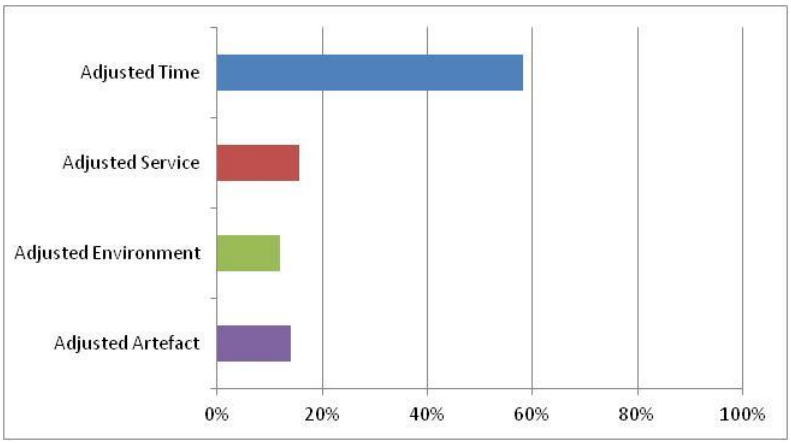

Figure 3: Distribution of coded segments, adjusted for co-occurrence with the primary factor time

Thus, although the passenger experience is influenced by a number of factors, our results show that time is the most important of these factors, and that service, environment and artifact are all approximately equal secondary factors (Figure 3). In the next section, we present the themes that emerged from our analysis of the coded segments within each of the four categories of time, service, environment and artifact.

5. Analysis: Emerging Themes

Following our initial coding, the passenger transcripts were analysed for emerging themes. This process involved multiple iterations, as the coded segments in each of the categories were abstracted and grouped into themes. The emerging themes were coded in Atlas.ti [2] as "memos", and refined by the researcher as commonalities emerged. As an illustrative example, consider the coded segments (time) below from passengers 56, 52, 53 and 65:

> *[How was your experience today?] It was lovely … yes, but we follow the rules, you see. It says get here, well, we think it says for an international flight get here three hours before, so, we pretty much do that. [PAX56]*
>
> *That's why I try to get here early, as there is always a hiccup somewhere along the line. [PAX52]*
>
> *If we're coming here, we always go by the guidelines of what they say … at least 2 hours. [PAX53]*
>
> *I arrived with plenty of time, about 2 hours ahead … pretty much [when] they tell me. [PAX65]*

The above segments were initially coded as memos "responsibility" and "arrival time". Subsequent iterations over the coded memos refined these broad themes even further, ultimately resulting in the identification of four key themes.

In the remainder of this section, we present these key themes that emerged from our analysis of the data, as summarised in Table 2. Of note is the absence of any cohesive themes from the artifact category. In this category, passengers loosely spoke of rental cars, smoking, luggage, coffee, shopping and automation at other airports. With the exception of references to the passengers' checking-in of bags, which is included in the discussion in section 5.1, there was no strong relationship found between passengers and artifacts. Possible reasons for this could be the absence of any tangible artifacts, such as automated check-in kiosks, at the airport the study was conducted at. A second reason could be that interactions with certain artifacts, such as a passenger's own technology, were considered such a normal part of life that passengers did not articulate these as something that they thought of as specific to their "airport experience".

Table 2: Summary of key themes which emerged from our analysis of the passenger interviews

Factor	Theme	
TIME	Theme 1	Perceived passenger concern: "Will I make my flight?"
	Theme 2	Prior knowledge and familiarity
SERVICE and TIME	Theme 3	Tacit satisfaction thresholds
ENVIRONMENT and TIME	Theme 4	A place for waiting and queuing

5.1 Perceived Passenger Concern

The main theme to emerge from this research was the presence of an inherent concern common to all passengers, namely: "Will I make my flight?". As an example, consider the following representative quotes from passengers 46 and 55:

> *I was freaking out … well I made my flight … but you know what, there were just too many things that went wrong there. I actually stopped booking that particular flight. [PAX46]*

> *This time I've arrived 2 hours before [departure] but that's because I drove from the Gold Coast. But to be very clear, I only left the Gold coast an hour before I got here, which is stupid because one traffic jam on the day, and I would have missed the plane.* [PAX55]

Quite surprisingly, both of the passengers quoted above were frequent flyers, each making approximately one international flight per month. Upon further examination, we found that "Will I make my flight?" was an underlying concern for almost all travellers, irrespective of their experience level (frequent/not-frequent flyer) or the nature of the trip (business/holiday).

The analysis of the passenger stories highlighted an interesting relationship between the passenger concern identified, and the key factor "time". Returning to passenger 55 above, we note that "time" is used by the passenger as a means to mitigate the passenger concern "Will I make my flight?". In particular, the arrival time at the airport was found to be the key variable over which passengers' felt they had both control, and responsibility. Passengers felt that as long as they arrived at the airport at the "recommended" time, that they had done everything within their control to alleviate the concern of missing their flight. The remainder of their airport experience was largely considered "out of their control". As an example, consider the following representative quotes from passengers 7 and 52:

> *I always like to be here early. I got here about 2:45, and the flight leaves at 5:30 … leaves a little time just in case anything goes wrong. You know, stuff like that, I like to leave early. [PAX07]*

> *That's why I try to get here early because there's always a hiccup somewhere along the line. [PAX52]*

The perceived passenger concern of "Will I make my flight?" was observed to decrease as the passenger made their way through the departure processing phases, namely check-in, security, customs and finally boarding. As the passenger successfully completed each processing step, the apparent uncertainty associated with "Will I make my flight?" decreased.

The decrease in passenger concern appears to be related to two milestones in the passengers processing journey. The first of these milestones was baggage drop, which, at this airport occurred at check-in. The dropping off of passenger luggage was in fact the only identifiable sub-theme that emerged from the artifact category of coded segments. The act of dropping off cumbersome luggage, as well as being "registered" in the system appeared to be a marker of relief for many passengers. As an example, consider the following representative quote from passenger 53:

> *I start to relax after check-in, because they know about me. If there's some reason you're tripped up in the process, there seems to be a fair effort made to make sure they don't leave you behind … so if I'm checked in I feel like I'm in the system … I feel like I'm being looked after to some degree.* [PAX53]

The second major milestone was observed when the passenger cleared security and customs. At this stage, the passengers had effectively overcome all but one of the obstacles that would prevent them from making their flight. As the only obstacle left is the navigation to the departure gate, an activity which the passenger has control over, the effective concern was greatly reduced when the security/customs milestone was completed. As an example, consider the following representative quote from passenger 56:

> *I'm actually relaxed now … because there is nothing else procedurally to be done … we've done everything, we've got our boarding passes … gone through security … all we need is, you know, go down to the departure lounge ... and we are done.* [PAX56]

It is important to note that it is only at this point, when the passengers have completed security/customs, and their concern has dropped to a negligible level, that the passengers appear ready to engage in the "airport experience". Until this last milestone is passed, the presence of the main concern prevents the passengers from becoming more than superficially involved in the offerings at the airport. This observation is supported by the research findings of Livingstone et al, who reported that landside (before security/customs) retail engagement was strongly correlated to the presence of wavers (non-flying family and friends), and was dominated by expenditures in "coffee" shop areas [15].

5.2 Prior Knowledge and Familiarity

In addition to the allocation of time, we found that passengers also use prior knowledge and familiarity to control their airport experience. A finding that emerged from the research is that all passengers, irrespective of their experience level (frequent/not-frequent flyer) or the nature of the trip (business/holiday), come to the airport with a set of expectations, or prior knowledge, about what their airport experience entails [9]. This knowledge gives them a sense of familiarity, or control, over what may be a very unfamiliar environment. As an example, consider the following representative quote from passenger 66 (translated by the passenger's Granddaughter):

> *She is travelling from Adelaide, back to India, via Brisbane … very happy and nice flying … [check-in] was good, no problem, very good. We had already checked in through Internet and just did the bag drop, and now we were just looking to get some Indian food for her to have.* [PAX66]

Of note is that passenger 66 was an elderly lady, who was about to take her first international flight. Despite her age and lack of experience in flying, the passenger was observed to be very comfortable and relaxed in what constituted a completely unfamiliar environment. The passenger's comfort was provided through her Granddaughter, who was herself an experienced flyer. The Granddaughter had checked her Grandmother in on-line and was directing her towards the security/customs area.

The interaction between the Granddaughter and Grandmother was representative of a theme found amongst all travellers who were not at the airport alone. Prior knowledge of wavers (non-travellers) and/or travelling companions affected the group dynamics of the travelling party. It was observed that that the prior knowledge of the most experienced member of the group became the baseline of knowledge for the group, i.e. the most experienced traveller took charge of the process which absolved the other members of the group from being individually worried or concerned about what had to be done next. As an example, consider the following representative quote from passenger 60, a young adult travelling overseas for the first time with his young companion, and accompanied at the airport by three additional wavers:

> *[When will you head down to security?] When do we have to go? As soon as we have had our coffee? I don't know ... What is a good time? … [waver jumps in] I'd say in the next 15, 20 minutes or so. After they have had their coffee, they will go downstairs.* [PAX60]

In the example above, one of the three wavers was an experienced flyer. It was apparent that although the two young travellers were not experienced themselves, they were comfortable in the airport environment as their expectations were being "directed" by the most experienced member of the group.

A second way in which passengers gained control in unfamiliar settings was through the re-enactment of personal routines, such as "I check-in, have a coffee, go to the bookstore, fill out my card, head to security". These personal routines helped passengers to feel a sense of familiarity even when in an unfamiliar environment, such as an airport they have never travelled through. As an example, consider the following representative quotes from passengers 55 and 48:

> *I usually go through to security pretty quickly after checking in. I'll sit here with the passenger card, make sure no other emails come in and then I'll head straight through.* [PAX55]

> *I'm going to get downstairs, get through, I'm going to make a phone call to our accommodations in New Zealand to verify a few things … and then we're probably going to have a drink and sit around and wait for boarding time … and before we get down there, I'll disappear to the bathroom and [my companion will] visit the bookstore*. [PAX48]

Although passenger 48's companion had not travelled through this specific airport before, her comfort in the unfamiliar environment was provided through the familiar routine enacted by her more experienced travel partner.

5.3 Tacit Satisfaction Thresholds

In contrast to the current view of service levels required by passengers, there was no evidence found to suggest that passengers correlated feelings of satisfaction with processing speed, as distinguished in the order of minutes [1, 4, 9]. In fact, most passengers recalled waiting in queues, such as check-in, with a very broad reference to actual elapsed clock time. As an example, consider the following representative quote from passenger 60:

> *[Check-in was] ... fine, slow, but it was OK. Everyone was nice.* [PAX60]

Thus, as passenger 60's story illustrates, passengers do not readily distinguish between fine variations in processing speed. However, what is apparent from this passenger is that the human element of the service, and the fact that the staff were "nice", made up for any delays which the passenger may have experienced. This observation supports the findings by Norman related to queue dynamics [21].

Although passengers did not appear to measure their wait times in the order of minutes, there does appear to be a tacit threshold which, when crossed, leads to passenger dissatisfaction. From the data collected at this airport, this tacit threshold corresponded to a 50/50 split in the passengers' total airport time, with the first half conceptually allocated to check-in, and the second half to security/customs. In other words, as long as passengers were checked-in in the first hour (of the recommended two hour airport duration), they appeared to be satisfied. As an example, consider the following representative quotes from passengers 64 and 53:

> *I'll probably send an email, grab a coffee before I go downstairs [through security/customs] … [And when would you start to think about going downstairs?] Probably after … about an hour before my flight.* [PAX64]

I mean, if it's over an hour, hour and a half [to check-in], that'd be horrendous. I've had that experience … that's when it really gets to you. But lining up with a number of other people for 20-30 minutes is fine. [PAX53]

The existence of this 50/50 threshold may be explained in terms of the reduction of passenger concern, as discussed in section 5.1. Thus, as the reduction of passenger concern is related to two key milestones, namely the completion of check-in and the completion of security/customs, it seems natural that passengers would apportion their total airport time proportionally between these two milestones.

5.4 A Place for Waiting and Queuing

Our analysis of the coded segments related to environment supported a strong relationship between the environment and time. This was evident in the language that the passengers used to describe their airport experience. As an example, consider the following representative quote from passenger 52, describing their vacation in Australia:

Lovely, just beautiful … we came through the scenic route, and the paths and turns, it's like snakes … lovely. We haven't seen any wildlife, haven't we? [PAX52]

The language used by the above passenger is quite descriptive (paths and turns like snakes) and focuses on various elements of the environment (scenic route, paths and turns, wildlife). In contrast, when passengers spoke of the airport environment, their descriptions were dominated by references to time. As an example, consider the following representative quotes from passengers 46, 7 and 8:

The line was probably … there were about 30 people in line … it took about 20 minutes. Not a big deal, just whatever … that's just what happens when you get to the airport, I mean you go in line, waiting. [PAX46]

Just checked in, and that was all good … Just straight in, I was here early … No queues, straight in. I think the key is I got here early enough that I've avoided the queues. Queues are very stressful, I hate queues. [PAX07]

It was fine … it was good for me, I don't like crowds and it was not crowded today … went through pretty quick today. [PAX08]

As illustrated by the above passenger stories, there is an intimate connection between observed congestion or crowding in the airport environment, and the perceived effect that this will have on the passengers' processing speed. It is important to note, however, that as passengers *expect* that the airport is a "waiting place" [8, 9], they are not adversely affected by the act of queuing itself - as long as the queue length falls below their tacit threshold as described in section 5.3.

6. Conclusion

On the basis of data collected in-situ at Brisbane International in 2012, we found that the minimal, authentic, *Kansei* passenger value is time. Although the passenger experience is influenced by four factors, namely time, service, environment and artifacts [9], we found that time has emerged as the dominant factor. Indeed, we discovered that passengers largely evaluated both service and the environment in terms of their impact on available airport time.

However, we discovered that although *time* is the Kansei passenger value, passengers do not relate to their airport time in the normal, clock measured way. We found a much looser relationship exists between passengers and their airport time. The passenger-time relationship is based on the presence of tacit thresholds, rather than the absolute value of elapsed minutes. This finding is important, as it runs against the grain of what current terminal design is founded on, namely the Level of Service metrics [10].

Under the current design paradigms, terminals are designed with the assumption that a passenger can distinguish between queues of 5 and 6 minutes duration, and that queues which are longer than 15 minutes are considered poorly by passengers [1]. Our results indicate that neither of these assumptions is necessarily true. Firstly, we found that most passengers are reasonably happy if their check-in is completed within the first half of their total airport time, namely, one hour. Secondly, we observed that as most passengers expect that the airport is a place of queuing and waiting, they are not overly dissatisfied when these expectations are met.

Our findings challenge the existing operationally focused approach to terminal design, and suggest that a shift in focus from processing speeds to the alleviation of passenger fear may result in a better passenger experience. Ironically, a shift away from a profit-centric approach may actually result in increased profits for airports. As we discovered, passengers do not actively engage in the airport experience until their main concern is alleviated, namely, after the completion of security/customs. Given that passenger engagement is a precursor to passenger spending, it follows that terminals designed to reduce the passenger concern as early as possible have the opportunity to be more profitable.

Amidst growing passenger numbers, slim profit margins and escalations of operational and environmental costs, the aviation industry has recognized the need to change existing approaches to terminal design [11]. Our research provides a new way of thinking about future terminal design. Embracing the Kansei passenger value, and drawing on the richness of research in the field of user-centered design indicates that in the future, terminal designs which begin with a solid understanding of the relationship between passengers and their airport time are likely to be successful.

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Citations

[1] ACRP. (2011) *Passenger Level of Service and spatial planning for airport terminals* ACRP. Airport Cooperative Research Program (Report 55) (ed. D. English). Retrieved from Transport Research Board website http://onlinepubs.trb.org/onlinepubs/acrp/acrp_rpt_055.pdf.

[2] ATLAS.ti. (2011) *ATLAS.ti: The Qualitative Data Analysis & Research Software* Retrieved August 1, 2011, from http://www.atlasti.com/

[3] Correia, A., Wirasinghe, S., & de Barros, A. (2008) *A global index for level of service evaluation at airport passenger terminals*. Transportation Research Part E: Logistics and Transportation Review, 44(4), 607-620. doi: 10.1016/j.tre.2007.05.009

[4] Correia, A., Wirasinghe, S., & de Barros, A. (2008) *Overall level of service measures for airport passenger terminals*. Transportation Research Part A: Policy and Practice, 42(2), 330-346. doi: 10.1016/j.tra.2007.10.009

[5] Friedman, S. (2010) *The inflation calculator* Retrieved February 2012, from http://www.westegg.com/inflation/

[6] Gallo, C. (Ed.). (2010) *The innovation secrets of Steve Jobs: Insanely different principles for breakthrough success*. n.p.: McGraw-Hill.

[7] Harada, A. (1997) *The framework of Kansei engineering*. Report of Modelling the Evaluation Structure of Kansei. University of Tsukuba, 49-55.

[8] Harrison, A. (Writer). (2013). *Airports - Where you go to wait*. In A. R. National (Producer), ABC Radio National The Science Show.

[9] Harrison, A., Popovic, V., Kraal, B., & Kleinschmidt, T. (2012) *Challenges in passenger terminal design: A conceptual model of passenger experience*. Paper presented at the DRS: 2012, Bangkok, Thailand.

[10] IATA. (2004) *Airport development reference manual* (9th ed ed.). Montreal.

[11] Jager, J., & Ofner, G. (2012) *Opening Address*. Paper presented at the Passenger Terminal EXPO, Vienna, Austria.

[12] Kirk, P., Popovic, V., Kraal, B., & Livingstone, A. (2012) *Towards a taxonomy of airport passenger activities*. Paper presented at the DRS 2012 Bangkok, Bangkok, Thailand.

[13] Lee, S., Harada, A., & Stappers, P. (2002) *Pleasure with products: Design based on Kansei*. Pleasure with products: Beyond usability, 219-229.

[14] Levy, P., & Yamanaka, T. (2006) *Towards a definition of Kansei.* Paper presented at the Design Research Society, International Conference in Lisbon.

[15] Livingstone, A., Popovic, V., & Kraal, B. (2012) *Understanding the airport passenger landside retail experience*. Paper presented at the DRS 2012 Bangkok, Bangkok, Thailand.

[16] Luminant Software Inc. (2013) *AudioNote - Notepad and Voice Recorder*. Retrieved from https://itunes.apple.com/au/app/audionote-notepad-voice-recorder/id369820957?mt=8

[17] Margolin, V. (1997) *Getting to know the user*. Design Studies, 18(3), 227-236. doi: http://dx.doi.org/10.1016/S0142-694X(97)00001-X

[18] Nagamachi, M. (2010) *Innovations of Kansei Engineering* Retrieved from http://QUT.eblib.com.au/patron/FullRecord.aspx?p=589919

[19] Nagasawa, S. (2008) *Customer experience management: Influencing on human Kansei to management of technology*. The TQM Journal, 20(4), 312-323.

[20] Nielsen, J., Norman, D., & Tognazzini, B. (2011) *Nielsen Norman Group: Usability consulting, training & user research reports* Retrieved May 21, 2011, from http://www.nngroup.com/

[21] Norman, D. (2009) *Designing waits that work*. MIT Sloan Management Review, 50(4), 23-28. doi: 1786691491

[22] Odoni, A., & de Neufville, R. (1992) *Passenger terminal design*. [Article]. Transportation Research Part a-Policy and Practice, 26A(1), 27-35.

[23] Popovic, V., Kraal, B., & Kirk, P. (2010) *Towards airport passenger experience models*. Paper presented at the Proceedings of 7th International Conference on Design & Emotion, Chicago, Illinois.

[24] RITA. (2012) *Research and Innovative Technology Administration Bureau of Transportation Statistics* Retrieved February 2012, from http://www.transtats.bts.gov/Oneway.asp?Display_Flag=0&Percent_Flag=0

[25] U.S Centennial of Flight Commission. (2011) *History of Flight* Retrieved February 2012, from http://www.centennialofflight.gov/essay_cat/re_category.htm

[26] Zidarova, E., & Zografos, K. (2011) *Measuring quality of services in airport passenger terminals*. Paper presented at the Transportation Research Board 90th Annual Meeting Washington DC.