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Editorial Team

The *Journal* is published by The Telecommunications Association (TelSoc), a not-for-profit society registered as an incorporated association. It is the Australian telecommunication industry's oldest learned society.

Editorial

Seeking the Benefits of Broadband

Leith H. Campbell
Managing Editor

Abstract: This editorial comes in three parts: some observations on national preparedness to capture the benefits of widespread broadband availability; some updates on the editorial team that produces the *Journal of Telecommunications and the Digital Economy*; and a brief introduction to the papers in this issue.

Keywords: Broadband, Editorial

Prepared for Broadband?

Over the last decade in Australia and elsewhere, there has been much discussion about 'league tables' for 'broadband' – based on availability, subscriptions, speed tests, and so on. Australia has 'improved' or 'declined' in various measures over the years and, importantly for some, not always fared so well as New Zealand. Debate continues over the usefulness or meaning of these comparisons.

Now that the availability of broadband access is improving in Australia through the rollout of the National Broadband Network (NBN), discussion inevitably turns to the question of capturing the economic and social benefits of broadband. Conservative estimates suggest that capturing the principal economic benefits of the NBN could make a 3% step change in Australia's Gross Domestic Product (Suessspeck, 2017). It turns out that there are league tables that may help to assess Australia's relative preparedness to capture these benefits.

The Institute for Management Development (IMD), a Swiss business school, provides some relevant rankings for 63 counties. The IMD World Competitiveness ranking 2020 (based on 'hard data' from 2019 and survey results from early 2020) shows Australia ranked at 18th, below Canada at 8th but above the UK at 19th and New Zealand at 22nd (IMD, 2020). General competitiveness will be significant in determining how quickly the economy will adapt to greater availability of broadband access.

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The IMD World *Digital* Competitiveness ranking 2019 (the latest available), which focusses on preparedness for 'the adoption and use of digitalization' (IMD, 2019, p. 1) has Australia at 14th, with Canada at 11th, the UK at 15th and New Zealand at 18th. The US leads the rankings, with Singapore at 2nd (IMD, 2019).

The ranking for digital competitiveness is made up of factors in three categories: Knowledge, Technology and Future Readiness. Under Knowledge, Australia ranks highly in 'Net flow of international students' but poorly in 'Digital/Technological skills', 'Employee training' and 'Graduates in Sciences'. Under Technology, Australia scores well for 'Country credit rating' and 'Enforcing contracts', but poorly for 'Communications technology'. Under Future Readiness, Australia ranks highly for 'Tablet possession' (a sign of 'adaptive attitudes') and 'E-Government', but poorly in 'Agility of companies' (IMD, 2019, p. 47). Australians may recognize their country in some of these descriptions.

While one can (and we undoubtedly will) debate the merits of such rankings, they do provide some pointers of where a country may improve its responsiveness to change as the digital economy rolls ever outward. In Australia's case, a lack of skills and training may be creating a 'digital divide' between those who have a good awareness of digital services and how to use them and those who do not. This is not just an issue for Australia: in this *Journal* number, we publish some survey results from the Czech Republic (Bokšová *et al.*, 2021) that describe differences in attitudes towards Government digital services based on familiarity and usage.

The Editorial Team

As foreshadowed in the last issue, Associate Professor Mark Gregory has stepped down from the editorship and I have had the honour to be appointed Managing Editor by the TelSoc Board. Mark Gregory established a strong operational system for the *Journal* and expanded its interests and reach. He also achieved a Q2 rating for the *Journal* from SCImago (based on Scopus data). It is on this solid foundation that we can continue to build influence and readership.

I would like particularly to acknowledge the contributions of two Section Editors who joined the *Journal* a few years ago: Dr Michael de Percy from the University of Canberra for the Telecommunications section; and Associate Professor Payam Hanafizadeh from Allameh Tabataba'i University, Iran, for the Digital Economy section. They have worked diligently behind the scenes to ensure that submissions are well reviewed, that authors are kept informed, and that papers are appropriately revised before publication. It is through their efforts that the quality of the *Journal* is maintained and enhanced. I am pleased to report that they will be continuing in their roles.

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We have also moved to formalize some other section arrangements. Dr Jim Holmes has become Section Editor for Book Reviews; and Professor Peter Gerrand has taken on the Sections for Biography and History of Telecommunications. They, like all members of the editorial team, are volunteers, giving their time freely to bring you a new issue each quarter.

There will be further changes to the editorial team, especially to the Board of Editors, over the next few months that I will report on in a future issue.

In This Issue

We publish in this issue two papers reporting surveys of attitudes to and usage of digital services: Jiřina Bokšová and colleagues on *E-Government Services and the Digital Divide: A Quantitative Analysis of the Digital Divide between the General Public and Internet Users* (p. 27); and David Kennedy on *Australian Video Viewing Survey: Household Consumption across Formats* (p. 73).

We also explore the design and acceptance of digital services through a paper by Javier A. Sánchez-Torres and colleagues on *Adoption of Tourist Mobile Applications: Motivating Factors for their Use, an Exploratory Study in Spanish Millennials* (p. 1).

In our regular features, we bring you a book review by Jim Holmes on *Subprime Attention Crisis: Advertising and the Time Bomb at the Heart of the Internet* (p. 19); and Simon Moorhead introduces two historical reprints in *Seas No Longer Divide* (p. 50), detailing the long saga on improving the telecommunications connections between the Australian mainland and Tasmania.

As always, we encourage you to consider submitting articles to the *Journal* and we welcome comments and suggestions on which topics or special issues would be of interest.

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Adoption of Tourist Mobile Applications

Motivating Factors for their Use, an Exploratory Study in Spanish Millennials

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Abstract: The objective of this article is to examine factors that affect the attitude to and use of tourist mobile applications. In line with previous studies, an empirical model that integrates variables of a technological nature and others related to the design and architecture of tourist apps was proposed. An online survey of 156 millennials in Spain was carried out and the data were analysed using the partial least squares methodology. The results validated the hypotheses proposed in the model, achieving a high level of statistical prediction. The results supported that, when choosing a tourist mobile application, tourists take into consideration design aspects, such as visual design and navigation design; personal aspects, such as perceived personal outcome expectations, perceived enjoyment and subjective norm; and operational aspects, such as effort expectations, performance expectations, and conversion rate.

Keywords: Tourist mobile applications, Tourism, Tourist Behaviour, Technology

Introduction

The fourth industrial revolution, which revolves around the latest ICT information and communication technologies, has permeated all sectors; the disruptive innovations it has generated have transformed interaction and daily processes, especially in regards to the company-client relationship (Kuazaqui, 2018).

Technological developments have significantly changed the lives of people and companies, improving certain aspects of the market, including accessibility, competitiveness, information, and its impact on consumer decisions (Wei *et al.*, 2019; Zwillenberg, Field & Dean, 2014).

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This is why customer relationships are largely supported through ICTs and the Internet, which are the most effective mechanisms for connection in a globalised world (Day, 2011). According to the digital density index, the use of ICTs will increase by 1.25 trillion euros of the GDP of the main economies of the world (Fundación Orange, 2016).

In the last decade, the massification of the smartphone has been exponential, generating an increase in, and development of, applications (APPs) that offer different services and utilities to users (Frey, Xu & Ilic, 2017). Comprising 90% of the total in regards to strategic importance, APP technology has been the greatest development towards company success (Fundación Orange, 2016).

An 'app' is defined here as a mobile application on a smartphone/tablet that is used for purchases or the completion of some transaction that may result in a purchase (Newman, Wachter & White, 2018). The development and consolidation of tourist APPs in recent years have become great tools for world tourism; different services and applications, such as information search, reservations, and purchase of tickets, among others, are of great help for the tourist.

The growth of tourist APPs is largely due to two essential aspects, according to Morosan & DeFranco (2016): (1) A tourist is in constant interaction with the (online-physical) ecosystem; and (2) APPs can offer more services and promotions through the Internet.

The tourism sector has transferred many processes that were previously achieved physically to a digital format. Today, more than 95% of travellers use digital resources during the course of their trips (Fundación Orange, 2016).

The usefulness of APPs in tourism is broad: they can be used as an intermediation mechanism, a mechanism for a direct relationship with the client (to contract or buy tourist services or products, for example), or as a means of attaining information and the comparison of information. Additionally, APPs also save time and money, and they increase convenience for tourists (Xu, Huang & Li, 2019).

Some studies have found that even the feelings generated by APPs are factors in an individual's decision to use such technology, in relation to the experience, identity, and social interactions that they allow (Ding & Chai, 2015). There are even applications that have become their own brand (Chen, Lu & Gong, 2019), such as the famous Trivago, Waze, and TripAdvisor.

This dynamic has generated an increase in tourist-related mobile applications for smartphones (APPs) worldwide (Xu, Huang & Li, 2019).

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The tourism sector in Spain is first in Europe and second in the world in regards to financial profitability: its income of approximately 57,866 million euros represented 11.7% of the GDP in 2015 (Fundación Orange, 2016).

However, many facets of the tourism sector in Spain make it extremely difficult for these technologies to develop; it is a very atomised and competitive sector that struggles with financing, has uncertainty about the digital sector, maintains ignorance of the benefits and advantages of digitisation, and has a deficient ICT infrastructure (Fundación Orange, 2016).

There are several studies that have focused on the reasons tourists use tourist APPs (Morosan & DeFranco, 2016); however, the use of these technological applications is still in the introduction and development phases (Leon, 2018) and tourist behaviour regarding the use of these APPs has not been analysed in depth. While some studies have found that APPs improve customer engagement (Marino & Lo Presti, 2019), most do not consider all the variables that could be generating the adoption of this technology. In regards to Spanish populations, the only study of relevance is that of Palau-Saumell *et al.* (2019), which considered the adoption of APPs in restaurants; however, the only variables that were analysed were those related to the UTAUT-2 theory.

Therefore, there is a need to go deeper into this line of research to more fully understand the reasons that persuade tourists to use a mobile application. The main objective of the present study is to analyse the adoption of tourist mobile applications among Spanish millennials. More specifically, this study aims to explore a causal-relational model that groups together most of the variables that have been generally validated in previous studies as a contributing factor to peoples' use of tourist-related APPs.

Literature Review and Research Hypotheses

People's attitudes towards the use of mobile applications are largely governed by their mood and ethical considerations, as well as their frequency of use and familiarity with the APPs, their technological addictions, the costs of the technology, and the real, physical aspects of the environment (Carter & Yeo, 2016).

Different studies were built from the technological adoption models proposed in previous specific studies regarding tourist APPs (Castañeda, Martínez-Heredia & Rodríguez-Molina, 2019; Chen, Lu & Gong, 2019; Cheng & Jin, 2019; Choi, Wang & Sparks, 2018; Escobar-Rodríguez & Carvajal-Trujillo, 2014; Hui, Wan & Ho, 2007; Lu *et al.*, 2015; Mohsin, Lengler & Subramonian, 2017; Morosan & DeFranco, 2016; Munar & Jacobsen, 2014; Okumus & Bilgihan, 2014; Palau-Saumell *et al.*, 2019; Stocchi, Michaelidou & Micevski, 2019; Wu, Tao & Yang, 2009; Xu, Huang & Li, 2019).

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This study proposes a model from the previous studies that integrates the major aspects that a tourist can consider when adopting and using a tourist APP. Each variable and its relationship of incidence in the adoption of tourist APPs are presented below.

Social cognitive theory and technology adoption theories

According to social cognitive theory (SCT), human actions are the product of triadic, dynamic, and reciprocal interactions among personal, behavioural, and environmental factors (Compeau, Higgins & Huff, 1999). This theory proposes that behaviour is a system of self-regulation, where external influences mediate and provide a basis for an action (Lu *et al.*, 2015). The intention to use a tourist APP will therefore be the best sign to show that a tourist would use this technology on their trips. Therefore, our first hypothesis can be summarised as the following:

H1: The behavioural intention of tourists influences APP use.

Subsequently, the theories of technological adoption, grouped within the unified UTAUT (the unified theory of acceptance and use of technology) and UTAUT2 models, and the determinants of usage and intention technology, including performance expectancy, effort expectancy, social influence and facilitating conditions (Venkatesh, Thong & Xu, 2012), have facilitated many tests on significant variables in the adoption of APPs (Tak & Panwar, 2017).

It has been proven that a subjective norm has to do with the influence of the close group and leaders or social referents in the use of a tourism APP (Tak & Panwar, 2017); for example, TripAdvisor is a mechanism for consultation among tourists, allowing the user to see the comments of others about their tourist experiences. In other studies, however, it was not significant (Castañeda, Martínez-Heredia & Rodríguez-Molina, 2019). This leads us to our two-part second hypothesis:

H2a: A subjective norm influences the behavioural intention of a tourist APP.

H2b: A subjective norm influences the use of a tourist APP.

Effort expectations are one of the key variables in any analysis of technological adoption, since the user's ease in learning how it functions and subsequent use are positively valued in their decision-making (Venkatesh, Thong & Xu, 2012).

Several studies highlight the significance of effort expectations in the adoption of APPs and tourist APPs, for example, the benefits that these technologies have in facilitating the purchase of tickets, tickets to shows, and reservations, among other useful actions for tourism (Castañeda, Martínez-Heredia & Rodríguez-Molina, 2019; Hew *et al.*, 2015; Kim *et al.*, 2016; Leon, 2018; Marino & Lo Presti, 2019; Newman, Wachter & White, 2018; Stocchi, Michaelidou

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& Micevski, 2019; Tak & Panwar, 2017), thus contributing to our two-part third hypothesis in this study:

H3a: Effort expectations influence the behavioural intention to use a tourist APP.

H3b: Effort expectations influence the use of a tourist APP.

Performance expectations make up another important variable in the adoption processes of APPs, relating to the benefits offered by the application to tourists, such as saving time and convenience. In the case of tourism, time is money, and these benefits are added value when tourist services are offered. Several studies have significantly validated this variable (Chen, Lu & Gong, 2019; Ding & Chai, 2015; Hew *et al.*, 2015; Leon, 2018; Xu, Huang & Li, 2019), which leads us to our two-part fourth hypothesis:

H4a: Performance expectations influence the attitude towards using a tourist APP.

H4b: Performance expectations influence the use of a tourist APP.

Hedonic motivations, or perceived enjoyment, are yet another variable that the UTAUT-2 model has significantly validated for the adoption of APPs (Hew *et al.*, 2015; Tak & Panwar, 2017; Verkasalo *et al.*, 2010; Wang *et al.*, 2016). This characteristic is associated with the state of mind in which the tourist seeks to use the APP. Therefore, tourist APPs that provide enjoyment may be more desirable, thus producing our fifth hypothesis:

H5: Perceived enjoyment influences the behavioural intention to use a tourist APP.

Another important factor is people's expectations of results on an action; in other words, people anticipate the likely consequences of their prospective actions and are more likely to adopt actions that will produce the desired results rather than actions that could bring undesired results (Lu *et al.*, 2015).

Previous studies confirmed that expectations of results influence the adoption of technology by individuals, and those expectations of performance results had more influence than expectations of personal results (Lu *et al.*, 2015). On the other hand, however, Lin and Hsu (2015) found that the expectations of personal results were still positive factors in technological adoption. Regarding the adoption of tourist APPs specifically, the authors found that the perceived personal outcome expectations were also influential factors. This leads us to the sixth hypotheses:

H6a: Perceived personal outcome expectations influence the performance expectations to use a tourist APP.

H6b: Perceived personal outcome expectations influence perceived enjoyment of using a tourist APP.

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H6c: Perceived personal outcome expectations influence the behavioural intention to use a tourist APP.

Usability variables and APP design

Other variables related to the functions, navigability, and usability of the APP were also integrated, adapted from studies related to tourism and other e-commerce services (Kapoor & Vij, 2018; Lu *et al.*, 2015).

Information design is related to the structure and content of information offered by the application to the user. Several studies have proven its importance in the adoption of tourist APPs, since useful, quality information generates more usability and improves trust and loyalty (Ji *et al.*, 2006; Kapoor & Vij, 2018; Peters *et al.*, 2016). This concept produced our seventh hypothesis:

H7: Information design influences the behavioural intention to use a tourist APP.

Visual design is one of the most important variables regarding the use of APPs and includes everything related to consistency, aesthetics, images, colours, fonts, shapes, animations, icons and backgrounds (Kapoor & Vij, 2018). Visual design is especially important within the field of tourism, since the visual design has a high impact on consumer behaviour; likewise, it is possible that the visual design generates higher expectations regarding the results of APP use (Chang *et al.*, 2016; Kapoor & Vij, 2018; Nah, Eschenbrenner & DeWester, 2011; Wells, Valacich & Hess, 2011). Therefore, our eighth hypothesis is that:

H8: Visual design influences the behavioural intention to use a tourist APP.

Navigation design refers to the organisation and structural design of pages and content, as well as the ease, speed, efficiency, and effectiveness of navigation within the APP (Kapoor & Vij, 2018). Several studies have proven its importance in the use of APPs (Chang *et al.*, 2016; Kapoor & Vij, 2018), which leads us to our ninth hypothesis:

H9: Navigational design influences the behavioural intention to use a tourist APP.

Finally, conversion rate refers to the achievement of an action through the use of the tourist application. There are different conversion rates, such as the purchase of tourist products and services, the reservation of services, the use of online services, and the ability to obtain useful information (a tourist review, for example), among many others. It has been shown to be yet another valuable factor regarding the use of tourist applications (Iskandar & Sia, 2020; Kapoor & Vij, 2018; Stocchi, Michaelidou & Micevski, 2019), which leads us to our tenth and final hypotheses:

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H10a: Conversion rate influences the performance expectations of using a tourist APP.

H10b: Conversion rate influences the behavioural intention to use a tourist APP.

The relationships between features of an APP and the model hypotheses are shown in Figure 1.

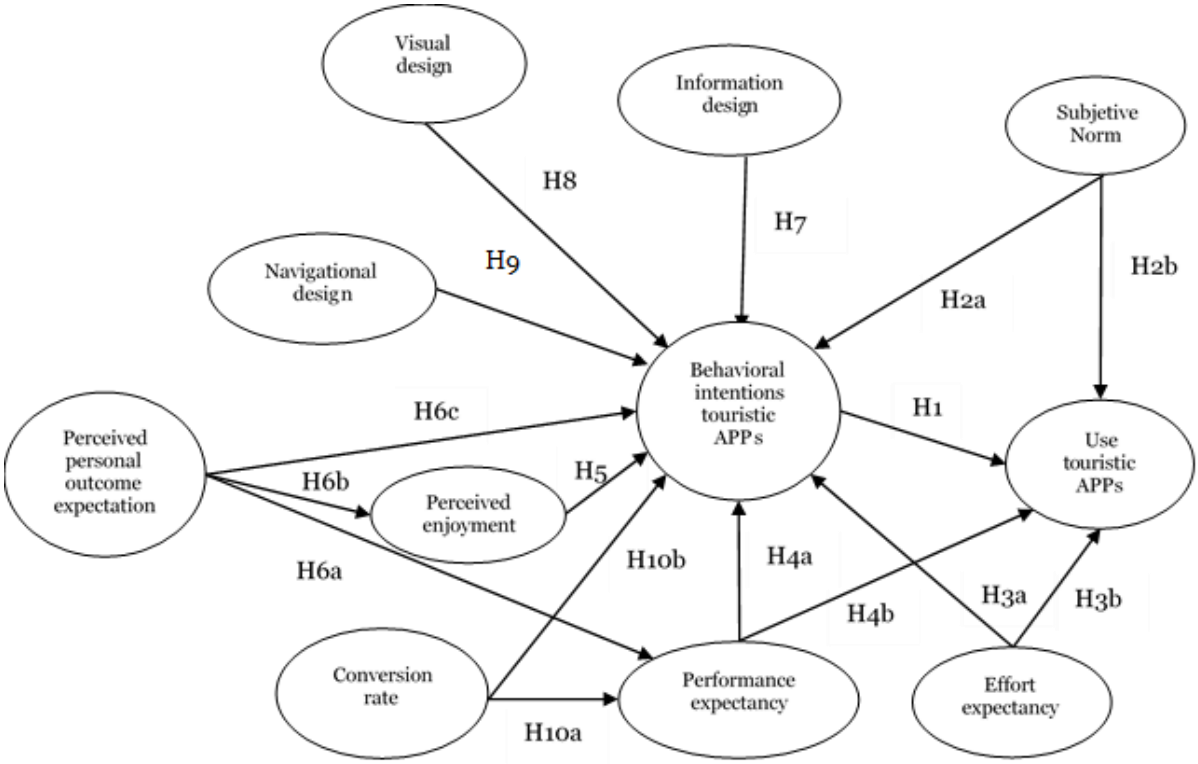

Figure 1. Model proposed

Sample Selection/Methodology

Sample selection and model analysis

A non-probabilistic sample based on the convenience method (Hernández Sampieri, Fernandez Collado & Baptista Lucio, 2010) was developed through personal surveys with students at the University of Barcelona, given that millennials are considered potential users of APPs in general. In fact, 40% of all online bookings for leisure-related travel are made by millennials (Allende, 2018).

The study requirements for model analysis were met through the Partial Least Squares (PLS) method (Hair *et al.*, 2017). Partial Least Squares Structural Equation Modelling (PLS-SEM) has become a standard tool for establishing complex interrelationships between observed and latent variables in social science research, hotel management, marketing, and tourism (Sarstedt *et al.*, 2020). This method is one of the most recommended for exploratory and even verifiable analyses (Hair, Howard & Nitzl, 2020). As Manley *et al.* (2020) propose, while

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prediction is the primary statistical objective of the research, conducting exploratory research to develop or extend theory or research must include multi-item latent variables, because PLS-SEM is a powerful tool through which it can simultaneously assess the relationships between multiple variables that are measured with more than one item, an approach not possible with multiple regression.

Measurement tool and data collection

The questionnaire was designed in two sections. The first section collected basic demographic information of the participants, mainly gender and age range. The second section included variables taken from the previous literature (Table 1).

Table 1. Measurement tool

Construct	Items
APPs use (Kapoor & Vij, 2018)	BI1 I consider using travel APPs when travelling BI2 I use travel APPs when travelling BI3 I will increase the frequency of using travel APPs when travelling
Information design (Kapoor & Vij, 2018)	ID1 The APP provides me with relevant information to my needs ID2 The APP provides accurate information ID3 The APP provides a dedicated account for all my transactions
Visual design (Kapoor & Vij, 2018)	VD1 I like the way information is structured on the APP VD2 The APP is visually attractive VD3 The graphics displayed on the mobile APP are engaging
Navigational design (Kapoor & Vij, 2018)	ND1 The APP provides a dynamic filter option for making choices ND2 The APP enables me to track my order status ND3 The APP has a menu which tracks different options
Effort expectancy (Lu *et al.*, 2015)	EE1 I find is easy to use the APP EE2 It doesn't take brains to learn how to use an APP EE3 It is easy to use information from this APP
Performance expectancy (Lu *et al.*, 2015)	PE1 The APP improves the efficiency of travel information searches PE2 The APP makes it easier to make travel decisions PE3 The APP improves my satisfaction with my tourism experience
Perceived enjoyment (Hedonic) (Hew *et al.*, 2015; Verkasalo *et al.*, 2010; Wang *et al.*, 2016).	EJ1 I believe that using the APP is fun EJ2 I believe that using the APP is enjoyable EJ3 I believe that using the APP is very entertaining

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Construct	Items
Conversion rate (Kapoor & Vij, 2018)	FB1 I pay for tourism services/products through the travel APPs FB2 I purchase special services/products online through the travel APPs FB3 I reserve tourism services/products through the travel APPs
Perceived personal outcome expectations (Lu *et al.*, 2015)	OE1 Using the travel APP increases my sense of achievement OE2 Using the travel APP provides fun and recreation OE3 Using the travel APP keeps me up to date
Subjective norm (Tak & Panwar, 2017)	SN1 My family thinks I should use the travel APPs SN2 My friends think I should use the travel APPs SN3 Many people around me use the travel APPs
Behavioural intention APP (Tak & Panwar, 2017)	AT1 I intend to use a tourism APP AT2 In the future I would use a tourism APP AT3 I would like to use a tourism APP on my next trip

The questionnaire was collected from students enrolled in any college course. The data was collected using the snowball technique, since a link with the online questionnaire was shared and disseminated among the students to facilitate its completion. The final sample included 156 valid questionnaires, which was a valid number to perform the analysis given that the PLS technique allows the use of small samples with a high degree of reliability and robustness in the results of the statistical analysis. Students were asked to indicate to what extent they agree or disagree with the statements of the questionnaire on a 5-point Likert scale (1 = Strongly disagree; 2 = Disagree; 3 = No opinion; 4 = Agree; 5 = Strongly agree). The sample received a greater response from females (66%); however, this did not affect the results of the study since statistical tests were made by gender and of moderating effect without finding any significant difference. Similarly, no significant differences were found between the three participating age groups (Table 2).

Table 2. Sample

Gender	Age	Reasons for using tourist apps
Male 34%	16–20 20%	Tourism bookings 90%
Female 66%	21–30 46%	Information search 80%
	31–40 34%	Transport services 70%
		Travel management 40%
		Touristic guides 35%

Results

The data were analysed using the Smart-PLS 3.0 statistical program, given the exploratory nature of the model. The discriminant validity test was applied, which examined whether the

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items measured only their corresponding variable. The results indicated that the loads were greater than 0.505 for all items; likewise, the correlation test between the items and the variable they measured were valid (Hair *et al.*, 2017). The other reliability tests, including the Cronbach Alpha test (>0.70), Average Variance Extracted (>0.5), compound reliability (>0.6), and Rho A (>0.70), exceeded the required levels (Table 3) (Gefen, Straub & Boudreau, 2000; Henseler, Ringle & Sarstedt, 2014).

Table 3. Reliability test.

Variable	Cronbach Alpha	Rho A	Compound reliability	Average Variance Extracted (AVE)
Behavioural intention to use APP	0.957	0.957	0.972	0.920
APP use	0.852	0.868	0.912	0.777
Effort expectancy	0.841	1.036	0.897	0.746
Perceived enjoyment	0.871	0.879	0.921	0.795
Conversion rate	0.849	0.926	0.904	0.759
Information design	0.796	0.797	0.907	0.830
Navigational design	0.768	0.872	0.892	0.805
Perceived personal outcome	0.901	0.902	0.938	0.834
Performance expectancy	0.787	0.818	0.874	0.699
Subjective norm	0.906	0.917	0.941	0.843
Visual design	0.722	0.747	0.877	0.781

Regarding the validity and predictability of the empirical model, a re-sampling was carried out with the bootstrapping technique using 5,000 sub-samples (Hair *et al.*, 2017). This test examined the size and statistical significance of the path coefficients and assessed in-sample prediction of the dependent constructs based on the R2 of the endogenous variable (Manley *et al.*, 2020).

As obtained from the study, the dependent variable attitude adopted APP received a R^2= 0.516, and the dependent variable APP use was a R^2= 0.613. Because these values are acceptable, we can thus conclude that the model may enable a high level of prediction with a great degree of statistical validation of the variables (Table 4).

Table 4. Validity of the empirical model.

Hypothesis	Validation	Original sample (B)	T (| O/STDEV|)	P Values
H1	Supported	0.730*	14.455	0.000
H2a	Supported	0.148*	2.051	0.009
H2b	Supported	0.101*	1.918	0.015
H3a	Supported	0.166*	1.951	0.012

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Hypothesis	Validation	Original sample (B)	T (| O/STDEV|)	P Values
H3b	Supported	0.131*	1.985	0.009
H4a	Supported	0.219*	2.347	0.019
H4b	Supported	0.270*	2.759	0.006
H5	Supported	0.285*	1.969	0.009
H6a	Supported	0.151*	1.087	0.017
H6b	Supported	0.707*	1.932	0.011
H6c	Supported	0.302*	1.934	0.010
H7	Supported	0.279*	10.950	0.000
H8	Supported	0.146*	3.814	0.000
H9	Supported	0.166*	1.950	0.011
H10a	Supported	0.169*	1.992	0.015
H10b	Supported	0.130*	1.830	0.009

Notes: Significant * P < 0.05

Behavioural intention was supported as a condition for tourist APP use (H1: 0.730). This result, although it has already been validated within other APP studies (Tak & Panwar, 2017), allows us to verify the explanatory capacity of this behaviour in particular.

Regarding hypotheses H2, the data supported that the subjective norm of social influence affects both the behavioural intention (H2a: 0.148) and the subsequent use of tourist APPs (H2b: 0.101). This result is important because, in the context of tourist APPs, people consider the comments, recommendations, and suggestions of close friends and family or other tourists who generate trust; it is also important to consider that word of mouth (wom) and e-wom will affect its use.

H3 hypotheses were supported because the perception of effort expectancy, or ease of use, of tourist APPs is a fundamental condition for a positive behavioural intention of the tourist APP (H3a: 0.166) and the tourist's subsequent use of a tourist APP (H3b: 0.131). It should also be noted that the tourist APP must be easy to download and install on a smartphone, and that it complies with all the qualities related to ease of operation (Tak & Panwar, 2017).

The hypotheses H4 were verified; the performance expectations regarding the benefits that these applications will bring are determining factors for a positive behavioural intention of the tourist APP (H4a: 0.219) and the subsequent use of a tourist APP (H4b: 0.270). Therefore, tourism APPs that reduce costs, are convenient, save time, and allow for real-time transaction will be used most frequently (Iskandar & Sia, 2020; Tak & Panwar, 2017).

Hypothesis H5, which was related to how the influence of the perception of enjoyment influences the behaviour intention of the tourist APP (H5: 0.285), validates the need to offer enjoyment with this type of application (Castañeda, Martínez-Heredia & Rodríguez-Molina,

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2019), such as map viewing, augmented reality, pleasant information, games, and challenges. It has been shown that having fun can increase positive attitudes towards and use of APPs (Okumus & Bilgihan, 2014), as well as loyalty (Castañeda, Martínez-Heredia & Rodríguez-Molina, 2019).

Hypotheses H6 were also validated, which stated that perceived personal outcome is a determining factor for perceived performance expectancy in the use of a tourist APP (H6a: 0.151). This hypothesis was proposed in an exploratory manner and its validity shows that tourists associate elements of benefits in the use of the app to their perceptions of personal fulfilment offered by the app, and that the perceived personal outcome determines perceived enjoyment (H6b: 0.707). This result may indicate that people associate humorous aspects of the tourist APP with their personal fulfilment, which suggests that the perceived personal outcome helps determine the behavioural intention of tourist APP use (H6c: 0.302); this relationship was previously suggested in a study of tourist APPs in China (Lu *et al.*, 2015). These results show that tourists like to use the apps to socialise, so it is necessary that tourist applications are compatible with different lifestyles, so that they are perceived as inspirational (Ding & Chai, 2015).

Hypothesis H7 was supported, demonstrating the importance of the design of the information architecture of the tourist application to behaviour intention usage (H7:0.279). This is a factor of increasing relevance, as information, its management, and storage are becoming more important for the tourist; for example, users increasingly want to know that the APP is real, safe, and will be regularly updated. This relationship had already been proven for tourist apps in other studies.

Hypothesis H8 regarding whether visual design is a determining factor in the behavioural intention of tourist APP use (H8:0.146) was also valid in this and other studies. This factor is also related to visual aesthetic aspects.

Hypothesis H9 regarding navigation design as a determining factor for behavioural intention of tourist APP use (H9: 0.166) was also verified as another fundamental characteristic for a user of this type of application, and it is one of the most important usability factors; for example, from a practical standpoint, the user wants to use only one finger to navigate the smart phone. This factor is also linked to the fact that the user will want to have fun when browsing the APP (Ding & Chai, 2015).

Finally, hypotheses H10 were also supported, which regarded conversion rate as a determining factor for perceived performance expectancy (H10a: 0.169) and for behavioural intention towards tourist APP use (H10b: 0.130). Thus, the greater the services and benefits that can be made in the tourist applications, the more likely tourists are to continue to use them. In other

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words, the more operations the tourist can manage in the APP, the greater the APP demand will be among tourists (Marino & Lo Presti, 2019).

Conclusions/Recommendations

The objective of this study was to analyse the adoption of tourist mobile applications among millennials. More specifically, this study aimed to explore a causal-relational model that grouped together most of the variables that have been generally validated in previous studies as contributing factors towards peoples' use of tourist-related APPs. This study has managed to integrate in the same explanatory model most of the elements that a tourist considers important when adopting a tourist APP.

The theoretical implications of this study relied on the integration of a model that explained, with a better understanding, the key elements for the use of tourist APPs. The explanation of the variables demonstrated that this model, which validated those with values R square above 0.6, could widely predict behaviour in the use of tourist APPs. (See Table 3.)

All hypotheses proposed in the model were supported, confirming that all variables that were proposed significantly contribute to the adoption of tourist APPs in general. The variables that most greatly influenced the intention to use tourist APPs were the expectations of APP performance, perceived personal outcome expectations, and APP information design.

The results also validated the ideas that tourists consider visual design, navigation design, and other operational aspects when adopting a tourist APP. Therefore, it is important that the APPs have accessible menus and are easy to navigate, regarding the presence of the section menu, navigation within the same section, clarity in the navigation structure, and graphic quality, among other benefits.

As suggestions for the development and management of tourist APPs, we propose the following technical aspects: screen size, zoom or enlargement, visual contrast, keyboard control for touchscreen devices, touch target size and spacing, screen touch, device manipulation gestures, button placement (easily accessible), changing screen orientation (vertical/horizontal), consistent layout, positioning important page elements before the scroll page, operable elements that perform the same action, a clear indication that the elements are actionable, and, finally, providing custom touch screen instructions and device manipulation gestures.

Also, the results of this study suggest that co-creation in the development and improvement of tourist APPs is fundamental for their success. Thus, it is necessary to integrate end users in the innovation teams, since it is necessary to know the end users' needs, desires, and suggestions related to the following: perceived personal outcome expectations (i.e., that the

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application makes the user feel fulfilled when using it for their tourist activities); motivations for personal or communal achievement; perceived enjoyment (i.e., that the applications' focus on tourism must also generate exciting sensations, even if their services are associated with the wellbeing of tourism); subjective norm (i.e., giving priority to the recommendations that other people give, according to positive or negative experiences); and effort expectations (because easy-to-use touristic apps should be efficient, intuitive, and pleasant to use, and should take into account the degree of propensity for error and how much users like them). Whether a feature can be or is used is linked to the design variables, but also to their correct operation. Performance expectations of tourism APPs must offer solutions that tourists cannot find in other media and are possible on a smartphone. The conversion rate seeks to satisfy a specific need effectively by providing powerful search tools, tourist guides, and comments related to experience made by other travellers, and personal, authentic, and essential testimonies. Also of value is content supplied by experts on singular subjects and many additional services, such as photo and video capturing and editing for trips, the provision of electronic books to read during the trip, and augmented and online realities applied to visits of tourist sites.

This study is of great importance for companies in the tourism sector in general, since it offers a possible checklist of elements that must be analysed in the design, development, and implementation of a tourism APP. A practical contribution of this study is the recommendation to companies developing this type of application that they contemplate and consider fully all the design, navigability, and usability factors that the tourist requires; in an environment that is quickly and constantly evolving, the most successful companies will be those that are aptly positioned and competitive (Kim *et al.*, 2016). It should also be kept in mind that users tend to change applications when they find others that offer better or more services, such as real-time and location-based information. These factors should also allow for APP personalisation (Morosan & DeFranco, 2016; Okumus & Bilgihan, 2014). Although it was not analysed in this study, the results suggest that many aspects of use and assessment by the user reinforce the need to offer applications that satisfy very specific requirements, which allow for user personalisation (Marino & Lo Presti, 2019; Stocchi, Michaelidou & Micevski, 2019).

Finally, the limitations of this study were methodological; the sample consisted only of university students, which may bias the results with respect to other population groups. Likewise, this study did not analyse a specific tourist APP, but rather generalised the attitudes of tourists in regard to the idea.

Future studies should apply this type of model to tourist applications to examine this phenomenon with greater precision and to affirm whether, theoretically, another model would

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be more appropriate in studying variables analysed in other studies, such as facilitating conditions and innovativeness, or in examining moderating variables such as age or gender. Likewise, research on the use and applications of ICTs in tourism should certainly continue, given that the level of innovation in this sector is very high (Carter & Yeo, 2016). The use of other technologies related to APPs, such as the Internet of things, smart cities, virtual reality, and the future of mobile telephony, will be the new trends in the tourism sector.

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Subprime Attention Crisis: Advertising and the Time Bomb at the Heart of the Internet

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Abstract: In 2020, Tim Hwang, a writer, lawyer and technology policy researcher based in New York, published a short book entitled *Subprime Attention Crisis: Advertising and the Time Bomb at the Heart of the Internet*, which seeks to analyse the issues that are developing around the business model associated with the continued operation of the Internet, at least in its current manifestation, and the weaknesses and potential instability associated with that model. The book is of particular interest because the problems and possible next developments of the "time bomb" are set out in a plausible manner, together with some discussion on possible solutions. In particular, the author makes a credible comparison of the business model of the Internet with the subprime mortgage securities sector, the collapse of which contributed to the Global Financial Crisis in 2008.

Keywords: Book review, Tim Hwang, Internet, Online advertising, subprime crisis.

Introduction

Subprime Attention Crisis: Advertising and the Time Bomb at the Heart of the Internet (Hwang, 2020) is published by FSG Originals, the self-publishing arm of Farrar, Strauss and Giroux of New York. It is 164 pages long, of which 23 pages comprise End Notes. This is not a lot of book for the price of $US 15.00, but it is sufficient space for the author, Tim Hwang, to set out and elaborate on his thesis.

Basic thesis

Hwang's basic thesis is essentially as follows:

1. The development and expansion of the Internet, and the provision of many of the services and applications that are based on it and provided without charge, depend on funding through online advertising.
2. Like all advertising, advertising on the Internet is concerned with buying attention, or at least access to the possibility of attention.

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3. Massive volumes of Internet advertising are undertaken through programmatic advertising.
4. Programmatic advertising involves the almost instantaneous sale of access to attention to advertisers that is targeted to the profile of the Internet user.
5. Advertisers have limited means of testing whether advertising has occurred or is effective, requiring a high level of trust in the system.
6. In the case of the Internet, advertising effectiveness is measured in terms of clicks, but this measure is deceptive, not least because click fraud is rife, and so the value that is being ascribed is grossly exaggerated.
7. All participants seem to have an interest in maximising their returns and this reinforces the current system. The result is a bubble that grows and, like all bubbles, becomes unstable.
8. There is a substantial risk that the bubble will burst, rather than gracefully deflate, with equally substantial adverse effects for confidence and for the future of the Internet.
9. The parallels with the financial system and the subprime crisis in the United States are instructive.
10. This leads to the question of the options that are available to address the issues in advance of the advertising model collapsing dramatically.

Structure

The material that Hwang presents is well structured and logically ordered, and follows the lines of the basic thesis summarised above. However, Hwang takes considerable care to outline the key elements of online financial markets and of the subprime crisis that he considers have most relevance to the Internet advertising crisis. It is his key metaphor throughout – indeed it is more than a metaphor, since the Internet advertising market and the sale of attention are very closely matched, for Hwang, with other financial markets.

The advertising business model

Perhaps Hwang does not have to make the case that the Internet is about advertising. We might well accept that. However, he does make the case very well in his introduction, noting how concentrated is the market for online search and online display advertising. Google, he notes, “controls around 37.2 percent of the overall U.S. digital ad spend” with Facebook “accounting for another 19.6 percent of the U.S. market”, which makes the valuation of the market, in 2017, around $110 billion (Hwang, 2020, p. 10).

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The key, though, is not the size of the market but the dependence of the platform business models on advertising. Hwang notes that in 2017 advertising constituted 87% of Google's total revenue and 98% of Facebook's total revenue (p. 9).

Hwang offers some interesting insights into exactly how automated programmatic selling of attention takes place on the Internet and the way in which buyers for that opportunity compete in real time for it. The real-time bidding process takes, he says, about one hundred milliseconds, "about a quarter of the time it takes you to blink" (p. 20). In the time between the user clicking on an online site or material, the automated processes profile the user and seek material from competing demand-side platforms, complete the selection, and display the "winning" advertisement.

The development (and acquisition) of software tools to effect large scale, virtually instantaneous, automated placement of online advertisements followed the development of online financial marketplace systems. Hwang provides a useful history of this aspect of the online advertising history, including the acquisition of DoubleClick by Google and Yahoo's acquisition of Right Media, both in 2007 (pp. 34-41).

Commodification of attention

The other important development of commodity and financial markets that is replicated in the online advertising market is standardisation, followed by commodification. Hwang notes that standardisation of quality indices is important for accommodating large numbers of market participants who have no means of individually inspecting the good or services for sale – or, in the case of the Internet, the attention opportunity. For this to work, there has to be reliance and trust in the integrity of the overall market system and in its rules. Hwang notes that standardisation was necessary for stock and produce markets of the 19th century (such as those in Chicago) to develop beyond their physical boundaries and to sustain a range of securities, including trading in futures (p. 46). This could only occur once the system recognised the standardised goods as commodities, and once the integrity of that process was accepted and trusted.

The development of standard definitions for online advertising is extremely interesting. Hwang describes the work of the Internet (now Interactive) Advertising Bureau, formed by the industry itself in 1996, to determine standards by which the successful delivery of online advertisements might be verified and measured. One of the standards cited by Hwang is that of the concept of "viewable impression", which determines whether an online advertisement has been successfully delivered:

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> "To achieve a viewable impression, more than 50 percent of the pixels in an advertisement must occupy the viewable space of a browser page for greater than or equal to one continuous second after the advertising renders" (p. 51).

With commodification the market can be greatly expanded, and Hwang contends that this not only happened with former commodity markets, but with financial and Internet advertising markets as well. The parallels that he draws with financial markets are strong and many. He makes the further point that, although there are major differences between financial securities and online advertising inventory (the latter is not bought and sold, but bought and consumed or used), the failure of markets is ultimately for the same reason, whatever the commodity involved, and that reason is a "crisis of confidence" (p. 55).

Contributors to crises of confidence: market opacity

Hwang argues that market opacity – "the inability to see what is actually happening within a marketplace" (p. 55) – is fundamental to the emergence of a crisis of confidence in any market, and the crisis is usually associated with growing doubts about the value of the assets being traded. He says that:

> "in the 2008 [financial] crisis, financial innovation in the form of collateralized debt obligations and complex options pricing algorithms prevented the players from having a clear idea of what was going on. … In the subprime crisis of 2007-2008, packages of shoddy mortgages that were nearly certain to default at unexpectedly high rates were increasingly circulating in the marketplace. Opacity allowed these toxic assets at prices far above what they were actually worth" (pp. 55-6).

It is at this point that Hwang's thesis needs to be stress tested. What he says about the subprime crisis is now accepted wisdom. There was a collateralisation of debt obligations with the addition of subprime mortgages that were bound to fail at some point in the near future. The "collateralised" securities were then sold well above their realistic weighted value in a market that was opaque and where all the incentives were to keep trading. Once the substantial divergence of real and market values was suspected, then realised, panic set in and confidence across the board collapsed. But, if this is a true indicator of the prospects for the online advertising market, then a number of matters need to be shown: firstly, that there is an equivalence in the online advertising market to the development of toxic assets; secondly, that the revelation of a substantial divergence between market and "real" value is inevitable; thirdly, that the market does not have the capacity to reduce the divergence and restore adequate confidence under its own dynamics; and fourthly, that other business models might not develop at the same time as this dénouement and adjustment are occurring.

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Hwang makes use, on a number of occasions, of the words attributed to John Wanamaker that "half the money I spend on advertising is wasted; the trouble is, I don't know which half". Assessing the value of particular advertising is a perennial issue, and, as Hwang notes, is equally acute for online advertising, despite the belief that online advertising can be uniquely targeted and that, overall, online advertising is more measurable and, therefore, accountable. However, Hwang argues that "the measurability of the online ad economy is an inch wide and a mile deep" and "the tidal wave of data that has accompanied the development of online advertising provides on an illusion of transparency" (p. 62).

Hwang attributes the "deeply opaque" nature of online advertising to algorithmic trading which blends speed, automation and scale; substantial off-market transactions;[1] and the increasing disintermediation in the market as large advertising platforms such as Google and Facebook displace the traditional market gatekeepers.

Opacity matters in this market, as in others, because it enables expectations of the parties, and particularly of advertisers, to develop and diverge quite separately from the underlying reality. When, and if, the divergence is revealed, market adjustment occurs, and market collapse may result.

Click fraud and other dubious practices

Hwang describes in some detail the click-through measurement that is widely used to assess the impact and immediate efficacy of online advertisements. This measure is the percentage of people viewing the advertisement who subsequently clicked on it. In 1994, Hwang notes, early online banner advertisements had a high click-through rate of around 44%. But by 2018 this had dropped to below 1% on Facebook and less than 0.5% on Google (p. 78). Hwang states that close to 50% of all click-throughs on mobile devices are inadvertent or accidental ("fat finger" clicks) (p. 79). Hwang also cites experimental studies that show a high level of indifference to online advertisements, particularly among younger age groups.

The problem of declining click-through rates, and general and increasing (through age cohorts) indifference, is compounded by the widespread and growing use of ad blocking software. One response has been increased fraud.

Hwang describes click fraud as "a widespread practice that uses automated scripts or armies of paid humans in 'click farms' to deliver click-throughs on an ad" (p. 84). Hwang cites an Adobe study in 2018 that estimated that about 28% of website traffic showed 'non-human signals', and originated in click farms (p. 84).

Another practice described by Hwang, is 'domain spoofing', which involves sale of online space that looks like, but is not, the sought-after high value website the advertiser believes it is. This

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practice appears to be straight-out fraud but is a contributor to potential collapse of confidence in the integrity of the market.

Inevitability of market failure

How inevitable is failure of the online advertising market? Hwang argues that a bubble (being the diversion of expectations from reality) already exists in the online advertising market, and that its growth is sustained by the same kind of perverse incentives that fed the 2008 subprime mortgage crisis. Online advertising has been successful at the expense of traditional media, which in 2018 accounted, globally, for $273 billion out of a total advertising revenue of $629 billion (p. 98). But these figures also show that there is substantial potential to take more from traditional media. Hwang notes that both the marketing agencies and the marketplaces themselves have strong incentives to continue to oversell the value and price of online advertising inventory, despite evidence of declining value and fraudulent manipulation.

The comparison with the 2008 subprime mortgage market collapse works to a certain extent. There are undoubtedly parallels, as Hwang repeatedly notes, but there are also important differences. In response to substantial levels of investment funding seeking safe haven in the housing market, property developers and their financiers were encouraged to lend to more and more people, including those with no ability to repay their mortgage loans. It was inevitable that these mortgages would fail and that the property glut would result in sharp price declines. This would most probably not have had global financial consequences, because the quality of the subprime mortgages would have been readily recognised and they would have been traded directly on the security markets suitably marked down from the outset. However, the securitisation process employed involved mixing of subprime mortgages with more highly rated securities. This extended the toxicity throughout the whole of the financial system, and also the extent of the collapse in confidence when it came.

A constant throughout the period leading to 2008 and 2009 was the inevitability that subprime mortgages would fail. The impact of that failure may not have been fully foreseeable. Hwang has not made a solid case that the market for online attention will fail as inevitably or as quickly or with anything like the same widespread impact. In fairness, he talks in terms of probabilities, rather than inevitability. He has made the case for there being serious flaws in the online advertising market, and that there is a bubble because of the discrepancy between expectations, market values and reality. In terms of how it will end, however, he favours scenarios with higher dramatic value: “Bubbles pop, of course. And when they do, it’s loud” (p. 111).

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Healing or Restorative Capacity of Online Advertising Market

The model of market bubbles that Hwang adopts is that the bubbles grow and then become unstable, partly because market operators have incentives to keep going. Eventually, dénouement occurs, participants seek to get out with some residual value, prices rapidly drop and panic sets in. Why not just let this scenario play out?

Hwang argues that, if online advertising markets collapse, the journalism and media that are sustained on that revenue would be imperilled, and that such a collapse would have adverse effects across the online economy, including on the free services that are based ultimately on advertising (p. 120). These consequences are not elaborated by Hwang, and sound less than dire. The Internet will survive, and the business model will change, possibly even for the better.

Hwang argues for a controlled implosion, bringing forward the demolition of the current business model before the bubble gets bigger and potentially more dangerous. Essentially, he wants a regulatory agency, of the kind that undertake research into and regulate other markets. He calls his preferred agency the National Bureau of Advertising Research (NBAR), analogous to the existing American National Bureau of Economic Research. He believes that it is possible that the NBAR would have natural allies and support from the advertisers themselves, including very large corporates. On top of thorough and well-publicised research, Hwang sees the benefit of a disclosure regime of the kind that has operated in securities markets since the 1930s, with substantial penalties for non-compliance.

Building or Strengthening Other Business Models

One might be forgiven for being sceptical whether the United States of the 2020s has the governmental robustness and cohesion to undertake market reforms that are required, and to emulate the New Deal reforms of the 1930s. The rescue and stimulus programs in 2009 and the years following the global financial crisis are not the kind of approaches required to control the powering down of the online advertising market.

Shining a continuing and strong light on the market and its practices, aided by authoritative research, may have positive effects, including allowing opportunities for other business models, less based on advertising revenues, to develop more widely in the online word. Walled gardens, much favoured as a business model, at least for discussion purposes, in the 1990s and early 2010s, may make a comeback. Subscription services may develop in the absence of free, or apparently free, alternatives. Many serious journals and news media now serve paying subscribers, especially since their print versions have declined or been withdrawn.

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Conclusion

Hwang has outlined some fundamental problems and issues with the online advertising market and also the potential for those problems to grow to crisis proportions. His book is strongest in describing the problems and drawing strong parallels with issues that have bedevilled other markets, particularly financial markets and the development of the subprime mortgage crisis that led to the 2008 collapse and subsequent global financial crisis.

For this reviewer, the book is weakest in describing the manner and extent of the problems that will or may result from the bubble in the online advertising market bursting. Although serious enough, the consequences do not seem to be dire and do not find a parallel with the decade-long aftermath of the global financial crisis. In particular, Hwang has not demonstrated that the online advertising market would not develop alternative business models, including alternative advertising business models. Clearly these recuperative powers might be assisted substantially by authoritative research and disclosure regimes, but in the end the adaptive capacity of the market itself may be much stronger than Hwang assumes.

I recommend this book to the attention of all those interested in the way these markets work and their shortcomings. It is a very illuminating effort on the author's part.

Reference

Hwang, T. (2020). *Subprime Attention Crisis: Advertising and the Time Bomb at the Heart of the Internet*, FSGO/Logic, Farrar, Straus and Giroux, New York

Endnote

[1] Hwang calls these transactions "dark pools" and notes that they constitute a large part, 14%, of equity trading in the United States. The proportion is much higher with online advertising, 45% of all money spent in 2018 being in non-public marketplace transactions (p. 66).

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E-Government Services and the Digital Divide

A Quantitative Analysis of the Digital Divide between the General Public and Internet Users

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Abstract: The purpose of this article is to assess the digital divide that exists between the general public and (active) Internet users in their support for the digitalization of public services (E-Government). In conducting this study, the SKODA AUTO University Research Team gathered data from 1,613 respondents – 611 respondents who are active Internet users (using computer-assisted web interviews) and 1,002 respondents from the general public (using pen-and-paper or computer-assisted personal interviews). Results have indicated that the divide exists, although it does not pose as considerable a challenge to the current E-Governance as is often assumed. Based on the current divide, improved ICT skills and higher Internet usage among citizens could increase overall support for the digitalization of public services by up to 20 percentage points. Data results also identified two societal segments, namely, respondents from 1) the age category 60+ years and 2) 'Below-average income' respondents, as particularly vulnerable and marginalized.

Keywords: E-Government; Digitalization; Internet users; Survey; the Czech Republic.

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Introduction

The purpose of this paper is to further advance the understanding of how the approach towards E-Government and digitalization of public services fluctuates between general public and active Internet users. Undeniably, in a modern fast-paced online environment, there is an increased need not only for developing advanced and complex E-Government services, but also an increased need for citizens to actually use such services. Specifically, only in such a scenario can all benefits, which digitalized public services provide, be utilized to their maximum potential (Boksa *et al.*, 2019). As a result, it can be easily argued that the success of E-Government is largely dependent on citizens themselves accessing and using digitalized public services (Hardill & O'Sullivan, 2018; Kunstelj, Jukic & Vintar, 2007). Yet, in spite of more than a decade of varying efforts across developed societies to increase citizens' participation in E-Government, numerous obstacles still exist. The relevance and size of these obstacles can be easily demonstrated by a sheer number of scholarly articles focusing on this issue (Axelsson, Melin & Lindgren, 2010; Holzer & Manoharan, 2012; Axelsson & Melin, 2008; Dodel & Aquirre, 2018). Assessing scholarly research in this field over the past decade, it can be inferred that the lack of ICT skills among the domestic population has been commonly noted and perceived as a key culprit for sluggish growth of citizen engagement with E-Government (Boksa *et al.*, 2019; Fuglerud, 2009).

In order to further advance scholarly understanding of such conclusions, this research article, based on a large survey of nationally representative data, aims to further explore to what extent individual ICT skills truly inform and affect citizens' attitudes and perceptions of E-Government. The overall research approach implemented by the SKODA AUTO University Research Team is based on comparing assessments toward E-Government among two groups (represented by two distinct data sets) – the 'General public' and active 'Internet users'. An essential premise of the research is that those who are active Internet users by default possess more advanced ICT skills and, according to the current academic understanding, should therefore demonstrate more favourable predisposition and attitudes toward the digitalization of public services. Importantly, the scope of this research does not only aim to shed more light on such a supposition, by either validating or refuting current scholarly understanding, but it likewise strives to provide quantifiable evidence, which will indicate the extent of the difference between the two sample groups. If current academic understanding is accurate, our SKODA AUTO University Research Team's survey should be in line and further substantiate the proposition that a positive correlation exists between the population's ICT skills and its tendency to be in favour of advancing digitalization of public services (see Dodel & Aquirre, 2018; Deursen, Helsper & Eynon, 2014). Aside from academia, this view is currently also

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maintained by some of the most prominent international bodies and organizations, such as the United Nations (Stoiciu, 2011) or European Union (Davies, 2015).

Throughout this paper, the terms E-Government, digitalized public services or simply digitalized services are used interchangeably, always ultimately referring to the currently available governmental services to which citizens have online access (typically via the governmental online portal).

Data Collection and Methodology

Considering the scope of this paper, which strives to compare the varying attitudes toward e-Government currently found in 1) the general public and 2) active Internet users, the data collection process was itself divided into two phases, altogether based on a large-scale survey with 1,613 respondents.

Within the first phase the SKODA AUTO University Research Team focused on active Internet users and utilized a computer-assisted web interviewing (CAWI) method. Between 31 October 2019 and 6 November 2019, the team successfully gathered data/complete answers from 611 respondents who are active Internet users on a daily basis. The essential criteria for quota selection were gender, age, education level, the municipality size, and region. As a result, the collected data are representative of the adult (Internet active) population specifically in the Czech Republic and to a greater extent of the Central and East European area.

The second phase subsequently focused on a data collection from the general public.[i] Herein, the SKODA AUTO University Research Team implemented face-to-face interviewing methods, specifically, the Pen-and-Paper Personal Interview (PAPI) and Computer-assisted Personal Interview (CAPI). Overall, the data were collected from 1,002 respondents – out of which 680 were interviewed via PAPI and 322 via CAPI methods. The criteria for quota selection were identical with those implemented during the first phase of the data collection process in order both to preserve the comparability between data sets and to again ensure that the data are representative of the adult population.

Of note, the binary division between general public and active Internet users in the result section intrinsically resulted from the data gathering process and generated data samples, where the CAWI method was used for active Internet users and PAPI and CAPI were used for the general public. Data gathering was conducted professionally via cooperation with market research institution STEM. Statistical collection was based on random sampling within pre-selected categories (age, gender, location, education level) in order to make the results nationally representative.

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There were three identical questions that were posed to all respondents, each with multiple fixed answers. Comparing responses between 1) General public and 2) Internet users while simultaneously correlating them with respondents' gender, age, education level, the municipality size, and region (criteria for quota selection) generated data points from which the SKODA AUTO University Research Team inferred the results and conclusions provided below.

The **first question** asked: "*Do you support the digitalization of Government services?*" with possible answers, in descending order, being: 1) Certainly yes, 2) Rather yes, 3) Rather no, 4) Certainly no, 5) I do not care.

The **second question** asked: "*How well-informed are you about tools currently offered by E-Government public services?*" with possible answers, in descending order, being: 1) Certainly well-informed, 2) Rather well-informed, 3) Rather not well-informed, 4) Certainly not well-informed.

The **third question** asked respondents to fill in the blank: "*Further digitalization of public services is personally for you …*" with possible answers, in descending order, being: 1) Certainly beneficial, 2) Rather beneficial, 3) Rather not beneficial, 4) Certainly not beneficial.

Literature Review and Academic Contribution

Considering previous academic research focused particularly on the issue of the digital gap between Internet users and the General Public, as well as on how the lack of ICT skills among the domestic population undermines citizens' engagement with E-Government, several studies ought to be highlighted.

In terms of appropriate operational definitions and measuring processes of the digital divide itself, a study 'How to measure the digital divide?' prepared by the Korean Agency for Digital Opportunity and Promotion (ITU, 2004) represents a valid source. Although the study itself was prepared in 2004, large portions of its content remain pertinent and relevant to current research within this field to this date and can well serve as a comprehensive steppingstone.

Regarding particular research papers that looked at specific and country-associated digital divides, Nam & Sayogo (2011), need to be mentioned, as they studied this particular phenomenon in the case of the United States of America. Similarly, Brandtzæg, Heim & Karahasanovic (2011), addressed this divide in Europe. Nevertheless, it is of relevance that both of these studies focused on the presently most developed societies. Specifically, the former focused solely on the United States of America, while the latter restricted its concentration primarily to Norway, Sweden, Austria, the United Kingdom, and Spain. As such,

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presently still developing societies that are undergoing digitalization transformation as well, such as those we can find in Central and Eastern Europe, have been notably neglected.

Regarding the further interlinks that exist between digital divide and often associated e-readiness, Hanafizadeh, Hanafizadeh & Saghaei (2009) well discuss and investigate further model definitions and methodologies while identifying their potential weaknesses and strengths. Further elaboration on varying e-readiness assessment measures have been also provided in greater detail, particularly by Hanafizadeh, Hanafizadeh & Khodabakhshi (2009). Nevertheless, thus far, the most notable review of existing literature on digital divide and its assessment can be found in Hanafizadeh, Hanafizadeh & Bohlin (2013).

Lastly, it is worth noting that some scholarly work, such as Alshehri & Drew (2011), has focused on the nexus between ICT skills and E-Government from the reversed perspective – thus implying that it is in fact via developing and increasing the number of digitalized public services that ICT skills among the population rise. While the SKODA AUTO University Research Team acknowledges that this relation does exist and has a (perhaps even notable) effect, such a perspective is beyond the scope of this paper, which will consider the issue only from a standpoint of how ICT skills affect citizens' attitudes toward E-Government, not vice-versa.

Considering the current level of scholarly understanding and knowledge regarding the digital divide, this research paper therefore strives to further advance the contemporary debate and academically contribute on several levels.

First, by focusing on the Czech Republic the collected data consider how current scholarly understanding of the digital gap and public attitudes toward digitalization of governmental services (a process which is typically studied in countries marked with very high or high living standards) matches and corresponds with the realities in former Eastern bloc countries, especially those that during the 1990s underwent a major economic transformation and subsequently joined the European Union. Currently, no research provides such data and this study aspires to fill this gap.

Second, survey results from the Czech Republic have a unique advantage – they are to a large extent applicable when assessing the public attitudes toward digitalization of governmental services on the EU level as a whole. This is particularly true because the Czech Republic's level of E-Government/digitalization of public services and of human digital skills consistently ranks, according to the Digital Economy and Society Index (DESI), to be among the countries that most closely correspond with the EU average (European Commission, 2019a). Specifically, the overall index score of the Czech Republic and the EU average score have over the past years been, respectively, 45.3 and 46.9 (2017), 47.6 and 49.8 (2018), 50.0 and 52.5

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(2019) (European Commission, 2019b). In other words, Czech society's preparedness for the digitalization transformation, parallels that of the EU as a whole, when averaged. Hence, the survey data can be likewise utilized as an instrument to convey, or at least approximate, information pertinent to the current situation within the European Union (as no other data specifically focusing on the researched issue are otherwise available). Of note, according to the most recent 2020 data issued by the EU DESI the Czech Republic shows complete average 4G coverage, meaning that 100% of local households are covered by the technology (EU average is 96%). Furthermore, 62% of local citizens are reported to have at least basic digital skills (EU average is 58%) and 26% have above basic digital skills (EU average is 33%) (European Commission, 2020). These data points further strengthen the suitability of the survey's results for approximation of EU average.

Third, the SKODA AUTO University Research Team strongly believes that socio-economic factors play a crucial role in the structure and social fabric associated with the contemporary digital divide. Hence, the conducted survey specifically focused on these indicators, aside from the main questions, in order to further verify or refute such interconnections, while striving to identify (in case they are corroborated) those that can be presently deemed to have the most notable ramifications on the digital divide as such.

Finally, the Research Team views the currency of provided results as another notable contribution, given that the majority of studies and quantitative data associated with digital divide and distinction between Internet users and general public now derive from studies, many of which, could be today regarded as out-of-date (see literature review and further references throughout this paper).

Results

The outcomes have been divided into three main categories, each being effectively interlinked with one of the aforementioned questions. Therefore, the results specifically elucidate and provide further quantification of differentiation between the general public and Internet users in regard to:

1) General support for E-Government and digitalization of public services;
2) Differences in awareness regarding E-Government services;
3) Perceived personal benefits resulting from E-Government services.

Results, along with accompanying charts and graphs for each category, are provided below.

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1) General support for e-government and digitalization of public services

The aim of the first category was to better quantify the difference among both data sets (General public and Internet users) regarding the support for E-Government and digitalization of public services. Data points and results, generated in this instance primarily via the first question '*Do you support the digitalization of Government services?'*, are largely in accordance with the current academic literature (see Wangpipatwong, Chutimaskul & Papasraton, 2008; Mofleh & Wanous, 2008; Carter & Belanger, 2004; Rokhman, 2011).

The overall results in this segment clearly indicate considerably higher support for E-Government and digitalization to be found among active Internet users, rather than among the general public (see Table 1). Hence, this substantiates a notion that, with improved e-literacy, society's overall demand for digitalization of public services is bound to further increase.

	General public	Internet users
Certainly yes	35%	57%
Rather yes	32%	29%
Rather no	9%	6%
Certainly no	8%	2%
I do not care	16%	6%

Table 1. 'Do you support the digitalization of Government services?'

Among Internet users, more than a half (57% exactly) of all respondents unequivocally stated that they certainly support the digitalization of Governmental services. Combined with those who answered 'Rather yes', the overall support for E-Government stands at a notable 86%. Regarding the general public, the overall support for E-Government (combining 'Certainly yes' and 'Rather yes') stands at still significant 67%. Hence, despite the 19 percentage points difference in support between the general public and Internet users, the digitalization of public services and E-Government enjoys a considerable backing throughout society.

When assessing the aforementioned question with regards to the gender of respondents, in both data sets (general public and Internet users), males have demonstrated to be consistently more inclined to support E-Government rather than females. Within the general public, the overall support (combining 'Certainly yes' and 'Rather yes') for males stood at 71%, while for females it stood at 62%. Similarly, within the category of active Internet users, the overall support for E-Government among males stood at 90%, while among females it stood at 82%.

Data likewise demonstrated a strong association between the educational background of respondents and their support for E-Government. Specifically, the data (both 'General

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population' and 'Internet users' sets) indicate a strong positive correlation between the higher support for E-Government and higher education (see Figure 1). Utilizing the 'Internet users' data set, it can be easily demonstrated that, while a respondent without a completed high school education was likely to favour digitalization of public services in 49% of cases, for a university graduate the percentage increased up to 72%. Although there is a generally significant disparity between the support provided by highly educated respondents as opposed to those who have lower education levels, it is worth highlighting that even among the least educated groups the overall support (79% when 'Certainly yes' and 'Rather yes' are combined) for digitalization is still the most common answer.

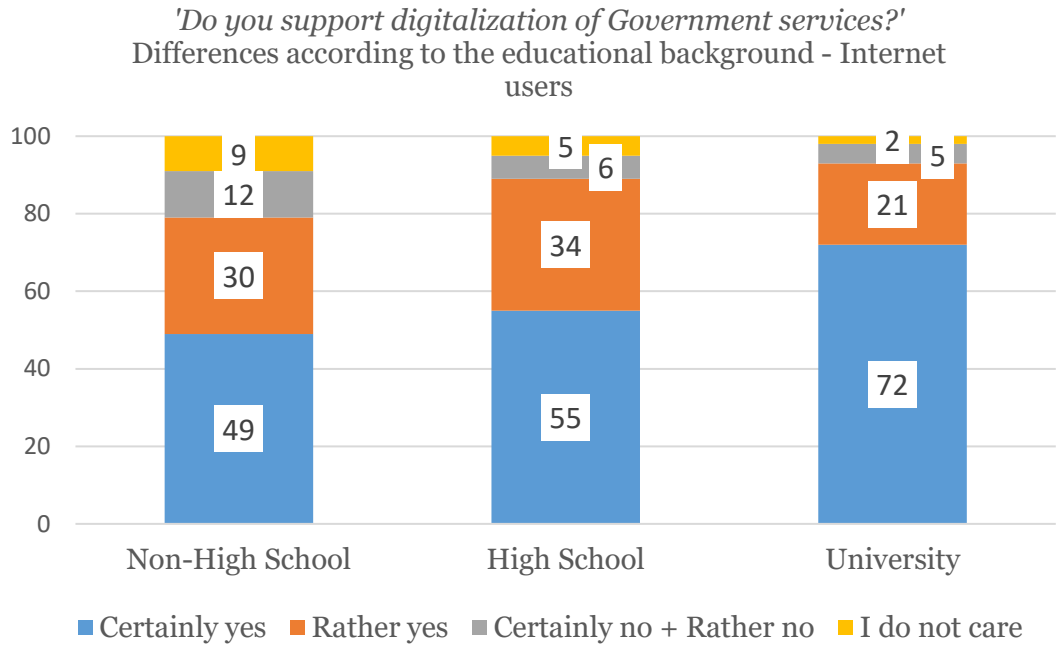

Figure 1. Differences according to the educational background — Internet users

Arguably, the most noteworthy results were, however, within the first query '*Do you support the digitalization of Government services?*' generated by a supplemental question posed in the 'General public' set. Specifically, the additional question asked whether the respondent uses the Internet on a daily basis or less (or not at all). The purpose of this question was to better inform our research regarding the overall impact of Internet usage when assessing the support for E-Government and digitalization of public services.

Herein, the data revealed a considerable gap which itself exists among general population segments that use the Internet on a daily basis and those segments that do not use it as frequently or at all (see Figure 2). While the former group favours further digitalization of public services in 80% of cases, the latter group supports it only in 43% of cases. Besides the significant drop in the overall support the data suggest that a considerable increase occurs in the 'I do not care' category (from marginal 9% to noteworthy 30%), likely reflecting the opinions especially of those societal segments that do not utilize the Internet at all or perhaps

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less than on a weekly basis, which might result in a higher lack of interest. These data further support previous results and academic understanding indicating that a strong positive correlation exists between the support for digitalization processes on a governmental level and penetration of Internet usage within a given society.

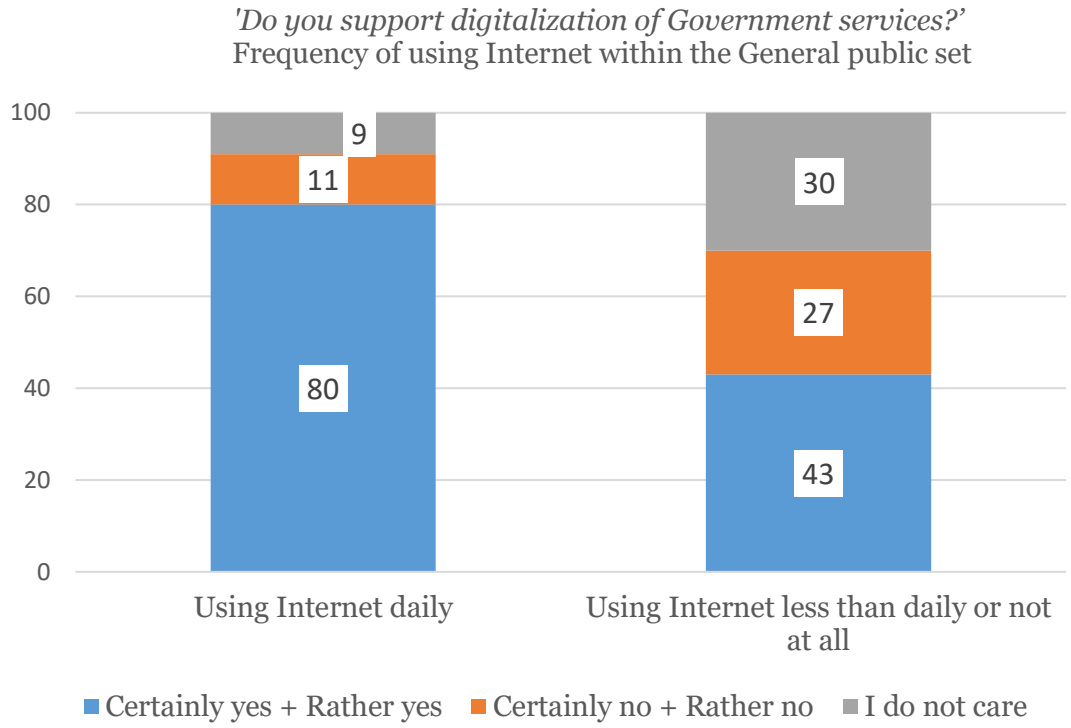

Figure 2. Frequency of using Internet within the General public set

2) Differences in awareness regarding e-government services

Utilizing the second question '*How well-informed are you about tools currently offered by E-Government public services?*', the SKODA AUTO University Research Team strived to establish and quantify the difference between 'General public' and 'Internet users' perceived awareness regarding digitalized public services. Importantly, this question was solely based on a self-assessment of each individual respondent, without any further queries or techniques implemented at this stage by the Research Team that would aim to determine how such self-assessment is correlated with an actual real understanding of tools currently offered by E-Government services. In other words, while some respondents might have a lower understanding of available services, they still might consider themselves to be better informed than they are and vice versa. The primary purpose was to assess whether Internet users generally consider themselves to be, regarding the digitalized services, better informed than the general public, to what extent, and how does such self-perception translate into differences between varying age groups, or educational backgrounds.

The data obtained via this question generated thought-provoking results. Whilst Internet users regard themselves to be overall (combining answers 'Certainly well-informed' and

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'Rather well-informed') slightly better informed than the general public, the difference is not significant and certainly not as high as initially expected. Ultimately, the difference between General public and Internet users' perceived sense of being well-informed about tools currently offered by E-Government public services was only three percentage points; with the former group stating that 21% consider themselves to be well-informed and the latter stating that 24% consider themselves to be well-informed (see Table 2).

	General public	Internet users
Certainly well-informed	2 %	3 %
Rather well-informed	19 %	21 %
Rather not well-informed	45 %	59 %
Certainly not well-informed	34 %	17 %

Table 2. 'How well-informed are you about tools currently offered by E-Government public services?'

The results were also indicative of a fact that the majority within both the 'General public' and 'Internet users' categories, 79% and 76% respectively, consider themselves not to be well-informed. Importantly, within the General public data set 34% of respondents stated that they are 'Certainly not well-informed'. Such a response rate is arguably in line with previous similar surveys, for instance, the Accenture survey (Accenture, 2019) conducted in July 2019 of 5,000 respondents originating from five countries (namely, Australia, Germany, Singapore, the UK, and the US). Therein, gathered data indicated that 31% (slightly less than 34% of respondents within our General public sample) of citizens do not use or are not aware of digital government services (Accenture, 2019). Therefore, besides our survey validating these results, it has similarly indicated that such number is ultimately cut in half when concerned 'only' with respondents who are active Internet users ('Certainly not well-informed' category in this data set stood at 17%). Such a drop is a good indication of the currently existing knowledge gap between General public and Internet users regarding E-Government services.

Two key conclusions can be further drawn based on the SKODA AUTO University Research Team's survey results. First, the ability to inform the public and further raise awareness regarding E-Government remains to be one of the key challenges in the current trend of digitalization of public services, as also indicated by works such as Carter *et al.* (2016), Weerakkody & Choudrie (2005) and Choudrie & Dwivedi (2005). Second, Internet users — a group which utilizes the Internet daily and, hence, by default possesses better IT/Internet skills than the general public — do not perceive themselves to have a considerably higher understanding of digitalized government services.

Data points further indicated that males, 29% of cases, generally regard themselves to be more well-informed than females, 18% of cases. Furthermore, those who certainly support the digitalization of governmental services (results provided by the first question) are more likely

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to consider themselves to be well-informed — a strong positive correlation has been identified between these two answers. Unfortunately, even within such an auspicious category those who regard themselves as overall well-informed represent 'only' 31%.

In both 'General public' (see Figure 3) and 'Internet users' (see Figure 4) a principle where respondents with higher education were typically more likely to self-assess themselves as certainly or rather well-informed applies in the majority of cases.

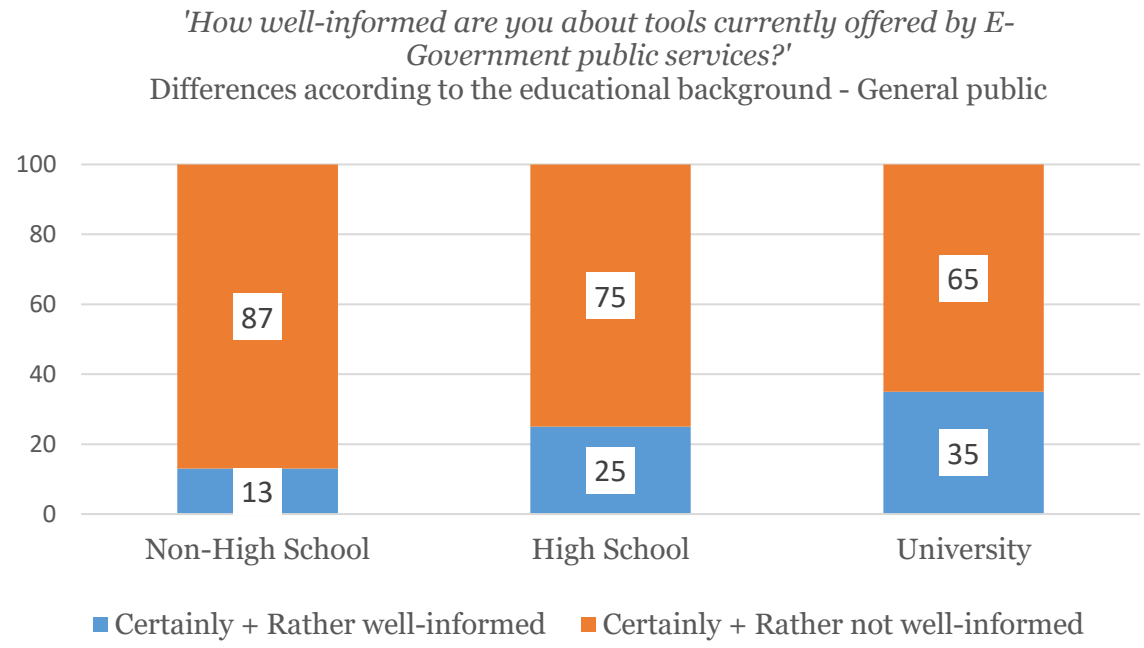

Figure 3. Differences according to the educational background — General public

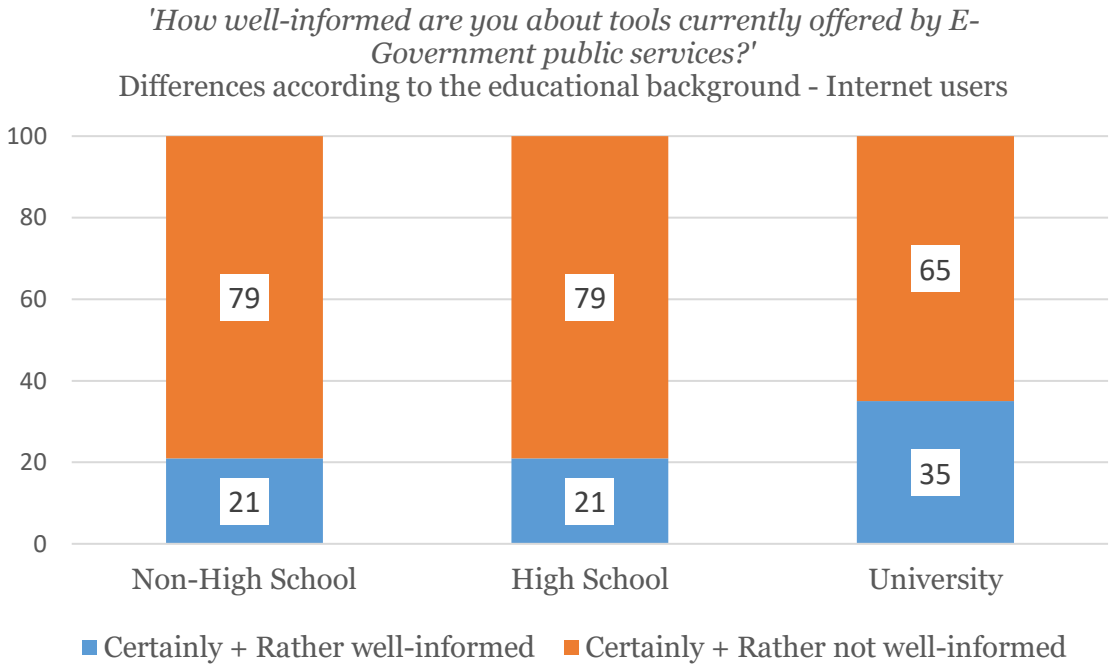

Figure 4. Differences according to the educational background — Internet users

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Comparing results generated by 'General public' and 'Internet users' data sets via the prism of respondents' educational background, two notable aspects emerge.

First, those respondents with a university-level education were, equally in both data sets, in 35% of cases likely to perceive themselves as either 'Certainly well-informed' or 'Rather well-informed'. Thus, this (university graduates) category perceives itself as being by far the most well-informed out of all categories within this division, irrespective of whether data originated from 'General public' or 'Internet users' sets. As a result, it could be (potentially wrongly) assumed that, regarding the level of awareness of offered E-Government services, education rather than, for instance, the frequency of Internet usage might be a key determining variable. Nevertheless, a strong positive correlation similarly exists between the frequency of Internet usage and higher education so that respondents with a university degree are almost certain to be utilizing the Internet daily. Hence, despite a strong positive correlation between the level of education and perceived (relatively) high awareness regarding E-Government services, it is important that no direct causation links are necessarily assumed, as other variables (such as frequency of Internet usage) are as likely, if not more, to be causing it.

Second, while the well-informed (including 'Certainly well-informed' and 'Rather well-informed') category progressively increases along with higher education (Non-High School 13%, High School 25%, University 35%) in the 'General public' data set, the situation slightly alters within the 'Internet users' set. Herein, respondents in Non-High School and High School category equally answered to be Certainly or Rather well-informed in 21% of cases. Thus, this potentially again demonstrates that frequency of Internet usage (on a daily basis in this instance) might be a more significant variable affecting the perceived awareness regarding E-Government services rather than educational background itself. Nonetheless, such a perception is simultaneously somewhat countered by the fact that respondents with tertiary education, as in the case of the 'General public' set, still scored considerably higher.

The last notable aspect conducted by the SKODA AUTO University Research Team in the 'Differences in Awareness regarding E-Government Services' subsection was to divide respondents according to their age categories within the 'General public' data set (see Figure 5). Respondents were split into four key categories: a) 18-29 years; b) 30-44 years; c) 45-59 years; d) 60+ years. The results indicated that respondents representing the 30-44 years category consider themselves to be generally most well-informed, followed by the 45-59 years category and 18-29 years category. Unsurprisingly, the 60+ years category scored to regard itself as the least informed, with overall 83% of respondents from this age group perceiving themselves as either Rather not or Certainly not well-informed. On the other hand, it is worth highlighting that differences in perceived awareness between different age groups are not as

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considerable as initially believed or oftentimes intrinsically implied by numerous academic works, such as Phang *et al.* (2005) or Becker *et al.* (2008).

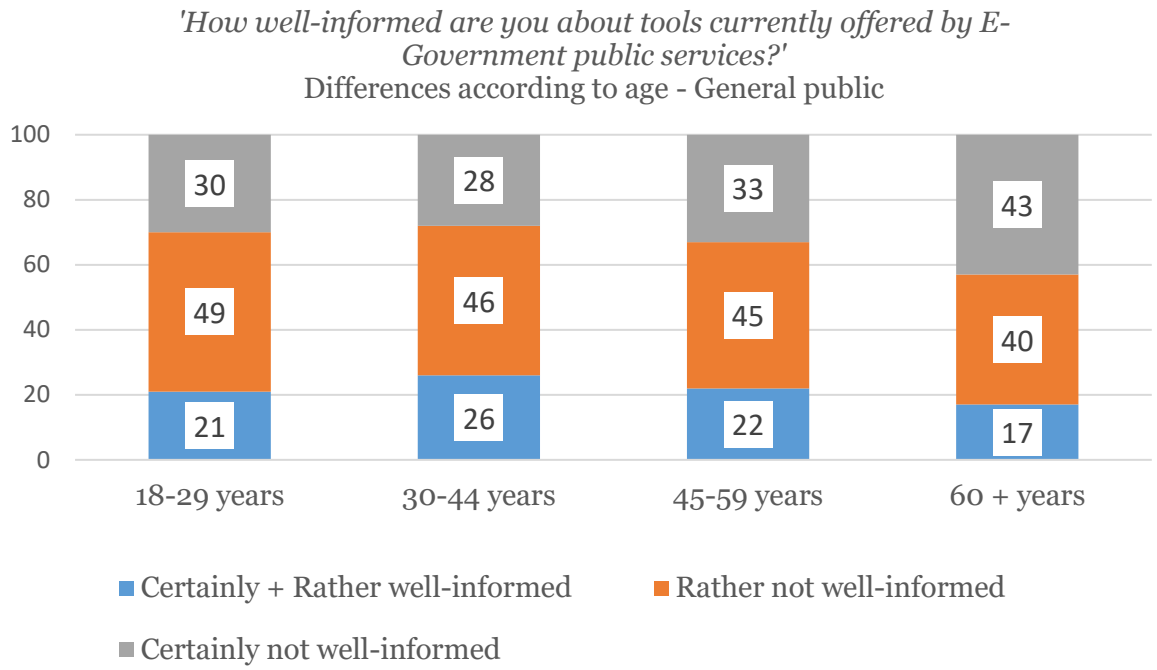

Figure 5. Differences according to age — General public

3) Perceived personal benefits resulting from e-government services

Numerous academic works, such as Veiga & Rohman (2017), Elder-Vass (2016) and Gluckman (2018), have often highlighted the positive ramifications that E-Government brings for the overall economy, primarily in the form of driving opportunities for private companies or in triggering further innovations. Nonetheless, apart from scholarly works focusing on a mandatory adoption, such as Chan *et al.* (2010), considerably less has been written about how E-Government benefits are perceived directly by citizens, taking into consideration varying factors such as age, education, or their material/financial background. Consequently, this study strived to further quantify the divide between how the alleged benefits provided by E-Government services are being perceived by the 'General public' and 'Internet users'. Results pertinent to this effort were based on data collected primarily via the third question, which asked respondents to answer whether digitalization of public services is personally, for them, 1) Certainly beneficial, 2) Rather beneficial, 3) Rather not beneficial, or 4) Certainly not beneficial.

While the majority in both data sets perceived digitalization of public services as beneficial (see Table 3), this number was considerably higher within the 'Internet users' data set (92% of respondents answered either 'Certainly beneficial' or 'Rather beneficial') – as opposed to the 'General public' data set, where this number stood at a still respectable 72%. Furthermore,

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within the 'Internet users' sample, only 1% of respondents stated that they consider E-Government transformation as 'Certainly not beneficial'; while this number was slightly higher in the other data set ('General public' – 9%). Despite these, relatively marginal, discrepancies, respondents in both data sets indicated strong support (by viewing such process as beneficial) for further digitalization of public services.

	General public	Internet users
Certainly beneficial	26 %	48 %
Rather beneficial	46 %	44 %
Rather not beneficial	19 %	7 %
Certainly not beneficial	9 %	1 %

Table 3. 'Further digitalization of public services is personally for you…'

Comparing how educational background affects responses in each sample, results indicate, as per previous cases, that higher education progressively leads to more favourable views — in this instance views regarding the personal benefits provided by the digitalization of public services (see Figure 6). Importantly, even respondents in a 'General public' category that do not possess a high school diploma (Non-High School segment – data-wise the most skeptical group from the educational background perspective) still demonstrate to have a solid majority (65%) that views E-Government transformation as a process which is overall beneficial to individual interests.

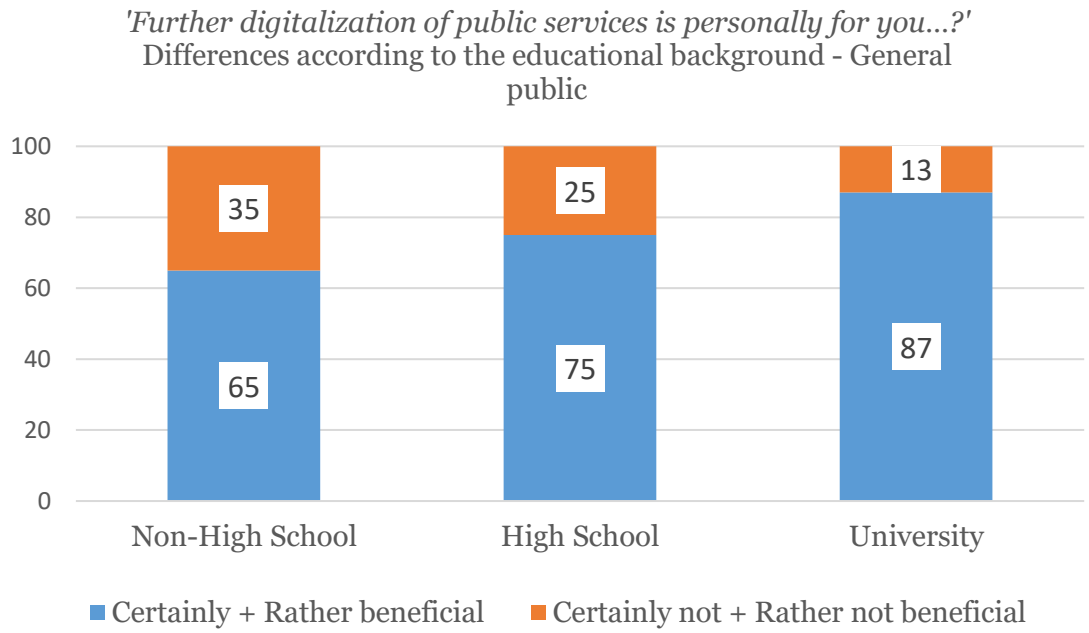

Figure 6. Differences according to the educational background — General public

It is worth noting that the difference between varying categories is lower considerably within the 'Internet users' data set (see Figure 7). The respondents from a Non-High School category view digitalization of public services as beneficial in 87% of responses, from a High School category in 94%, and from a University category in 96% — a notable increase when compared

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with earlier 'General public' data sets where these results stood at 65%, 75%, and 87%, respectively. Furthermore, it is interesting to note that within the 'Internet users' data set the gender division follows the same patterns as mentioned before, meaning that males are more inclined to view digitalization of public services as more beneficial than females. Specifically, 53% of males stated that such a process is certainly beneficial (as opposed to 43% of females), and 42% of males regarded it as rather beneficial (as opposed to 46% of females). In total, 95% of males from the data set perceive it as overall beneficial, while 'only' 89% of females share such a point of view.

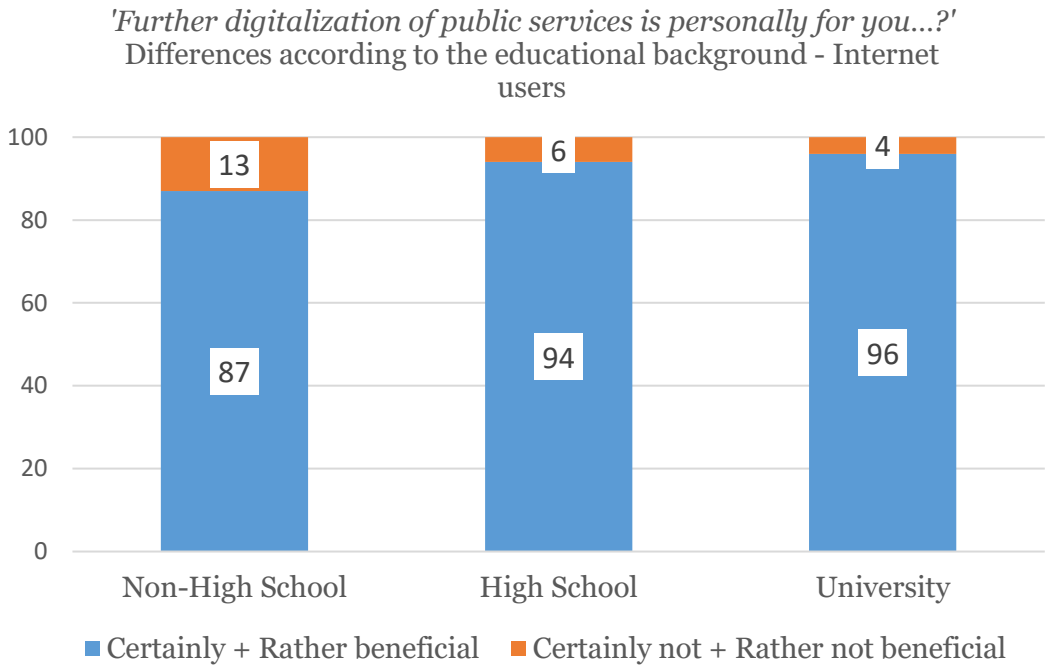

Figure 7. Differences according to the educational background — Internet users

Nevertheless, the overall positive view on personal benefits generated as a result of E-Government transformation changes considerably when respondents are categorized according to their age or material/financial background.

Dividing the 'General public' data set into categories according to age (see Figure 8) immediately indicates how closely correlated the age of respondents is with how the digitalization of public services as such is being perceived. While within the two youngest categories (18-29 years and 30-44 years), 81% of respondents answered that they regard E-Government transformation as a personally beneficial process, the situation is markedly different on the other end of the age spectrum. In fact, within the 60+ years category, 44% of respondents view digitalization of public services as not being beneficial – some respondents in the survey openly labelled such a trend as harmful. These results are largely in line with the current academic understandings, as indicated by numerous studies pointing out the

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tremendous variety of difficulties citizens over 60 years face when using the Internet (Denvir, Balmer & Pleasence, 2012).

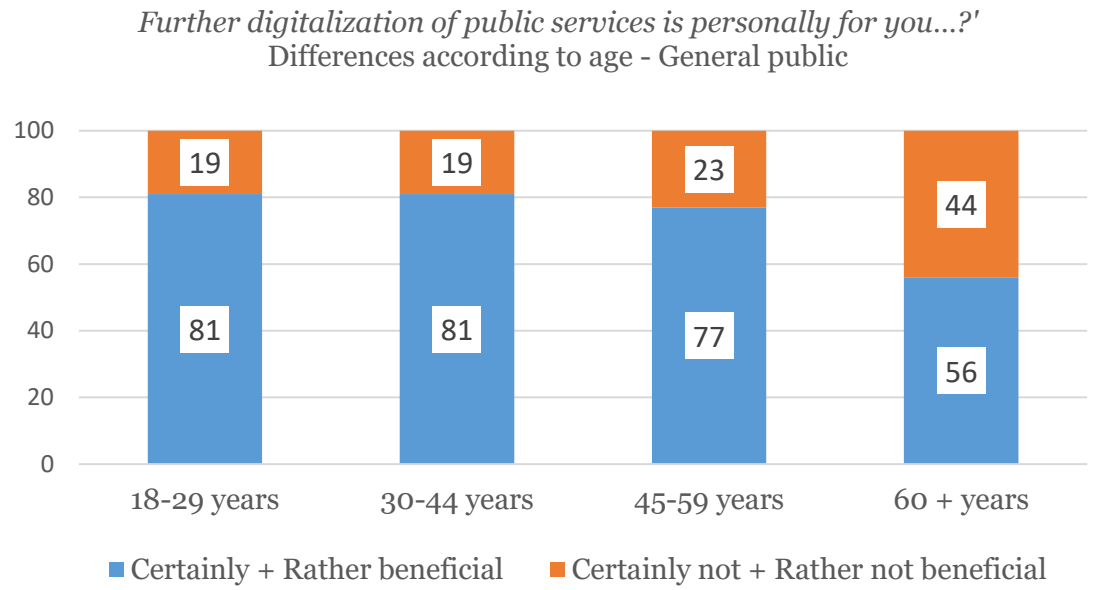

Figure 8. Differences according to age —General public

For a better understanding of dynamics particularly between the general public and its approach toward E-government, the SKODA AUTO University Research Team asked an appendix question regarding respondents' financial/material background. Dividing the resulting sample according to this added sub-question is further revealing and indicates how closely correlated are views on the digitalization of public services with socio-economic aspects of each respondent (see Figure 9).

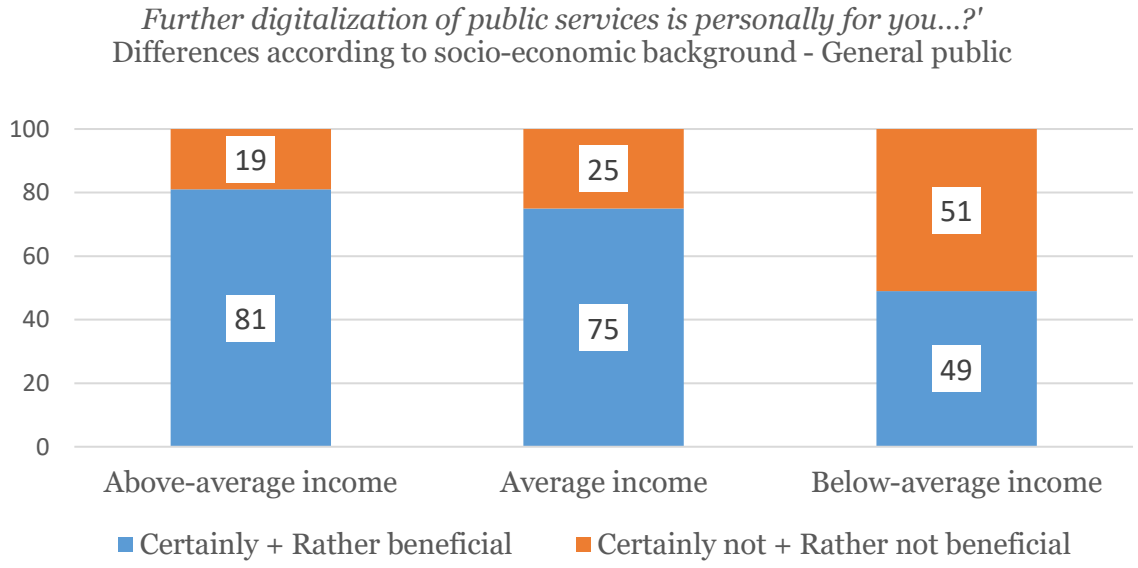

Figure 9. Differences according to socio-economic background — General public

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While respondents representing 'Above-average income' and 'Average income' categories overall viewed E-Government transformation as a personally beneficial process (81% and 75%, respectively), respondents from the 'Below-average income' category did not. In fact, the 'Below-average income' category was the only segment of respondents throughout the entire data collection process where the majority (51%) considered the digitalization of public services not to be a personally beneficial process. As a result, the negative socio-economic background (while itself strongly positively correlated with factors such as lower education or low frequency of utilizing the Internet) possibly represents another notable variable affecting an individual's attitude toward further digitalization of public services.

Conclusions

The SKODA AUTO University Research Team's results have to a considerable extent corroborated that the digitalization of public services is weakened by a lack of ICT skills and Internet usage among the citizens. This was particularly reflected by a fact that those groups with lower ICT skills and less frequent Internet usage demonstrated consistently lower support for E-Government. While those who use the Internet on a daily basis (and are thus also assumed to have higher ICT capabilities) supported E-Government transformation in 86% of cases, respondents from the general public supported it 'only' in 67% of cases. This discrepancy therefore indicates the digital divide, in support of digitalization of public services, between these two segments to be at around 19 percentage points. However, it is of note that these results likewise demonstrated that even within the general public as such, the overall support for E-Government stands auspiciously high. The size of the digital divide has been further confirmed by the fact that within the 'Internet users' data set 92% of respondents perceived digitalization of public services as a personally beneficial process, while within the 'General public' this number stood at a still high 72% — hence making the divide between these two segments to be at around 20 percentage points. The 19-percentage-points difference (between the 'General public' and 'Internet users' data segments) in support of E-Government and the 20-percentage-points difference (between the same segments) in perceiving E-Government as a personally/individually beneficial process are very closely ranged – thereby largely corroborating estimates regarding the size of the digital divide.

Educational background of respondents emerged to be a very significant variable affecting our results. It can be assessed that, almost throughout the entire survey, those respondents with higher education, irrespective of whether they belonged to the 'General public' sample or the 'Internet users' sample, demonstrated overall more favourable views of digitalization of public services. Respondents with the highest education were most supportive of E-Government transformation, they considered themselves to be most aware of tools currently offered by E-

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Government public services, and, ultimately, they perceived E-Government to be the most personally beneficial (out of all studied groups). Nonetheless, as indicated above by the SKODA AUTO University Research Team, the effects of the education variable should not be overestimated, as higher education has also a strong positive correlation with higher Internet usage – a variable which in itself might be actually more significant. Likewise, it is of note that, although respondents with higher education were more likely to view E-Government more favourably, the overall positive approach towards digitalization of public services was maintained even within 'Non-High School' respondents — hence indicating that E-Government and digitalization enjoy relatively strong support throughout society.

Gathered data likewise showed that respondents, irrespective of whether they represented 'General public' or 'Internet users' samples, largely regard themselves as not being sufficiently informed about the currently offered E-Government services. Considering the General public data set, 34% of respondents even stated that they are 'Certainly not well-informed'. As indicated above, our results are in line with a similar survey conducted by Accenture in 2019 in Australia, Germany, Singapore, the UK, and the US, where 31% of respondents stated that they do not use or are not aware of digital government services. The SKODA AUTO University Research Team estimates that insufficient publicity and marketing are among the most problematic features in current efforts to promote active usage of digitalized public services. Interestingly, the data show that this is an area in which the digital divide between 'General public' and 'Internet users' is not notably manifest. The reported difference between 'General public' and 'Internet users' perceived sense of being well-informed about tools currently offered by E-Government public services was only three percentage points; with the former group stating that 21% consider themselves to be well-informed and the latter stating that 24% consider themselves to be well-informed. These results demonstrated a considerable lack of governmental information campaigns that would promote E-Government services — not only for the general public but even for citizens who are active Internet users.

Data results have also identified groups with an overall lowest degree of support for E-Government. In congruence with the most current academic understanding, the SKODA AUTO University Research Team's results confirmed the age group 60+ years, throughout several observed areas, to consistently rank as a societal segment with one of the lowest support for digitalization of public services. In fact, up to 44% of respondents within this category viewed E-Government as not being beneficial. Likewise, these respondents were by far most likely to consider themselves not being sufficiently informed about offered digitalized public services — overall 83% of respondents from this age group perceived themselves as either Rather not or Certainly not well-informed. Aside from the 60+ years societal group, data identified 'Below-average income' respondents to be most distrustful of E-Government

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transformation and likely among the most vulnerable societal segments for not being fully incorporated in digitalization processes. The 'Below-average income' category was the only segment of respondents, throughout the entire data collection process, where the actual majority (51%) considered the digitalization of public services not to be a personally beneficial process (thereby scoring even lower than the 60+ years societal group). Results, therefore, indicated a continued and high need for more programs concentrating on these groups, enabling them to access benefits E-Government provides with ease and ensuring they are fully included in the occurring digitalization processes.

In conclusion, the current digital divide, between the general public and (active) Internet users, in support of E-Government, has been estimated at around 20 percentage points. Gathered data corroborated the understanding that with increased ICT skills and Internet usage among citizens the demand for E-Government increases. Furthermore, the SKODA AUTO University Research Team views auspiciously the fact that digitalization of public services, already as of now, enjoys majority support even among the general public and relatively across all societal segments. It simultaneously acknowledges, however, that some groups within society continue to be marginalized and excluded from the process. The negligence of these groups inadvertently results in a not insignificant diminishment of otherwise considerable support for the current digital transformation of governmental services.

Acknowledgement

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Endnote

[i] The SKODA AUTO University Research Team defines this term, for the needs of this research, as a broad reference to the general populace. As such, the term is statistically defined by the nationally representative data sample in which all segments of society are proportionally represented – based on indicators such as age, gender, level of education, municipality size, and region. Of note, this data segment by default did not distinguish between respondents that use the Internet regularly or not.

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Seas No Longer Divide

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Ericsson Australia and New Zealand

Abstract: A three-part historic paper by Alan Tulip in the *Telecommunication Journal of Australia* in 1988 describes the political campaign for the connection of Tasmania to the Australian mainland telecommunications network after World War I, not completed until 1936.

Keywords: history, telecommunications, Tasmania, submarine cable, radio

Introduction

This three-part historic paper (Tulip, 1998a; 1988b; 1988c) is unusual in that it documents the political machinations surrounding the connection of Tasmania to the Australian mainland telecommunications network between World Wars I and II.

Two submarine cables already existed between Tasmania and the mainland, installed in 1909. They suffered from technical problems and were unsuitable for connection to the wider Australian telecommunications network.

This frustrated a number of Tasmanian politicians and business leaders who saw the mainland states benefiting from the latest technology advances, denied to Tasmania because of the 300 km wide Bass Strait crossing.

After World War I, significant advances were made in submarine cables and radio, and these two technologies jostled for preference to replace the current submarine cables. The Postmaster-General's department (PMG) conducted several detailed technical investigations and determined that submarine cable was a better technical choice over radio; however, it was approximately twice as costly and these were the lean years of economic depression.

The historic paper details the political pressures that were brought to bear on the PMG, as well as the agitation of the vested interest groups. When the Federal Government finally accepted the recommendations for a submarine cable around 1930, the funds were not available, owing to the Depression. Contracts were finally signed in 1934 with Siemens Bros and STC.

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So, for nearly 20 years after World War I, Tasmania was effectively not connected to the mainland telecommunications network. When the submarine cable was fully commissioned in 1936, it was hugely successful and the usage far exceeded the planned take-up. This was not surprising to the Tasmanians, who had agitated for a better connection since World War I.

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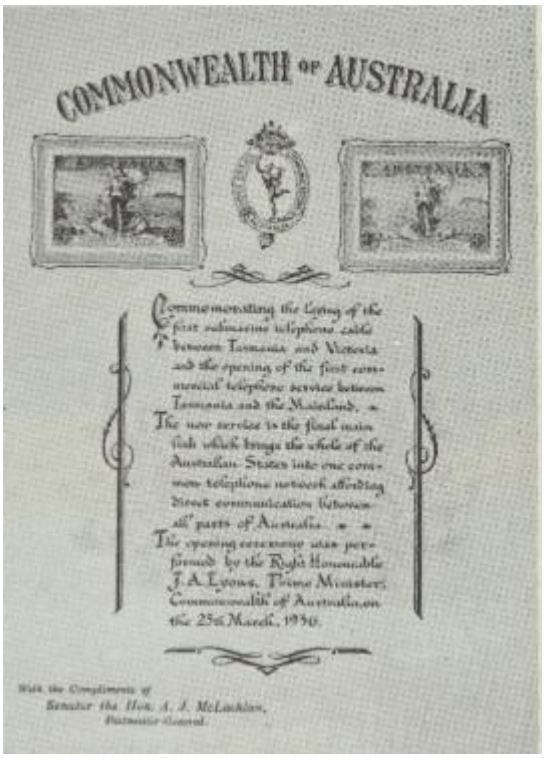
The Historic Paper

The reprints begin on the next page.

Commemorating the laying of the first submarine telephone cable between Tasmania and Victoria and the opening of the first commercial telephone service between Tasmania and the Mainland.

The new service is the final main link which brings the whole of the Australian States into one common telephone network affording direct communication between all parts of Australia.

The opening ceremony was performed by the Right Honourable J. A. Lyons, Prime Minister, Commonwealth of Australia, on the 25th March, 1936.



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Seas no longer divide

PART 1

A. Tulip

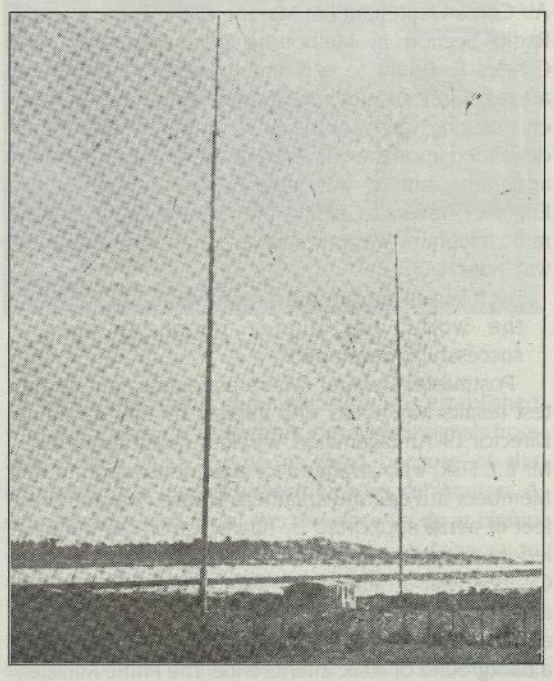
Ideas on a Tasmanian contribution to the Bicentennial Celebrations crystallized early in 1984 when it was decided to prepare a document detailing some major engineering project which had contributed significantly to our telecommunications development. The original concept was to tell the complete story of the submarine telephone cable which joined Victoria with Tasmania in 1935, for, although various aspects of the cable saga had been described in a number of technical journals, a comprehensive work was not available. Ensuing research showed that attempts to provide a "speech bridge" across the water were not confined to the 1930s, but originated from technical advances during the bitter years of World War I.

INTRODUCTION

In this and two succeeding articles, a summary will be given of the experimental work performed by engineers of the Postmaster-General's Department to provide a voice communication link across Bass Strait between Tasmania and the Australian mainland. The water barrier had caused endless problems for more than fifty years of the island's recorded history and when even today, the capricious temper of the Strait often provides a queasy journey for the sea-borne traveller in his modern, strongly built ocean transport, it requires only a little imagination to picture the fate of many small, wooden mail ships which were compelled to brave the turbulence of one of the most treacherous waterways in the world.

The magical electric telegraph which, in 1857, joined Hobart and Launceston over the first Overland Line in the southern hemisphere led to a revolutionary quickening in the island's business and social intercourse and, within two years, the first of a series of submarine cables permitted the dots and dashes of Samuel Morse's code to join Tasmanians with their mainland counterparts. When the Darwin-Port Augusta line was completed in 1872, Tasmania had telegraph connection with the world, and succeeding cables which were laid across the sea bed allowed telegraph communication to expand even into the 1930s. But at a much earlier date, Alexander Graham Bell's telephone replaced morse symbols along wires with the human voice. There were wires at the bottom of Bass Strait. Could not voices travel by that path between Victorians and Tasmanians? It was a dream destined to remain in abeyance for many years to come, for the technology was yet to be discovered.

At about the turn of the century, a young man named Marconi showed that wires were not necessary for the transmission of morse symbols, and so commenced the era of "wire-less" telegraphy. Was it possible that by some further scientific miracle the dots and dashes of wireless telegraphy could be replaced by a "wireless telephone" which would convey speech without wires? The realisation of that dream was heralded in 1904 with Fleming's invention of the thermionic valve to which a "grid" was added by De Forest. Two years later, a Canadian, Reginald Aubrey Fessenden, broadcast the world's first radio programme on Christmas Eve, astounding ship wireless telegraphy operators who, instead of receiving dots and dashes, picked up his transmission of words and music, and by 1910, the world famous tenor Enrico Caruso broadcast by radio from the Metropolitan Opera House in New York. Words without wires! Surely this was the answer to the Tasmanian problem, but there, half a world away, the tempo of events was much more leisurely.



Wireless Telegraphy Aerials East Devonport, 1906.

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In July 1906, the Marconi Company had successfully demonstrated wireless telegraphy between Queenscliff, Victoria and East Devonport, Tasmania, but there was little official enthusiasm for the new technology. There was a submarine cable — and Marconi's "wire-less" apparatus was expensive! Even the new wireless telephony which was widely regarded as the wonder of the age apparently received little consideration as a means of ending the island's isolation. Then, as with other scientific innovations, war brought about many refinements. During the 1914-18 conflict, air-borne radio transmitters reported the fall of artillery shells, the movement of troops, and assisted in the manoeuvering of battle fleets, and when peace returned, it seemed to be simply a matter of time before those in power would concede that the seas could be bridged by radio waves and that it was possible that voices could, by that medium, traverse Bass Strait. As events were to prove, it was, indeed, to be "a matter of time".

WIRELESS OVER THE WATER?

Despite the apparent lack of interest in wireless telephony by their political masters, the Post Office Engineers were well versed in the latest transmission techniques. They had seen the advantages of wireless telegraphy and now wireless telephony seemed to offer endless opportunities. What, after all, was the point in stringing up thousands of miles of wire on a multitude of wooden poles if words could be transmitted without the use of wire? Many of those who were returning from theatres of war on the western front and elsewhere had first-hand knowledge of the new technique and former Air Corps Lieutenant Jim Malone of the Departmental Radio Section in Melbourne persuaded Secretary Charles E. Bright to experiment with two borrowed aircraft wireless-telephone transmitters. Results were encouraging. Clarity of reception up to 40 miles distant depended upon the efficiency of the amateur receiving apparatus, but as was stressed by Chief Electrical Engineer Frederick Golding, the tests showed that while radio telephony was practicable, commercial utilisation was not:-

> "as it is well known that at present, in no part of the world, has duplex telephony been successfully developed."

Postmaster-General Wise's announcement of the test results was noted with interest by the Managing Director of Amalgamated Wireless (Australasia) Ltd., Mr E.T. Fisk, who arranged for a demonstration to the Members at Federal Parliament House. Two hundred feet of aerial supported by flag poles on the building led to a transmitting and receiving cabinet in the Queen's Hall. A similar unit was located seven miles away at Brighton, from where a musical selection and a short speech by the Mayor were clearly heard through a background of static interference. The Prime Minister, however, was unable to respond because rain induced electrical leakage rendered transmission impossible. But to many Members, it was a dramatic event and it appeared to them that Fisk had proved the capability of wireless telephony for commercial useage. Hansard reports were ecstatic! Engineer Golding, however, in a confidential memo to the Secretary, strongly advised caution. As he pointed out, it had originally been the intention to speak from Bendigo to Parliament House with brand new Marconi apparatus, but it could not cope with the range! Wireless telephones would not permit secrecy and electric power generators were not readily available in the outback! Added to that, as a result of cost estimates supplied by Fisk, it was quite clear that the needs of outback settlers could be provided more cheaply by land lines. Much more experimental work was strongly advised.

Jim Malone's minute to his Chief Engineer, dated 13 October 1920, gave the first indication of a scheme to provide a speech link over Bass Strait:—

> "To communicate between Hobart and Melbourne by wireless telephone would necessitate the installation of at least 6KW., and the cost would be about £5000. This practicability will be investigated further....."

Fisk elaborated upon the proposal giving costs for the equipping of stations linking Melbourne, Launceston and Hobart, and, perhaps sensing some impending lucrative contract, finalised his remarks with the observation:—

> "and furthermore, telephony by cable is impossible".

Golding expressed general dissatisfaction with Fisk's reply and suggested that as there was so much propaganda about wireless telephony, it was advisable to tie the Marconi Company down to specifics. No information was given as to the power of the stations, the type of equipment nor the means of obtaining duplex telephony. As he stated:—

> "The capabilities of a wireless telephone circuit should approximate as far as possible to those of a trunk telephone circuit, including simultaneous working both ways (duplex telephony) as is required by users of the telephone today. Until this is practicable we will not be able to justify wireless telephony for commercial purposes."

All the Department's requirements were detailed in a letter to Fisk dated 20 November 1920, and included the idea of providing a Radio-telephone circuit between the Mainland and Tasmania. His business-like reply indicated that most conditions could be met but he could not, at the time, guarantee duplex telephony, although he did know that:—

> "some very successful experiments along such lines are being conducted both by the Marconi Company in England and by the Radio Corporation of America."

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Press reports and stories of the wonders of wireless-telephony did little to enhance the Department's cautious but sensible attitude. As world-wide examples of achievements in the new science continued to proliferate from enthusiastic and often-exaggerated pens, the reaction in Australia was swift and brutal:—

"The wonders of wireless! Its chief wonder is that any human community allows a collection of government officials to sit on it in the way the Postal Department is doing in Australia."

"The handling of wireless by the Post Office is an excellent argument for private enterprise."

"The chief wonder of wireless continues to be the wonder why the Postal Department was ever allowed to take it over, in order to lock it up from the service of the people of this country!"

The relentless pressure continued until a way out of the impasse was indicated in Fisk's letter to the Secretary dated 6 May 1921:—

"I have also received a cable today informing me that the Marconi Company has successfully developed a method by means of which a wireless telephone circuit can be automatically connected with a land telephone circuit...."

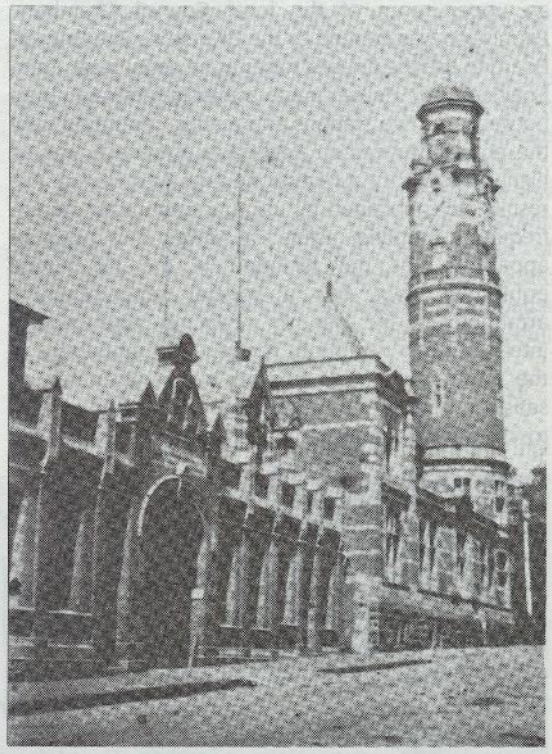
THE EARLY RADIO TRIALS

The duplex telephony breakthrough to which Fisk referred was announced in "The Times" of London and reproduced in the Sydney "Sun". It was a detailed account of the classical demonstration carried out by correspondents of "The Times" at Southwold (England) and their counterparts at Zandvoort (Holland) — the latter place now of Grand Prix racing renown. The Southwold correspondent spoke into an ordinary telephone instrument which was connected to a wireless station. His speech was carried by radio waves over the North Sea to a Dutch receiving station which relayed the spoken word to a second ordinary telephone at Zandvoort. An hour long conversation ensued without intermediate switching. The operation was automatic — duplex telephony had been achieved.

Amid renewed pressure in the House and further broadsides from the popular Press, tests were carried out on sets of Radio-telephone apparatus which had been procured from the De Forest Radio Company of America, and in October 1921, Malone reported to his Chief:—

"Preliminary trials have been sufficiently successful to justify making a test between Tasmania and the Mainland including repeaters between Radio-phone installation and land lines. The present intention is to arrange for a temporary station to be erected in Launceston — probably on the Post Office building — where speech would be repeated into the Tasmanian telephone system."

The De Forest apparatus consisted of two sets of Radiophone equipment Type OT 101, 500 watts and two of a more powerful unit, Type OT 401, rated at 2000 watts. Testing had shown that the smaller powered set could transmit speech clearly over a distance of 100 miles and it was therefore considered that the 2000 watt units would be capable of satisfactorily covering the 230 miles between Launceston and Melbourne. Radio Engineer George Apperley left for Launceston and commenced installation of the apparatus at the Post Office. A direct current generator was installed in the basement, the transmitter and ancillary apparatus in the mail fumigating chamber and an earth connection was attached to a convenient water pipe. The aerial system was suspended between the clock tower and three temporary poles on the roof of the building.



Launceston Post Office with Aerials 1921.

Radio-telegraphic communication was established with Melbourne on 22 October, but speech signals from Melbourne could not be received because of the induction from a nearby electric power sub-station. A separate receiving aerial was therefore set up at Elphin Show Ground and a 1 1/4 mile land line connection made with the Post Office transmitter. Testing continued at Launceston with the 2000 watt transmitter until early November but the strength of received speech at either side of the Strait demonstrated the futility of attempting land line relays. The failure between Launceston and

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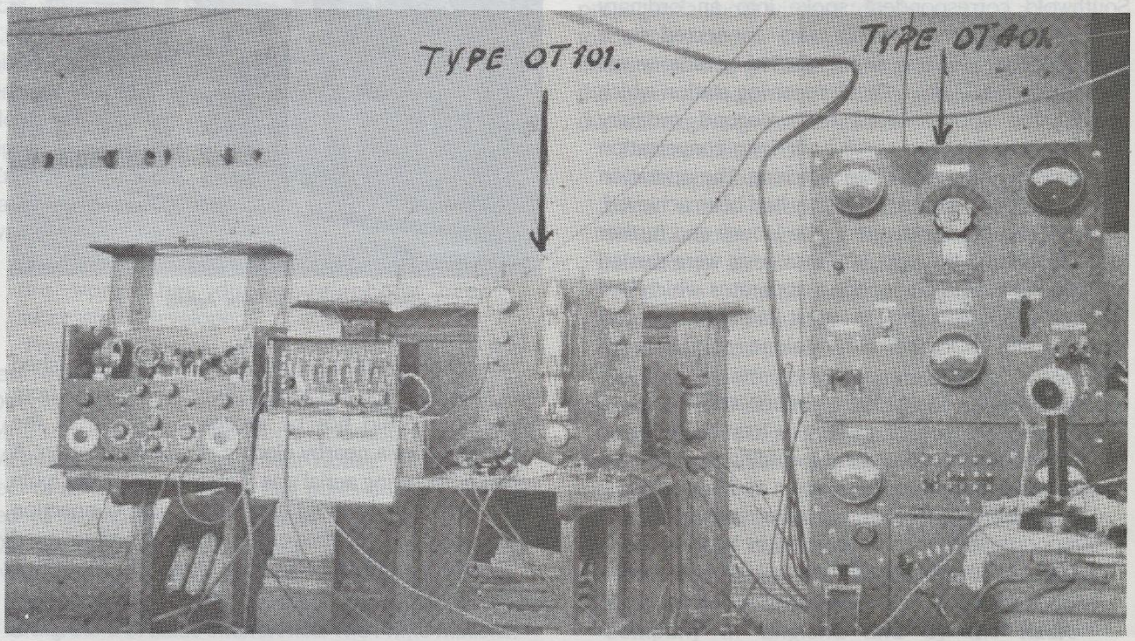
Melbourne was due, no doubt, to screening and absorption; 30 miles at either end of the transmission path was over country which, on the Tasmanian side, was particularly hilly.

On 4th November, a temporary inverted "L" four wire aerial was erected at West Burnie on a site at the Church of England vicarage and on the following day, a speech transmission from the Type OT 101 transmitter in Melbourne was received at maximum strength. The speech was so clear and strong that relaying it over 100 miles of landline presented no difficulty whatsoever, since it was all read with ease at Launceston. Such promising results justified the removal of the transmitter from Launceston to Burnie where the apparatus and aerial was installed in and on the Post Office. Simultaneously, the receiving apparatus was installed at Ulverstone, 14 miles along the coast from Burnie, in an upper room of the local Council Chambers. Permission was granted by the Ulverstone Fire Brigade Board to use the fire-bell tower as an aerial mast. State Engineer, W.P. Hallam made available a metallic loop between the two stations and testing continued until the end of November. Reception of speech was as highly satisfactory at Ulverstone as at West Burnie. The results were obtained by using a seven stage audio-frequency amplifier using five valves. This piece of apparatus was not included in the De Forest equipment, but was a special super-sensitive arrangement for use in reducing atmospheric interference to reception. The receiving apparatus in the Radio-phone sets proved to be incapable of satisfactory speech reception and this applied equally to the Melbourne end of the path. By use of the amplifying device, the Melbourne speech received at Ulverstone was increased in intensity to a degree suitable for relaying to Hobart where, on 20 November, State Engineer Hallam listened to the Melbourne transmission and reported that with the exception of slight atmospheric disturbances, all that was spoken came through well. The land line connection between Ulverstone and Hobart via Launceston was 215 miles of 200 lb. copper conductor. Problems of reception at the Victorian end were minimised by modifying the receiving apparatus and installing the equipment at the Sorrento Post Office, where the reception of Burnie's transmission from a smaller powered Type OT 101 panel almost equalled that obtained at Ulverstone. Testing continued at Sorrento until December 22nd. Line relaying to Melbourne met with limited success because it was not possible to obtain an exclusive trunk circuit. A service call had to be booked to coincide in time with the transmitted programme from Tasmania; thus different trunk circuits were obtained for different tests and many of the lines were very poor — even for ordinary conversation.

George Apperley's report was minutely detailed. He pointed out the limited capabilities of the De Forest equipment but emphasised that, with local improvisation, perfectly articulated, distortionless speech had been transmitted between Melbourne and Hobart, and that duplex Radio-telephony had been proved possible via Burnie and Ulverstone. Malone echoed these sentiments to Chief Electrical Engineer R.N. Partington but also noted the disappointing results at the Melbourne end of the proceedings. He stated:-

"These results, although not satisfactory in the



Burnie Radiophone Transmitter.

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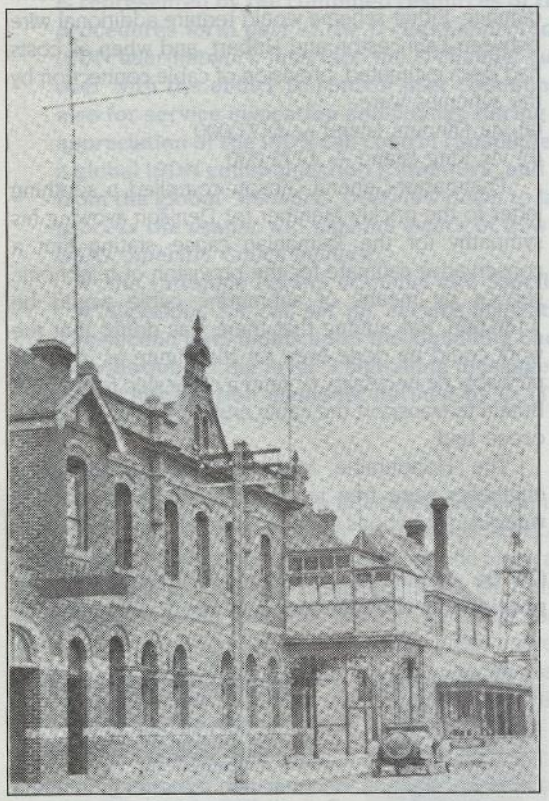
light of any expectancy of reliable communication being maintained, have been of considerable value in teaching us lessons which will be of importance, should it be decided later on to inaugurate a Wireless Telephone Service across the Straits. The tests prove again what has already been known — that Radio Telephony is still in the developmental stage; and, although more efficient apparatus than was at our disposal could be obtained from abroad, it is not safe to recommend its adoption for a commercial service to the public."

Partington agreed. A lot had been learned, the funds had been well spent, but there were to be no further tests for the time being.



Ulverstone Council Chambers with Aerial Connection to Fire Brigade Bell Tower.

RADIO OR CABLE ?

As masts and aerials were dismantled and transmitting and receiving equipment was crated for return to the mainland, Tasmanians must have experienced a bitter feeling of disappointment. The promise of a voice link seemed to have faded, but it would have been wrong to assume that, because testing across Bass Strait had ceased, the Department had gone into hibernation. The apparatus was installed at Melbourne Radio and further experiments were carried out to ascertain the reliability of the sets for wireless telegraph transmission under actual working conditions — but stations were asked to listen for accompanying speech also. The results obtained were most encouraging. Favourable reports on the volume and quality of speech were received from Brisbane and Perth Radio Stations, from ships far out at sea and from Auckland and Awanui stations in New Zealand. But it seemed that nothing was being done to promote the adoption of the system to alleviate Australian problems.

Cynical parliamentary barbs were regularly targetted at the Postmaster-General for his apparent disinterest in the provision of wireless telephones. Such attacks were unfair because at that period, the Department could not provide such facilities. The question of installing wireless telephones at isolated locations where no land line communications existed had received a lot of attention, but Amalgamated Wireless had not been successful in negotiating with interested parties because of the prices they quoted and the Company would not supply equipment which the P.M.G. Department would erect and operate because of a desire to protect vital patent rights.

In the midst of his multitudinous duties, the new Secretary of the Department, Harry Percy Brown, reminded Ernest Fisk of A.W.A. that a field of investigation lay in the provision of telephonic communication to Tasmania. Fisk's reply — six months later — indicated that he thought something useful might be done in that respect,

"although it might not, at the outset, be as good as the mainland trunk lines...."

The tenor of the response indicated clearly that there were still unsolved problems in the wireless telephony field, but Brown, assuming that the snags would be overcome as technology advanced, initiated an investigation into potential cross-Strait traffic. Superintendent of Telephones, L.B. Fanning compared the ratio of telephone to telegraph business between mainland capital cities and then applied his findings to the telegraph business between Tasmania and the mainland. 55 calls a day was the result. Estimated increasing use of the service showed a third year revenue of £7,200. In February 1925, the Western Electric Company (Australia) regaled Secretary Brown with details of their latest technology and achievements and later suggested that it might be possible to derive telephone channels on the existing Bass Strait telegraph cables. It was a fascinating prospect. If high frequency testing proved to be successful, then suitable paths for telephonic communication already existed at the bottom of Bass Strait. Heavy financial expenditure would be greatly reduced and provision of the desired voice bridge would be accelerated. Brown had no hesitation in ordering an investigation into the properties of the two cables, but Supervising Engineer (Research) S.H. Witt reported on 4 November 1926:—

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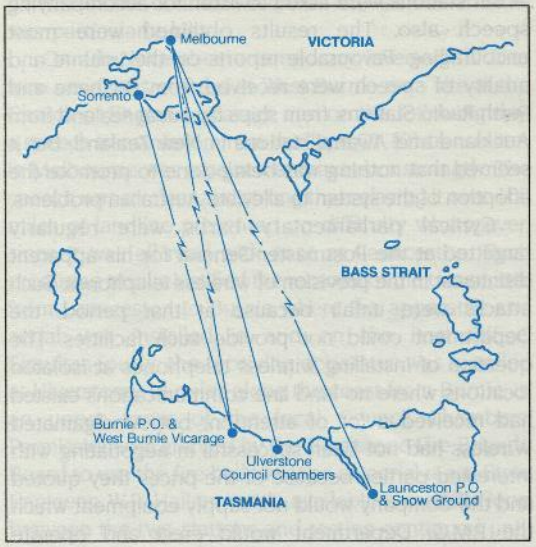
"This investigation is complete. The cables cannot be used for telephony."



Wireless Telephone Experimental Sites 1921.

PRESSURE FOR A SUBMARINE CABLE

Since London and Paris had been joined in 1891 by the first submarine telephone cable under the English Channel, there had been great advances in both cable design and insulation technology. The latest innovations were described not only in scientific and technical journals but received a fair degree of coverage in ordinary newspapers. It may not, therefore, have been any great surprise to H.P. Brown when, in August 1926, he was approached by the sub-editor of the Hobart "Mercury", Mr Clyde Black, who made representations on behalf of the newspaper and the Chamber of Commerce for the laying of a submarine telephone cable. Brown pointed out the technical difficulties in providing a cable of such a length and stressed the exceptionally heavy cost. Because of these obstacles in giving telephone facility by cable, the Department had directed its attention to the institution of a service by wireless telephony. It seemed significant that later in the same month, Tasmanian Member for Denison, Sir John Gellibrand, also raised the question of the telephone service with Postmaster-General Gibson. The prospect of a further onslaught by Parliamentarians, the Press and the big business interests of the Hobart Chamber of Commerce indicated that up-to-date answers be prepared. Quotations and complete specifications for the supply and installation of wireless telephony plant were awaited from both A.W.A. and S.T.C., but as public interest in a submarine cable seemed to be on the increase, an investigation into the economics of that alternative was necessary. That task fell to the lot of Chief Electrical Engineer J.M. Crawford, who supplied details to Brown some weeks later. From details of cable design and performance at that time, the distance across the strait was too great to allow a cable to be run direct and two routes were available which would allow the cable to be divided and for repeaters to be installed. The first was from a point near Wilson's Promontory (Vic) via the islands of the Furneaux Group to a suitable point near Cape Portland (Tas.), and the second was from Cape Otway (Vic) to King Island and then on to Marrawah (Tas.). Of the two, the route via King Island was preferred, because the many islands along the alternative path indicated a shallow, rocky sea-bed with consequent problems of tidal abrasion. It was also considered that open aerial construction over several islands multiplied the risk of storm damage. Either scheme would require additional wire between Launceston and Hobart, and when all costs had been estimated, provision of cable connection by the schemes were:-

(a) via Flinders Island — £171,000
(b) via King Island — £173,000

Postmaster-General Gibson compiled a soothing letter to the prickly Member for Denison avowing his sympathy for the Tasmanian cause, stating that a conservative estimate for the provision of telephonic service by means of submarine cable would be £180,000, but adding that there was doubt that the work could be done even for that figure as it would probably be necessary to send a cable ship from Great Britain to transport the cable and then to lay it on the ocean bed.

The Honourable Member was placated. The engineers were free to wrestle with their problem without distractions — for a little while!

(To be continued. A list of references will be provided at the conclusion of the final segment).

Alan Tulip, graduate and diplomate of the University of Durham, served for nine years as a Royal Air Force Instructor and then taught and administered a group of schools in Central Africa. Persuaded by an ex-service colleague to settle in Tasmania, he soon decided that a change from teaching was desirable and joined the P.M.G. Department in 1971. He became Tasmanian Historical Officer two years later and has, since then, been happily researching and writing and administering the Hobart Postal and Telecommunications Museum.

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Seas No Longer Divide

PART 2

A. Tulip

The second of three articles outlining the history of attempts to provide telephonic communications between Tasmania and the Mainland States.

WIRELESS TELEPHONY PREVAILS

By the end of September 1926, detailed quotations for the supply of equipment to achieve wireless telephone service between Tasmania and the mainland were received both from S.T.C. and A.W.A. Both manufacturers acknowledged the exacting requirements of the Postmaster-General's Department and then proceeded to describe their equipment and show how the desired result would be achieved. As S.T.C. stated:—

"It is our understanding that the link is required to give one radio telephone circuit between the two terminals, the circuits to be so arranged as to link up with the existing land line telephone circuits, and to form an intermediate portion of the regular trunk line network. Such a radio circuit as we should provide would enable you to establish full duplex operation, and ringing facilities are provided so that the circuits terminate on switchboards in the ordinary manner. Privacy is secured by inverting the speech frequencies before they are transmitted over the radio channels, and re-inverting them when they are received at the distant terminal. The circuits will function exactly as if the radio link were replaced by a normal wire line. It is estimated that an antenna power of five kilowatts will be required in order to give a reasonable degree of assurance that service could be maintained throughout twenty-four hours of the day."

But then came the reservations as would be expected in any fair and open submission:—

"It is, of course, impossible to guarantee a completely uninterrupted service, as there are occasions, as for instance during violent electrical storms, or when a station with a broadly tuned spark transmitter is operating close to either receiving station, when even ten times the power specified would not suffice to maintain a continuous service. If you feel that the demand for the service is not sufficient to justify a five kilowatt installation and would be willing to consider a service which would be subject to interference, we could more than likely provide you with a one kilowatt equipment. It must be understood that with this latter equipment, we could not guarantee continuous service, but we do feel that a fair degree of satisfaction could be obtained under average conditions."

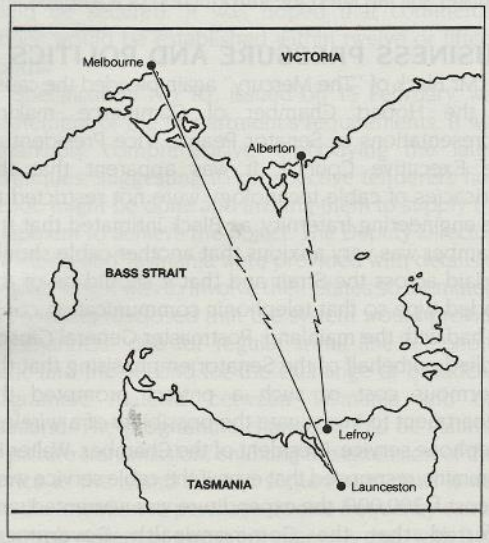
The proposal submitted by Amalgamated Wireless was equally detailed and honest in admitting the limitations of current technology. Chief Manager, Telegraphs and Wireless, Jim Malone provided an analysis of both proposals for Secretary Brown:—

"The A.W.A. quotation describes the equipment as being suitable for 200 miles, costing £22,020. The S.T.C. offer provides for alternative schemes:—

(a) Melbourne to Launceston; 275 miles; £27,866.

(b) Alberton (Vic) to Lefroy (Tas); 175 miles; £34,362

The latter case is the more expensive owing to the necessity for the installation of local power supply. In both cases the cost would be added to considerably in respect of installation costs for buildings, power supply, masts and aerial systems."



S.T.C's *Alternative W/T Terminals* 1926.

The technical details of the relative proposals were discussed most minutely and Malone concluded:—

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"The S.T.C. proposal technically is a much more satisfactory one, having special regard to the greater radio power level and the provision for reduction of atmospherics which will be severe on the wavelength proposed. The total cost of this installation — the shorter radio link — will probably be not less than £ 50,000 having regard to the cost of land, buildings, masts etc. The annual charges on this system would amount to about £ 16,000."

And then, significantly, he added:—

"It will be seen that the annual charges on the Radiophone system would not be much lower than 10% of the capital cost of a cable costing 160,000. The maximum life of the Radiophone system could be set down at 10 years as against the cable life of 30 — 40 years."

The position towards the close of 1926 relating to the provision of a Bass Strait speech link may thus be summarised. The Postmaster-General had stated five years previously that:—

"If present trials prove successful, it may be accepted that wireless telephone communication across the Strait will become accomplished fact in the near future."

According to Departmental requirements the tests were only reasonably successful and, despite great advances in radio technology, a continuous unimpeded radio-telephone service could not be guaranteed, even with the latest specifications from S.T.C. and A.W.A. Great advances in cable technology had provoked thoughts of providing a service by that means, but the cost was prohibitive and both Secretary Brown and his Minister still favoured the introduction of a wireless link.

BUSINESS PRESSURE AND POLITICS

Mr Black of "The Mercury" again pleaded the cause of the Hobart Chamber of Commerce, making representations to Senator Pearce, Vice President of the Executive Council. It was apparent that the intricacies of cable technology were not restricted to the engineering fraternity, as Black intimated that the Chamber was very anxious that another cable should be laid across the Strait and that it should be of the loaded type so that telephonic communication could be had with the mainland. Postmaster-General Gibson replied on behalf of the Senator emphasising that the enormous cost of such a project prompted the Department to investigate the possibility of a wireless telephone service. President of the Chamber, Walter H. Cummins, responded that even if the cable service were to cost £ 200,000, the expenditure was warranted, and inferred that the Commonwealth Government considered Tasmania as being in a different category from the other States and less deserving of adequate care — a charge to which Gibson took rightful exception:—

"I do not think it would be possible to sustain a charge against this Department concerning the treatment which is extended to the people of Tasmania. During the year 1924/25, the working expenses in respect of Post Office services rendered to the people of Tasmania were the third highest per 100 of the population compared with those of all other States, whereas the earnings were by far the lowest of any State in the Commonwealth. I think I have already given expression to the view that nothing would give me greater pleasure than to find it possible to establish a telephone service between Tasmania and the mainland — and I have not given up hope of inaugurating this service!"

The Postmaster-General's statistics could, nevertheless, do little to staunch the growing swell of public opinion. Tasmanians had conversed by telephone since 1883; the first trunk connection was made five years later and the major centres of Launceston and Hobart had been joined for the last twenty five years. Why, with all the latest advances, was it still impossible to speak across a stretch of water? Radio telegraphy had successfully bridged the gap more than twenty years previously! Why not radio telephone? It was done elsewhere — and over much greater distances; why not here? Why didn't the Government do something about it? Such sentiments were repeatedly echoed in the House by Tasmanian Members and although, in March 1927, they were assured that:—

Walter H. Cummins
(Courtesy Tasmaniana Library, State Library of Tasmania).

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"Consideration is being given to both alternatives" (i.e. cable and wireless), a foot-note to the paper on which that particular Hansard extract is recorded reads:—

"Please return file to Research Section so that a case may be prepared for the Radio Link."

It is clear that as far as the Department was concerned, radio was still the preferred option, and this was confirmed in a report published in November of that year by the Parliamentary Joint Committee of Public Accounts where mention of radio-telephony was abysmally brief:—

"The establishment of a radio telephone service would be most advantageous...The Postal authorities have been studying this question for some time, and the Committee has been assured that when the project is regarded as being feasible, it will be established."

The Launceston "Examiner" retorted caustically:—

"The official assurance reads rather like dope! Many years have elapsed since the first experiments were made, but in Australia we seem to be as far off anything practical as ever. It is possible to talk over the vast area of the Atlantic...Holland has talked with the Dutch East Indies. In view of such accomplishments it ought to be possible for the Commonwealth Postal Department to provide a similar facility across the couple of hundred miles across Bass Strait!"

There is little doubt that a radio-phone service could have been installed at the end of 1927, but it would not have measured up to the stringent requirements of the P.M.G.'s Department, and if, because of mounting criticism and political pressure, an inferior service had been installed and it was a failure, the political consequences for the Minister and the inevitable repercussions for his advisers can readily be visualised. Secretary Brown was not yet satisfied. The Minister, the honourable Members, the Press, and the public would have to wait!

Early in the following year S.T.C. produced a revised scheme for the establishment of a commercial short wave radio telephone and telegraph service between Melbourne and Launceston. They suggested that a 20KW set of equipment would meet all the Department's requirements and also provide additional channels for carrier wave telegraphy. The apparatus would operate on wave lengths from 45-90 metres. It was again admitted that local atmospheric conditions might arise when fading would be experienced over the transmission path, but a compensating device was offered to overcome such fluctuations in signal strength — at a cost of £3,000 per terminal. The total costs for the system were more than £65,000! Brown, nevertheless, ordered an investigation into the suitability of the 45-90 metre band width for propogation purposes, noting sombrely:—

"The cost of the proposed equipment is a heavy item to face and we must hope that further enquiries will result in a less costly quotation."

Experiments continued amid sniping attacks by the press and verbal assaults on the floor of the House, to which, on 11 September, the Postmaster-General replied:—

"The detailed technical requirements are being assembled in order that tenders for the equipment necessary to establish a telephone service may be invited. It is a subject receiving the most earnest consideration and no effort will be spared to bring about a realisation of this desire at the earliest possible date."

The assembly of requirements took, perhaps, a little longer than might have been anticipated. Christmas passed; the New Year arrived. The year — 1929!

"IT WILL BE A RADIO LINK"

The specification was prepared by S.H. Witt who may be regarded as the "founding father" of the P.M.G.'s Research Department and on 1 February, 1929, Director General Brown informed the Minister of his recommendations. In order to improve telephone and telegraph communication for Tasmanians, it had been decided to establish a wireless telephone service across Bass Strait. It was hoped that it would be possible to procure apparatus which would provide a telephone service capable of being linked up with the whole Commonwealth network and which would also derive a separate channel of such quality that broadcasting programmes might be relayed across the Strait for local transmission. It was also hoped that a supplementary telegraph service to that available by existing cables would be secured. It was hoped that commercial service would be established within twelve or fifteen months.

Specification No. R1, issued on 15 February, was a statement of the Department's requirements. It was remarkably comprehensive, embodying the latest techniques, suggesting to prospective tenderers how the job might be done and inviting them to supply the equipment to achieve the object. The Deputy Directors in Victoria and Tasmania were provided with details of the plan which was to involve their States so intimately. Witt's letters disclosed that the system would provide two channels; one for regular trunk line telephone traffic and the second for the exchange of broadcast programme material between Tasmania and the mainland. The programme channel would be suitable for picture transmission, enabling the extension of that service to the island state at some future date. It was also the intention to purchase a voice frequency carrier telegraph system of about six channels and, with it, to carry out experiments over the programme channel, having in view the provision of an emergency telegraph service for use in the event of a cable failure. Implementation of the scheme would therefore require

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the selection of four sites to accommodate sending and receiving stations in both Tasmania and Victoria. Indications of suitable localities had been provided by the 1921 experiments and it was suggested that the following areas be investigated:—

For the Victorian sending station, in the vicinity of Cranbourne;

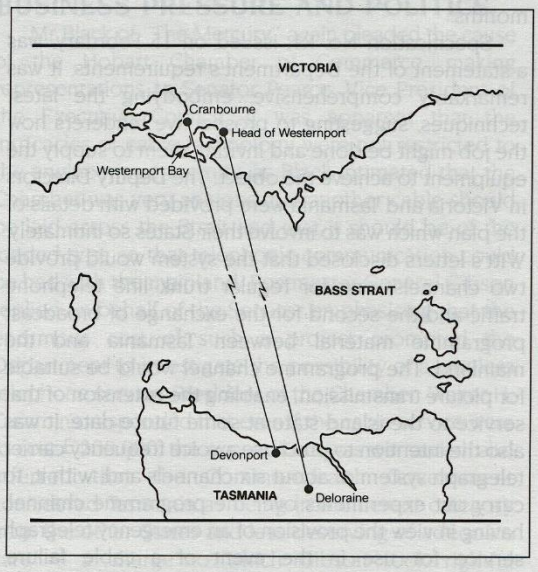
For the Victorian receiving station, near the head of Westernport;

For the Tasmanian sending station, between Deloraine and the northern coast;

For the Tasmanian receiving station, as close as possible to the coast between Burnie and Devonport.

The survey and selection of possible sites in Tasmania was performed by Equipment Engineer Eric Bowden and Line Inspector F.T. Smith. Their task was not an easy one as many points had to be borne in mind. The sites had to be elevated, surrounded by undulating country and free from houses and thick scrub. They had to be near the main trunk telephone and electricity supply routes and should have a natural water supply for valve cooling purposes. Proximity to a railway siding would be advantageous. The strictest confidence had to be maintained and no information given as for what purpose the sites were required, so, while ostensibly seeking information as to the location of certain telephone subscribers, the duo tramped the northern countryside and within a commendably short time had fixed upon two locations which seemed to be ideal for their respective roles. The transmitting site was located 1 1/2 miles from Deloraine and the receiver was to be four miles from Devonport.

Eric Bowden's report was but one document which received close scrutiny during the following months,



Suggested Radio Sites 1929.

because, in response to the Department's "invitation to tender", no less than fifteen schemes for providing the radio link were received from major manufacturers. Analysis and comparison continued endlessly. The Director-General no doubt viewed with pleasure his prospective visit to Hobart for the opening of the city's new automatic exchange, but after successfully launching the new facility, he immediately came under pressure from the proponents of the Bass Strait link. Brown sympathised with his impatient questioners but could do no more than truthfully inform them that a wireless telephone service would be installed when all tenders had been evaluated. For Tasmanians, it was a frustrating response, but then their hopes were uplifted. As a result of the General Election in that same month, the Scullin government came to power and the Tasmanian Member for Wilmot, Mr J.A. Lyons was allocated the portfolio of Postmaster-General. The reaction of the average citizen was predictable. A Tasmanian was now in control of telegraph and telephone affairs. Now there would be some progress!

Tasmanian Engineer Eric Bowden.

FURTHER THOUGHTS ON CABLE

"The Mercury" was quick off the mark in again pressing the Tasmanian cause. On 25 October 1929, General Manager Cummins wrote to Joe Lyons congratulating him on his appointment and then pointed out how badly the State was served by the existing telegraph cables.

"There are still occasions when our press messages are subjected to exasperating delays. This is because the cables are obsolete and cannot carry the traffic at anything like high speed. A wireless telephone would overcome that. The late government promised to install this, but so far it has not been done."

One might interpret Cummins' letter as a plea for improved facilities for his newspaper rather than for the

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Postmaster General J.A. Lyons

people of Tasmania, but Lyons realised that he had to do something about it. His political experience had no doubt inculcated a healthy respect for the power of the press and he was now in the "hot seat." A full report on the matter was called for and Sidney Witt provided the details. Telephone, radio broadcast and additional telegraph facilities could be provided by either a submarine cable or by wireless telephony. Cable offered the most satisfactory way of providing the desired services, but the cost would be extremely high. A radio telephone system would cost about half as much and could be expected to give a service for about eighteen hours a day, but it could be badly disrupted by atmospheric disturbances. In view of the lower cost it had been decided to proceed with a radio method. Tenders were being evaluated and it was thought that a service should be in operation within sixteen months.

The implications of Witt's report were discussed at length with the Postmaster-General, and Brown's record of the proceedings showed a significant change of thought:—

> "It was agreed that before proceeding further, the whole matter should be reviewed in order to determine whether it would not be better to provide a submarine cable, bearing in mind the recent great developments in submarine cable design."

Lyons faced the same dilema as his predecessor. He could authorise the installation of the radio telephone system with its acknowledged limitations, but it could not be provided for a lengthy period during which he would have to fend off persistent enquiries. It was, perhaps, politically expedient that while evaluation of radio tenders proceeded, he be seen to be examining the possibility of a submarine cable, which although much more costly, would provide a vastly superior service. It is suggested that he was persuaded by the arguments of his Director-General, who, at the end of November 1929, sought advice from the Chief Engineer of the British Post Office. Progress in the design of submarine cables had progressed rapidly with the introduction of continuous loading, the use of repeaters and the discovery of superior insulating materials. The modern cable was not subject to fading, it could guarantee secrecy and it did give an all round the clock service. Despite the expense, it was a possibility that had to be explored, and it is evident that provision of a service by cable was receiving considered attention at high level, as in December 1929, it was announced in the House, that:—

> "In view of substantial improvements which have recently taken place in the design of submarine telephone cables, further investigations are being pursued so that the relative merits of the two systems may be determined."

Based upon information supplied by Sir Thomas Purves of the British Post Office, Chief Engineer Crawford reported that the freighting and laying of some 220 nautical miles of suitable cable with the associated costs of repeater stations and terminal equipment would entail an outlay of 230,500! It was probable that a route from Lorne on the Victorian coast to Stanley in north-west Tasmania offered the best possible conditions for safe landing points, a sandy sea bed and freedom from fast running tides. A second possibility was to run a cable from the mainland to King Island and thence to Tasmania. This was a slightly longer route, but it would enable a repeating station to be placed on the island — which would considerably reduce the size of conductors in the cable and thus the expense — and it would provide telephone communication for the islanders. It would also facilitate the use of carrier systems in the cable thereby increasing its carrying capacity. Installation costs, running expenses, the advantages and disadvantages of the two systems — radio and cable — were scrutinised most minutely. The most attractive aspect of the radio link was its comparatively low cost. The provision of a submarine cable, though more costly, would give more satisfactory service and was cheaper on an annual cost basis. Crawford definitely favoured communication by cable, but as he pointed out:—

> "the scheme adopted might be dictated by severe financial restraints due to the depression period."

During April and May of 1930, Tasmanian Senator Herbert Hays continued pressure on the Postmaster-General and, as predicted by Crawford, the reply he received was not encouraging:—

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"Investigations are being continued into the technical merits of wireless and cable services, particularly in relation to the somewhat remarkable developments which have taken place in the manufacture of submarine cables for telephonic purposes. It has to be recognised, however, that in existing economic circumstances, there is unfortunately no option but to defer the projected scheme, which is one of considerable magnitude, for the time being."

The reaction by "The Mercury" was both swift and predictable:—

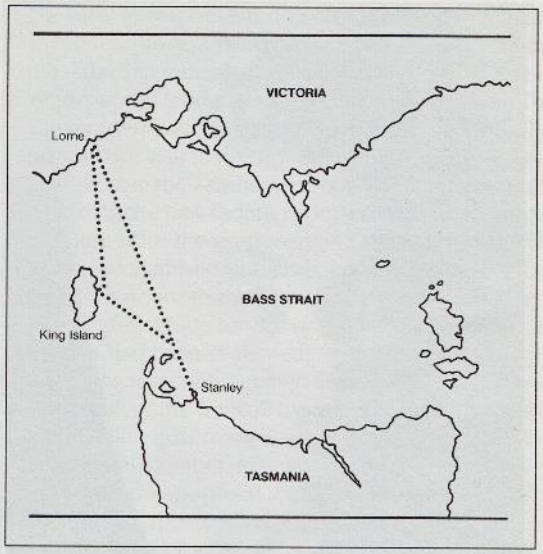
"The new Postmaster-General in his first annual report printed March 27, 1930, announced — no doubt with some pride — the advances in long distance telephone services which his department was carrying out between Sydney and Brisbane, Sydney and Melbourne, and Adelaide and Perth, and he finished up by informing us, "Tenders have been called for the provision of a wireless telephone link between Tasmania and the mainland with the object of providing full intercommunication between the two telephone systems." Excellent! And now, six weeks later, it is announced from Canberra, 'The Federal Ministry has decided not to proceed with the scheme to establish telephonic communication between Tasmania and the mainland." Of course, that sort of thing is chronic — we have learned by experience, to expect it. It helps to fill the cup!"

ABOUT FACE — AND YET AGAIN!

It was an understandable point of view but the scheme was not dead; it was simply deferred until a better economic climate permitted the Government to adopt a suitable system — a course to which it was committed. With emphasis on further exploration of cable possibilities, plans were formulated on 30 May for engineers Durant and O'Reilly of Crawford's staff to visit King Island to inspect possible cable landing sites and determine overland pole routes. But the significant event of that day was a conference between Brown and his senior colleagues who were jointly to recommend a definite course of action. All aspects of cable and radio schemes were examined and three were eventually selected for final comparison:—

(a) A submarine telephone cable of approximately 180 nautical miles length, with King Island as an intermediate point on which a repeater station would be located. The cable would have three screened pairs of conductors and would provide five telephone channels and four to six telegraph channels if desired;

(b) A radio telephone system using short wave directive transmission providing five telephone channels, at least one of which would be suitable for programme transmission;



Suggested Cable Routes 1930.

(c) A radio telephone system of one single channel capable of use either as a trunk line or a programme channel.

Capital and Annual charges were estimated as follows:—

	Capital Cost £	Annual £
Scheme A — 5 channels cable	196,000	24,110
Scheme B — 5 channels radio	321,600	72,233
Scheme C — 1 channel radio	57,700	19,307

Scheme B was eliminated immediately since both its capital and annual charges were higher than those of a cable. An examination of the record of interruptions to the existing telegraph cables showed that they suffered one interruption in 3 to 4 years and that the duration of the interruption was approximately 2 weeks. A new submarine cable would increase the submarine group and the chance of total interruption of communication would be considerably reduced. The chance of severance of telephonic communication would, however, still be of the order of one interruption in 3 to 4 years. It did not seem justifiable, therefore, to instal a radio system such as scheme "C" merely for use about two weeks every 3 1/2 years. Scheme "C", the single radio channel, was estimated on the basis of using the Victorian end as a short wave radio broadcasting station for programme service to other States when not required for Tasmanian service. It had not been possible, however, to find any other use

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whatever for the Tasmanian terminal of the link. It was therefore exclusively chargeable to reserve service in case of cable failure and would not be installed because of such small justification.

The Director-General decided that, having reviewed all aspects of such a complex problem, submarine telephone cable was the proper scheme to adopt. It was agreed that a specification of requirements be drawn up for the purpose of calling for tenders, and that the provision of continuously loaded cable be encouraged so as to permit the use of carrier systems.

The cable recommendation, from a highly professional group of engineers, was passed on to the Postmaster-General in a memorandum dated 3 June 1930, and two days later, Mr Lyons announced to the House that the Tasmania — mainland telephone service was to go ahead — by means of a wireless telephone system! It was a political solution to an aggravating problem. Ignoring professional advice, Lyons was saying in simple language, "Yes, Tasmania, you can have a radio-telephone system. It will not be perfect but it will serve as a stop-gap measure until we can give you a cable. We can then use the radio apparatus for broadcasting, so it's not a waste of money."

All activity associated with a cable service was stopped as energies were channelled into the preparation of a case for the radio project to be submitted to the Parliamentary Public Works Committee. In response to the Minister's request for information as to when the project might be completed, Crawford could give little comfort. Taking of evidence by the Committee, invitation and evaluation of tenders — assuming Committee and Parliamentary approval — delivery, installation and testing of equipment may not enable completion of the project until May 1932!

Brown discussed the problem with the Minister and no doubt emphasised the possible completion date — two years hence! The substance of that conversation may never be known, but it is suggested that because of the inevitable delay, the Director-General again stressed the claim of superior cable technology. There could be an economic change for the better and might it not be politically desirable to have both radio and cable proposals examined by the Public Works Committee? Parliament would, after all, act upon the Committee's recommendation. Whatever transpired during that interview is illuminated by a scrawled note in Brown's handwriting at the foot of the minute:—

"Discussed with Mr. Lyons. Pursue with preparation of both cable and radio schemes."

Alan Tulip, graduated and diplomate of the University of Durham, served for nine years as a Royal Air Force Instructor and then taught and adminstered a group of schools in Central Africa. Persuaded by an ex-service colleague to settle in Tasmania, he soon decided that a change from teaching was desirable and joined the P.M.G. Department in 1971. He became Tasmanian Historical Officer two years later and has, since then, been happily researching and writing, and administering the Hobart Postal and Telecommunications Museum.

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Seas No Longer Divide

PART 3

A. Tulip

The final of three articles outlining the history of attempts to provide telephonic communications between Tasmania and the Mainland States.

CABLE VERSUS RADIO

Guided by Director-General Harry Brown, the finalisation of details for the bridging of Bass Strait by either a submarine telephone cable or a radio telephone link proceeded apace. The time was fast approaching when the Department's proposals would be presented in the House by the Postmaster-General and they had to be right. Officers of Brown's staff were to visit King Island to examine possible cable landing sites and consider overland transmission routes, and a mass of detail was requested from Superintending Engineer Braithwaite of Hobart. Many of those urgent queries could not be answered until Braithwaite had visited Circular Head - and the response was required in eight days! Undaunted by the task, the Tasmanian engineer departed with all speed for the far north-west, carried out a detailed inspection and submitted his report by 4 July 1930 - one day late, but under the circumstances, a highly commendable piece of work.

Accompanied by representatives of the local seafaring fraternity, all possible landing sites were considered and Perkins Bay was finally recommended. Running into the bay, the sea bed was free from obstacles, a cable steamer could safely approach the shore, the beach was of hard sand up to the high water mark and a suitable site for a repeater building was close at hand.

A pole line and road from Stanley Post Office were within reasonable proximity and could easily be extended to the proposed repeater station. Electric power was to be extended from Wynyard to Stanley within six months and could be extended to Perkins Bay if required. There were problems with the existing transmission route from Stanley to Hobart via Burnie, Deloraine and Launceston, but suggestions were offered and costs were estimated. Problems existed on the Victorian side of the project, but a discernible cable scheme gradually emerged.

The radio telephone proposal received equally detailed examination. Estimates were requested for the purchase of sites and the erection of transmitter and receiver buildings in both Victoria and Tasmania; staff cottages were to be provided; equipment had to be accommodated. No detail was to be overlooked before

Captain Richard Legget of Stanley (Left) — Braithwaite's Principal Authority at Circular Head

the proposals were aired before Parliament and the scrutineers of the Works Committee. Traffic studies were undertaken, estimates of revenue from both schemes were prepared and costs were examined most minutely, but by the end of July all were completed. On 5 August 1930, Assistant Minister Beasley, on behalf of Mr Lyons, in the House of Representatives moved that:-

> 'In accordance with the provisions of the Commonwealth Public Works Committee Act, the following proposed work be referred to the Parliamentary Committee on Public Works for investigation and report:- Establishment of telephone communication between the mainland (Victoria) and Tasmania.'

Full details of both proposals were then outlined before the Members of the House. The advantages and disadvantages of both were displayed before a critical audience. The radio telephone project was cheaper but it would give only limited service; a submarine telephone cable would guarantee a twenty-four hour service but it was vastly more expensive. The document presented by Mr Beasley stated the truth. It had been compiled by teams of engineers who, being fully aware of the technicalities, could only conclude that cable was the logical answer and the document was definitely biased in favour of that method. Such bias was not

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missed by many Members who voiced their disapproval on that account and condemned the proposal accordingly. Others stated quite bluntly that, as the Commonwealth's finances were in such disarray because of the depression period, this was not the time to be airing expensive proposals of any kind. Many remembered the whirlwind advances in radio science over recent years and inclined towards that method. It was left to the Tasmanian members for Denison and Franklin to enumerate the many disadvantages suffered by the State because of the lack of an interstate telephone link. As they pointed out, the Honourable Members were not experts in the telecommunications field and it was strongly suggested that the whole matter be left to the Public Works Committee who would further consult with such experts and report their decision to Parliament. The final word was left to the Assistant Minister:

> 'The investigation of this matter can be safely entrusted to that Committee. It will collect all the facts that are available, and may bring to light a good deal of information that is not now in the possession of the Right Honourable Members who have seen fit to oppose it. The committee can be depended upon to arrive at an impartial decision. I am satisfied that the time is not far distant when the requirements of Tasmania in this direction will be met. Those who vote against the motion will be acting against the best interests of that State.'

The motion was then put to the House and as the official record briefly reports, "Question resolved in the affirmative". The matter was to be resolved by the Parliamentary Public Works Committee.

DECISIONS, DELAYS AND THE "TELEPHONE COMMITTEE"

The committee's task was two-fold. In the first instance the members were required to determine if a telephone service was really justified in view of the heavy expenditure which would be involved and secondly, if the service was to be provided they were to recommend the method of provision - submarine cable or radio. Investigations commenced in Canberra on 12 November, 1930 and, during ensuing months, continued in Sydney, Melbourne, Hobart, Launceston, Stanley and Burnie. The viewpoint and opinions of a broad spectrum of the general public and business world soon convinced the committee that some kind of service was highly desirable. There was a sense of isolation from both family members and friends, and the Tasmanian business man was certainly handicapped by being unable to contact promptly his mainland agents or customers. So a telephone service was certainly justified, but how should it be provided? The answer to that problem could only be derived from the evidence of the "experts" in cable technology and radio telephony - the evidence of Director General of the PMG Department, H.P. Brown, and that of Ernest Fisk, Managing Director, Amalgamated Wireless Australasia. Both men openly and honestly pleaded the cause of their respective technologies and patiently elucidated the multitude of questions from probing committee members. Fisk stressed the relative cheapness of a radio service and high-lighted the rapid advance of the newest science; Brown acknowledged the greater cost of a submarine cable but pointed out the greater efficiency of cable telephony and the greater income which would eventually be derived. He appeared before the committee on three occasions and was adamant that a cable would provide the only satisfactory answer to the problem.

He was quite aware of the financial implications and did not advocate going ahead with the work immediately. As he pointed out, Tasmania had done without a service for a long time:

> 'Better to wait until a cable service can be provided rather than have a radio service now.'

The final evidence was taken on 20 March 1931 and, after due deliberation, the committee's recommendations were presented to Parliament. In brief, it was resolved that:-

> 'Tasmania is entitled to enjoy the same telephone facilities as the other States and that when funds can be conveniently made available, the committee is unanimous in recommending that a submarine telephone cable be laid from Lorne, via King Island to Stanley....'

Ten years of experiment and deliberation had preceded the decision but lack of money prevented further action - and that situation was to continue for a lengthy period. But a cable had been sanctioned and Brown directed his energies into ensuring that the best possible cable should be provided. Some six months earlier he had expressed interest in a telephone cable which had been laid between Key West (Florida) and Havana (Cuba), and ensuing dialogue with Western Electric Company (Australia) was to have a profound effect upon the Department's thoughts about the construction of the Tasmania - Victoria cable. The Key West cable was made up of a single conductor insulated with a relatively new compound named paragutta. It was then enclosed with copper tapes which formed the return portion of the circuit. Channels were provided by carrier wave. The Department considered that three pairs of conductors might possibly give greater flexibility than a single core cable and Brown requested details of Western Electric's preference for single core.

The matter was fully investigated by the Bell Telephone Laboratories who recommended a cable of the same type as the Key West - Havana, and pointed out that, because of a proposed repeater station on the King Island route, a considerably smaller, and thus less expensive cable could be used. It was also stressed that the Key West cable was proving capable of furnishing more circuits than was originally contemplated!

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These pronouncements obviously provided the Director-General and his team with much food for thought, but they had ample time for deliberation. The financial situation was still gloomy; the King and Flinders Island settlers squabbled about claims for a cable to traverse their respective shores, while the vexed question, "When can we have our cable?" was repeatedly asked, only to receive the same frustrating response, "When it can be afforded." Not even Tasmanian Joe Lyons, who became Prime Minister in January 1932, could do anything to help. By the end of the year, Federal finances showed a small surplus, but Lyons had many more immediate matters of urgency to consider before thinking of his native State's telecommunication problems.

Early in the following year an organisation was formed with the object of applying pressure for the laying of the cable. "The Bass Strait Telephone Committee" was a strong pressure group which boasted members from the field of politics, the legal profession, tourism, the complete spectrum of Tasmanian business and the general public. Groups were formed on a state-wide basis and their persistent clamour was widely reported in the Press. Postmaster-General Parkhill and the Prime Minister, mindful of the upturn in the Federal economy, must have realised the dangers of further prevarication. In answer to "that question" Parkhill replied on 21 March, 1933 -

> 'Financial difficulties preclude the Government from undertaking the expenditure this year, but it will be considered in connection with the Estimates for the next financial year.'

The announcement triggered a further spurt of activity. It seemed that funds might be available in the near future and Harry Brown further exhorted his colleagues:-

> '..it is important that all preliminary steps be taken so that the Department is able to go forward with full recommendations at short notice.'

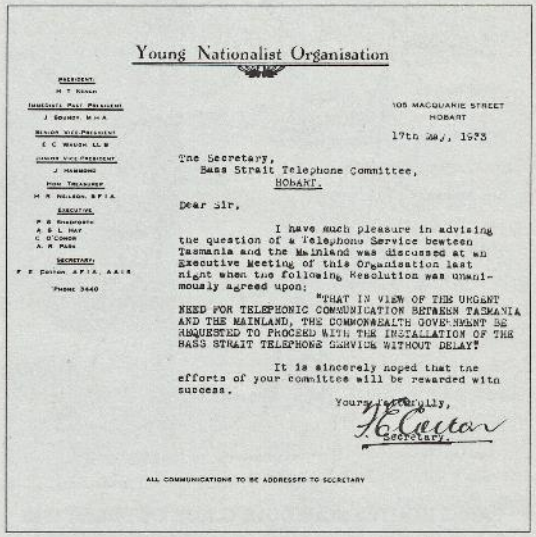
The Telephone Committee, far from being appeased by the promise of "consideration" stepped up their pressure! The support of every organisation of consequence in the State was sought to a resolution which read:-

> 'That in view of the urgent need for telephone communication between Tasmania and the Mainland, the Commonwealth Government be requested to proceed with the installation of the Bass Strait Telephone Service without delay.'

An avalanche of positive responses duly reached the desk of the Postmaster-General. Their message was clear. Such a depth of feeling could no longer be denied!

Members of the new Cabinet were reassured of the superiority of the cable service and, on 5 October 1933, Tasmanians noted, no doubt with great satisfaction, one simple sentence in a "Mercury" report on Federal expenditure approvals:-

> 'An amount of 180,000 is put down for a cable across the Strait.'



Young Nationalist Organisation

105 MACQUARIE STREET
HOBART

19th May, 1933

The Secretary,
Bass Strait Telephone Committee,
HOBART.

Dear Sir,

I have much pleasure in advising the question of a Telephone Service bewteen Tasmania and the Mainland was discussed at an Executive Meeting of this Organisation last night when the following Resolution was unanimously agreed upon:

"THAT IN VIEW OF THE URGENT NEED FOR TELEPHONIC COMMUNICATION BETWEEN TASMANIA AND THE MAINLAND, THE COMMONWEALTH GOVERNMENT BE REQUESTED TO PROCEED WITH THE INSTALLATION OF THE BASS STRAIT TELEPHONE SERVICE WITHOUT DELAY!

It is sincerely hoped that the efforts of your committee will be rewarded with success.

Yours faithfully,

Secretary.

ALL COMMUNICATIONS TO BE ADDRESSED TO SECRETARY

A Typical Response to the Telephone Committee Resolution

CABLE SPECIFICATIONS AND EVALUATION

The green light was signalled and the outcome of thorough Departmental planning was shown when, one week later, tenders were invited for the supply of:-

> 'Submarine Cable and Associated Equipment to provide telephone and telegraph channels between the Mainland of Australia and the Island of Tasmania.'

All aspects of the cable proposal were outlined in Schedule No. C.1086 and its accompanying specifications. Alternative cable routes were suggested, and broadcast, telephone and telegraph channel requirements to the year 1940 were clearly delineated. The Schedule sketched out the project, suggested ways of doing the job, specified exacting standards, but invited the most modern innovations so long as the cost was not prohibitive.

The best "deal" was required - within budget limits!

Of the three routes suggested (see map), Cable Route "A" was that suggested by the Parliamentary Works Committee. It would enable a repeater station to be built on King Island and would provide telephone service to the islanders. Route "B" direct from Lorne to Stanley was shorter - and therefore cheaper, while Route "C" from Waratah Bay to Low Head, was even shorter. The latter closely followed the path of the East Telegraph Cable which had given little trouble since it was laid 25 years earlier.

The closing date for tenders was 13 March 1934, and while the manufacturing giants were left to plan their proposals for the ultimate designs in cable and terminal equipment, thoughts were urgently directed to a multitude of tasks which must be undertaken on

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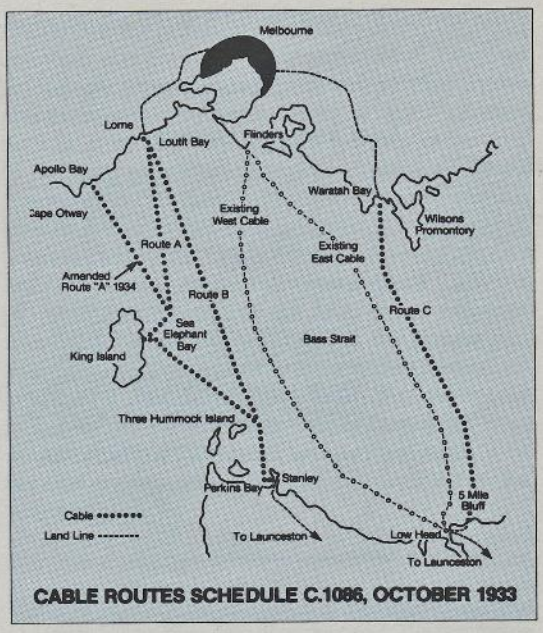


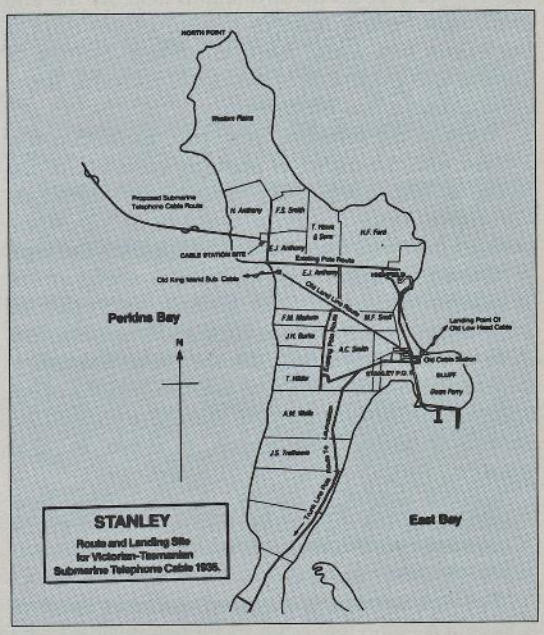
Cable Routes Schedule C.1086 *October*, 1933

both sides of the Strait. The cable would provide high quality channels across the sea bed, but equally efficient land-line trunk networks would be necessary to conduct successful conversations from terminating points to and from the respective State capitals in Victoria and Tasmania. Extensive upgrading and renovation of land lines would be necessary whatever cable route was selected, but all had to be costed beforehand.

Further surveys of the sea bed were carried out along the King Island route and Superintending Engineer Braithwaite was required to produce a plan of the Perkins Bay area showing the proposed landing point. The pressure was undoubtedly on but there is no evidence of any major set-back. There was a slight delay in the planning and preparation of tenders when it became necessary to modify the suggested cable Route "A". The northern section of the cable had to be shortened to make it compatible with the length of its southern counterpart, and after urgent consultation, all potential tenderers were informed that a further alternative route was available with Apollo Bay as the mainland point of contact.

No less than twenty-nine schemes were offered by seven manufacturers, but many were quickly discarded on grounds of expense or failure to meet the Department's exacting standards. The evaluation of tenders was a lengthy process but negotiations were finalised in August 1934 when a joint contract was awarded to Siemens Bros and S.T.C. The total value of the Siemens cable, including the charge for laying it across Bass Strait, was £127,504. S.T.C's equipment totalled £77,227 and was guaranteed to provide on the cable:-

> 'One broadcasting channel, Melbourne to Hobart, with Launceston intermediate - all stations capable of originating a programme. Three telephone channels with terminals at Melbourne and Launceston.
>
> One telephone channel with terminals at Apollo Bay and Stanley, with King Island as an intermediate station.
>
> Five telegraph channels which could, when necessary, be superimposed over one of the three telephone channels.'



Stanley Cable Route and Landing Site

CABLE AND EQUIPMENT

The announcement of the acceptance of tenders produced the first request for a telephone call via the new facility. The cable was not yet constructed nor the terminating equipment assembled -yet a booking list was already commenced. That minor event perhaps served as a reminder of the tasks which had still to be undertaken before the cable-laying operation was finished, and, according to the contract provisions, that date was only fifteen months ahead! The Deputy Directors in Hobart and Melbourne quickly became aware of the parts they would play in the implementation of the grandiose scheme. The cable would be laid from Apollo Bay to a repeater station at Naracoopa on the east coast of King Island and thence to Perkins Bay, Stanley. It would consist of a central conductor weighing 500 lbs per nautical mile with paragutta insulation of 670 lbs per naut., and a concentric return of five copper tapes weighing in all 840 lbs per naut. - all to be enclosed within steel armouring wire. S.T.C's equipment consisted essentially of:-

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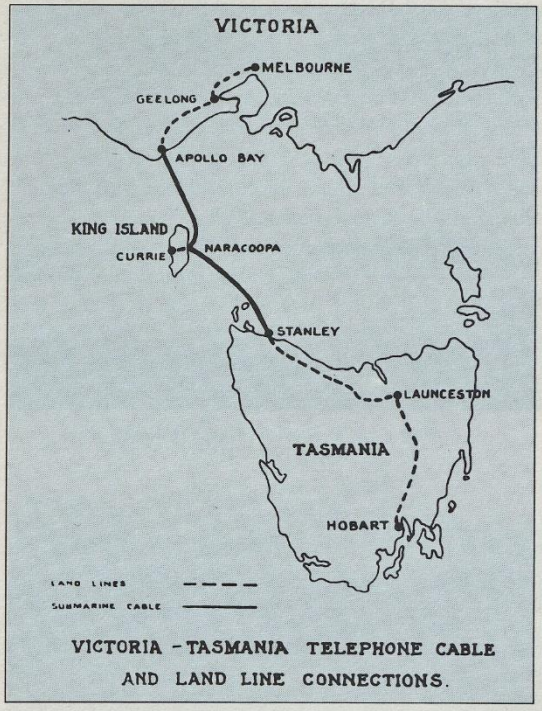


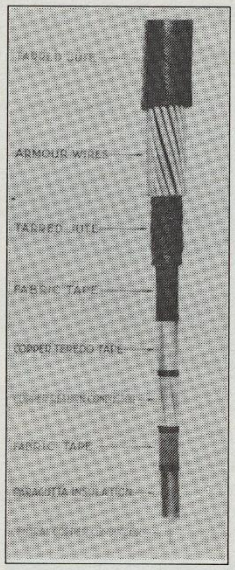
Vic-Tas Telephone Cable Route and Land Line Connection

(a) a 3-channel carrier telephone system between Melbourne and Apollo Bay;
(b) a 6-channel carrier system on the cable with a repeater station at King Island;
(c) a 3-channel carrier system between Stanley and Launceston;
(d) a broadcasting programme transmission channel operating between Melbourne, Launceston and Hobart with repeaters at Apollo Bay, King Island and Stanley

and

(e) a voice frequency carrier telegraph system with terminals at Melbourne and Launceston, and the necessary equipment for providing two composite telegraph circuits between Launceston and Hobart.

The contractors would lay the cable and install terminal and repeater equipment at respective stations, but the Department was committed to supply labour for an ominously long list of supporting tasks. Repeater houses and staff residences must be built; concrete foundations for machines and plant were required; lighting, heating and other building services were essential. Power plant, fuse panels, battery supply, test boards, distributing frames, filter and transformer racks, cable runways and wiring - all were to be provided by the expenditure of thousands of manhours of work. A massive operation was under way. The cable was to be laid and tested by 30 November, 1935 and all equipment was to be installed sixteen weeks thereafter.



Structure of a Sub-Telephone Cable

By mid-January, 1935, Director-General Brown received a specimen of the cable with a reassuring report from Siemens Bros. that:-

> 'both the progress in manufacture and the electrical characteristics are fully up to expectations.'

There was obviously to be no delay in delivery of the cable and S.T.C's equipment, but in the following month, it seemed that the buildings at Apollo Bay, Naracoopa and Stanley would not be ready for the necessary installation work. If equipment could not be accommodated, testing could not be done. The project would not be completed on schedule and the contractors would not be to blame! Spurs were judiciously applied in certain quarters and the construction work proceeded with urgency. Superintending Engineer Braithwaite was short of both staff and equipment, a situation which was promptly alleviated by timely assistance from his Chief in Melbourne. The work-load, which a few months earlier had looked so formidable, was steadily whittled away and as the land based problems were steadily solved, the longest submarine telephone cable in the world commenced its journey - heading "down under".

THE SUBMARINE LINK

The cable, weighing 1,395 tons was loaded into the specially designed cable ship "Faraday" opposite Siemens factory on the river Thames, and the ship arrived at Melbourne on the 26th October. Having replenished her stores and oil fuel, the "Faraday" commenced laying operations three days later. Detailed accounts of the operation have been produced in a wide variety of documents (see references) and therefore only a summary of essential features are given in this narrative. On paper, the plan of action appeared relatively simple. The programme was to lay the northern section - Apollo Bay to Naracoopa - in two parts, paying out cable from the shore towards the centre and making a splice about half-way. The southern section - Naracoopa to Stanley - would be laid in like fashion. Reference has already been made to the weights of the core constituents, and when the extra weight of armouring wires is considered, the cable could truly be described as "massive". There was, therefore, no question of man-handling the cable ashore and, as neither tugs nor lighters were available,

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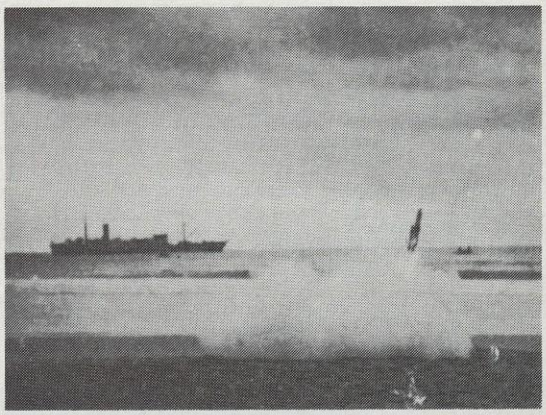
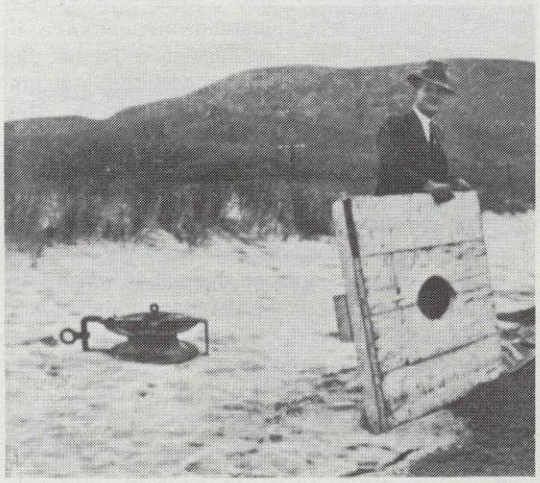
Attempting to land the Cable Shore end in heavy surf — Apollo Bay, 1935.

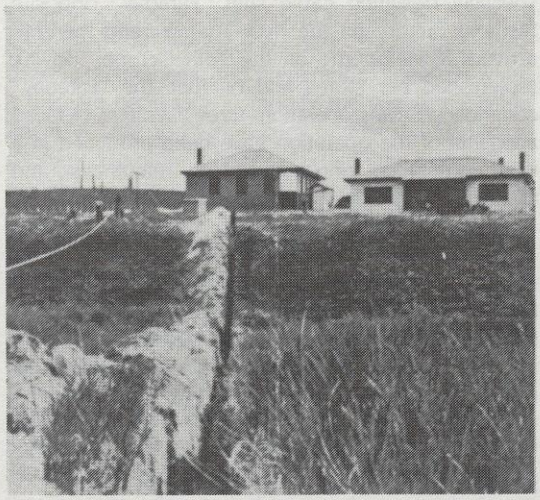


Sending a line to Faraday's Cutter by Rocket — Apollo Bay, 1935.

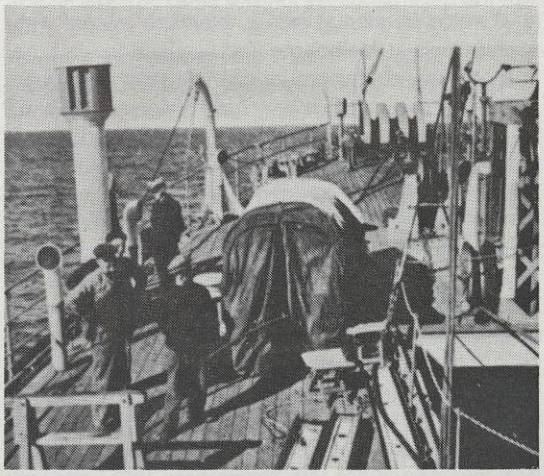


Sand Anchor Equipment

The Cable "Floated" Ashore — Apollo Bay, 1935.



The Cable Hauled Ashore at Naracoopa.



Cable Jointer's Tent on Board "Faraday".

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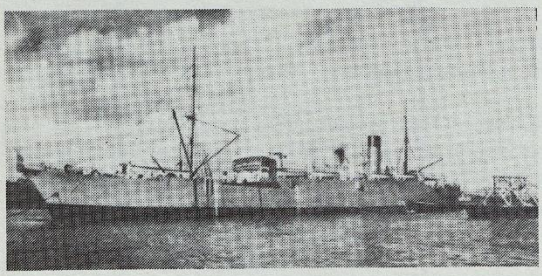
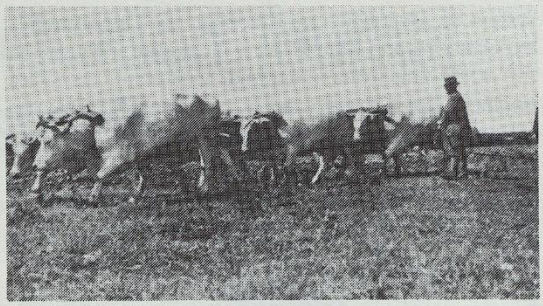
the ship's own hauling gear was used to land the shore ends. Landing lines were first connected by means of rockets - boats could not proceed to the shore at Apollo Bay because of heavy surf - a four inch manila rope was then dragged ashore followed by the cable which was "floated" by means of empty watertight steel barrels. By 10.30 pm on 5th November, the Victorian end of the Bass Strait cable had been connected in the repeater station. All the barrels were then cut away, collected and returned to the ship.



"Faraday" Loading Cable 1935.

The following morning, a course was set for King Island, and at the half-way point, the cable was cut and buoyed. The shore end was connected at Naracoopa and cable payed out on the reverse course until the buoyed end of the northern half was reached. Both ends of the northern section were then securely jointed on board "Faraday" and the spliced cable was slipped into 50 fathoms of water on November 11th.

The section from Naracoopa to Stanley was successfully laid using similar procedures but it must not be assumed that the operation was completed without difficulties. The project had been planned to coincide with the period when favourable weather conditions might be expected, but Bass Strait again lived up to its treacherous reputation. Gales blew up unexpectedly, flotation drums broke adrift, boats were overturned in heavy surf and shore parties spent uncomfortable nights on land because they could not be re-embarked. Every possible opportunity was taken of pushing ahead as the storms abated - even to the extent of working by moonlight and floodlight. On 25 November, the cable was brought ashore at Stanley and the southern splice was successfully made. On Tuesday the 26th, a 600 yard length which had been hauled to the beach by a bullock team, was jointed to the southern section, thus completing the connection from Stanley repeater station to Apollo Bay via King Island. Notwithstanding that about half the available time had been spent in waiting for suitable weather, the work was finished four days before the contract date of completion.



Hauling Cable by "Bullock Power", Stanley 1935.
(Courtesy Mrs. Irene De Jonge)

TESTING AND TRIUMPH

The cable was laid and the long-promised voice link with the outside world drew even closer:-

> 'But it will not be just yet,' cautioned "The Mercury'. 'Terminal land line carrier and repeater equipment has also to be installed at Launceston and carrier equipment at Hobart before the cable can be brought into use. The testing of the cable upon completion of laying operations and the large amount of installation work to be done in connection with the complex equipment will probably occupy some months.'

And so it proved to be. A vast amount of money was being expended upon a truly imaginative engineering project, and it was therefore imperative for exhaustive tests to be applied by Departmental officers before final acceptance of the system. At each landing of the cable and at each splice, cable characteristics were examined most minutely and checking was carried on continuously throughout a thirty day guarantee period. All was well; the cable's performance satisfied all concerned with the venture. S.T.C's equipment for the various stations arrived steadily and was distributed with all haste as the system gradually approached completion.

The commissioning of the service would undoubtedly be a noteworthy event. The longest submarine telephone cable in the world was to begin operating; a new era in radio broadcasting was to commence for Tasmanians and they could at last speak to the mainland - and, if desired, to countries far beyond Australian shores. The occasion was celebrated at a banquet held in Hadley's Orient Hotel in Hobart on 25th March, 1936. Prime Minister Lyons, broadcasting from Albury, declared the new service to be open, and at 9.25pm, a number of courtesy calls were made from a hotel room especially prepared for that purpose. Overseas reception was good; as "The Mercury" reported:-

> 'Reception was fully as good as that from another part of the city.'

Ninety one calls were booked over the circuits between Tasmania and the mainland on opening night and two hundred reservations were made for the following day. It is a matter of record that within the five ensuing months, 30,000 calls were made over the

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system - a total which far exceeded the Department's expectations and which clearly illustrated the value of the voice link from a national viewpoint. As Chief Engineer J.M. Crawford aptly commented, "Seas no longer divide."

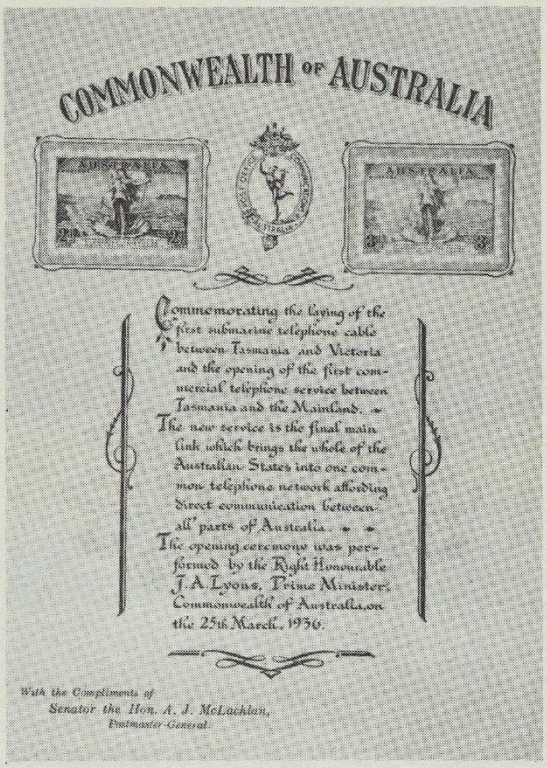

COMMONWEALTH of AUSTRALIA.

DINNER

CELEBRATING the INAUGURATION of the SUBMARINE CABLE - - - - - - TELEPHONE SERVICE between TASMANIA and the MAINLAND OF AUSTRALIA.

HADLEYS HOTEL

Hobart, 25th March, 1936.



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Alan Tulip, graduated and diplomate of the University of Durham, served for nine years as a Royal Air Force Instructor and then taught and adminstered a group of schools in Central Africa. Persuaded by an ex-service colleague to settle in Tasmania, he soon decided that a change from teaching was desirable and joined the P.M.G. Department in 1971. He became Tasmanian Historical Officer two years later and has, since then, been happily researching and writing, and administering the Hobart Postal and Telecommunications Museum.

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Australian Video Viewing Survey

Household Consumption across Formats

David Kennedy
Venture Insights

Abstract: In late 2020, Venture Insights conducted a video consumer survey of 1,003 Australian households. This paper provides an overview of the results. A television set remains the most common device for watching video, but a substantial majority of households also watch video on PCs, tablets and smartphones. Internet-connected TVs are now common. Only 24% of households currently have a 4K or better TV, but 44% of households anticipate buying a 4K TV set over the next three years. More than half of households do not subscribe to a pay-TV service. Of those which do, two-thirds have Foxtel. Netflix remains dominant in the Australian subscription video market, while its main competitors are each subscribed to by about one-fifth of households. Most survey respondents expect their video consumption to remain stable across all formats over the next year.

Keywords: Video viewing, household consumption, survey

Introduction

Venture Insights conducted a video consumer survey of Australian households in late November/early December 2020, in collaboration with Swinburne University of Technology. The survey was conducted nationally for 1,003 respondents, with a representative survey sample across demographic and regional groupings. Those respondents who watch free-to-air TV, pay TV, catch-up TV or Subscription Video on Demand (SVOD) services qualified to participate in this survey.

This paper reports on a single, recent survey. For a more detailed analysis of trends over time, see our latest Video Entertainment Market Outlook (Venture Insights, 2021).

This survey was about consumer viewing of video and TV services, and the kinds of services we asked about in the survey are:

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- "Free-to-air television": this is traditional television programming (e.g., ABC or Channel Nine) delivered through an aerial or antenna on your TV or roof. The TV broadcaster decides when each program is broadcast, in a linear sequence.
- "Pay TV": this is multi-channel television that you pay for monthly (e.g., Foxtel). The service provider decides when each program is broadcast, in a linear sequence.
- "Catch-up TV": this includes any free-to-air programming delivered over the Internet by the free-to-air broadcasters (e.g., ABC iView or 7Plus). It includes both:
    - Live streaming of free-to-air programming, so you can watch the free-to-air broadcast over the Internet at the same time as everyone else, and
    - Delayed streaming of free-to-air programming, so you can view their programs at a later time of your choosing
- "Subscription video on demand" (SVOD): This is TV you pay for monthly (e.g., Netflix or Stan), delivered over the Internet. You decide when to view each program.
- "Video services" does not include physical media like videotapes or DVDs.

Note that, with a sample size of 1,003 respondents, sample proportions in the full sample can be determined with 95% confidence to within approximately 3 percentage points (under the Normal assumptions for an unbiassed sample). Sampling errors for subgroups, such as age groups, may be larger.

Television Viewing

We asked our respondents which kinds of television they watched.

- Free-to-air television (FTA TV) was watched by 88% of respondents. There was a measurable difference across age groups, with 81% in the 18-24 group watching FTA TV, while 98% of the 65+ group did.
- Pay TV was watched by 41% of respondents, mainly Fetch TV or Foxtel (whether they paid for it or not). The least likely to watch pay TV were the 55-64 age group, where only 29% were pay TV watchers. In the 18-44 group, watching was higher at around 50%.
- SVOD services were watched by 47% of viewers, and BVOD (Broadcaster Video on Demand, FTA-provided on-demand TV) was watched by 51%. SVOD viewing was highest for the 25-34 age group at 67%, and lowest for the 65+ group at only 20%.
- BVOD was more evenly distributed, peaking with the 35-44 age group at 60% and lowest for the 65+ age group at 39%. The contrast with SVOD appears to reflect lower willingness to pay for TV amongst old demographics, which is also evident in pay TV watching.

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For all these results, while sampling errors may be larger than 3 percentage points for each age group, the results are sufficiently variable that it is likely that differences between age groups are significant.

Video Devices in Households

We asked the survey respondents what and how many devices they use to watch videos in their households. Only 1% of households had no television. The average number of sets was 1.83 sets per household. About half (47%) the respondents have one TV set and one-third (32%) have two TV sets at home. In addition:

- 12% of the respondents do not use a PC to watch video, while 44% have one PC that is used to watch videos in their households. A further 44% have more than one PC at home.
- 35% of the respondents do not use a Tablet to watch videos, while 40% have one Tablet that is used to watch videos in their households; 25% have more than one Tablet they use for video at home.
- 12% of the respondents do not use a Smartphone to watch videos, while 32% have only one Smartphone that is used to watch videos in their households; 56% have more than one Smartphone they use for video at home.

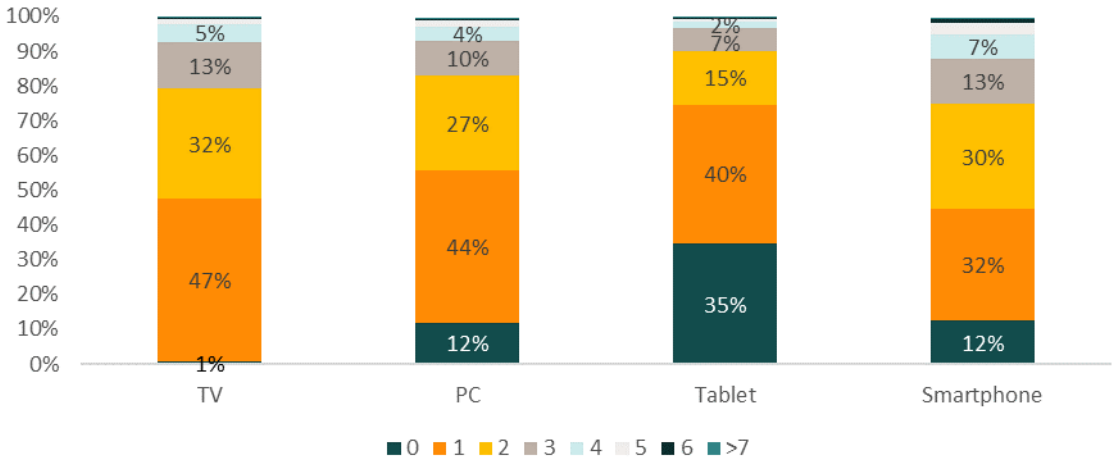

Figure 1. Number of screen devices used to watch video services inside households (Source: Venture Insights consumer survey, n = 1,003)

An interesting finding is that, while many households have multiple TV sets, the vast majority (98%) of homes had a main TV in the household where most or all household viewing takes place.

In summary, there was a TV in almost every household surveyed. There are more Smartphones and TVs per household than PCs or Tablets being used to watch video. On average, there were

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1.85 smartphones and 1.83 TVs per household used to watch video, while this number was 1.58 for PCs and 1.05 for Tablets.

Internet connection in TV sets

We asked the survey respondents if their main TV was connected to the Internet: 69% answered in affirmative. Of those who watched SVOD or BVOD, around 79% had an Internet-connected TV. This suggests that around 20% of SVOD and BVOD services are watched on devices other than television. Internet-connected TVs were most common in younger age groups, peaking at 82% for 25-34 year olds, and declining steadily to 39% for the 65+ group.

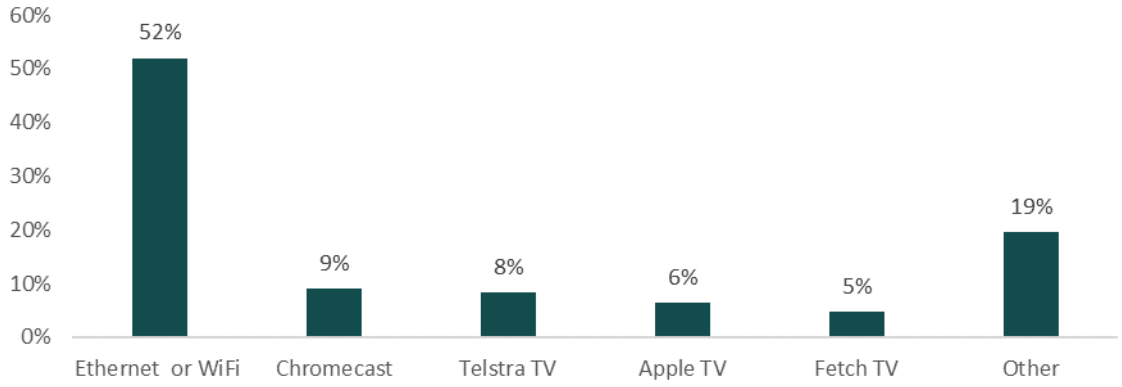

Figure 2. How is your TV connected to the Internet?
(Source: Venture Insights consumer survey, n = 1,003)

For respondents with more than one TV set, 56% had other TV sets in the household connected to the Internet.

The most common way of connecting to the Internet was through an Ethernet cable or Wi-Fi, but other devices were also commonly used as the Internet connection device, particularly Chromecast, Telstra TV, Apple TV and Fetch TV devices.

The reasons for not connecting the main TV to the Internet are shown in Figure 3. The TV being too old and a lack of appetite for Internet-based programming were the top two reasons, chosen by 42% each. These numbers were similar for the main and other TVs in the household.

The average reported age of television sets was 4.4 years, suggesting that TVs are being turned over fairly often. Of the respondents, 31% had their main TV between 1-2 years old, 21% between 3-4 years old and 22% between 5-6 years old. However, amongst those who were not connected to the Internet, 42% reported that the age of their television was a factor. This suggests many of these viewers are unaware that relatively cheap devices can be used to connect even an old television set.

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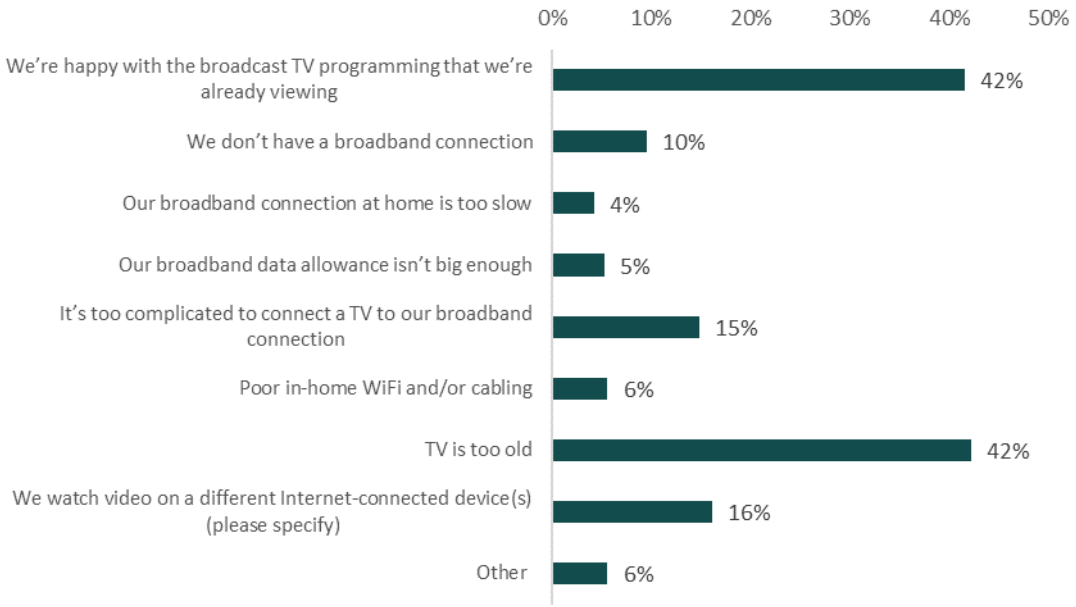

Figure 3. Reasons for not connecting main TV to the Internet (more than one option could be selected) (Source: Venture Insights consumer survey, n = 1,003)

TV definition

4K televisions are becoming a fixture in many households. The reported highest screen definition in the household is shown in Figure 4: 24% of households reported a 4K or better screen. Only 9% reported a standard definition screen as their highest definition screen.

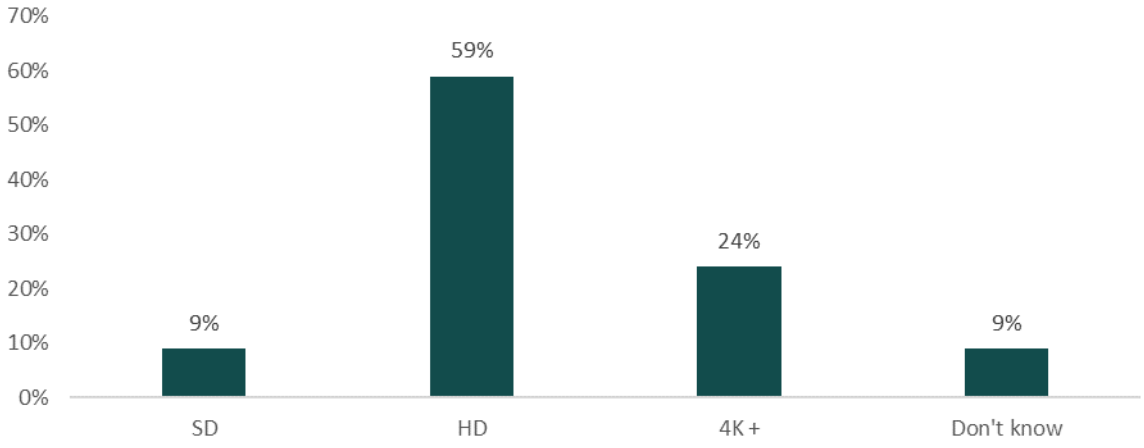

Figure 4. What is the highest definition television set in your household? (Source: Venture Insights consumer survey, n = 1,003)

In addition, many households plan to buy 4K TV sets. A total of 44% of households have clear plans to buy (or buy another) 4K or better set in the next 3 years (Figure 5). This has clear implications for network demand as 4K content becomes more commonly available on SVOD and BVOD services.

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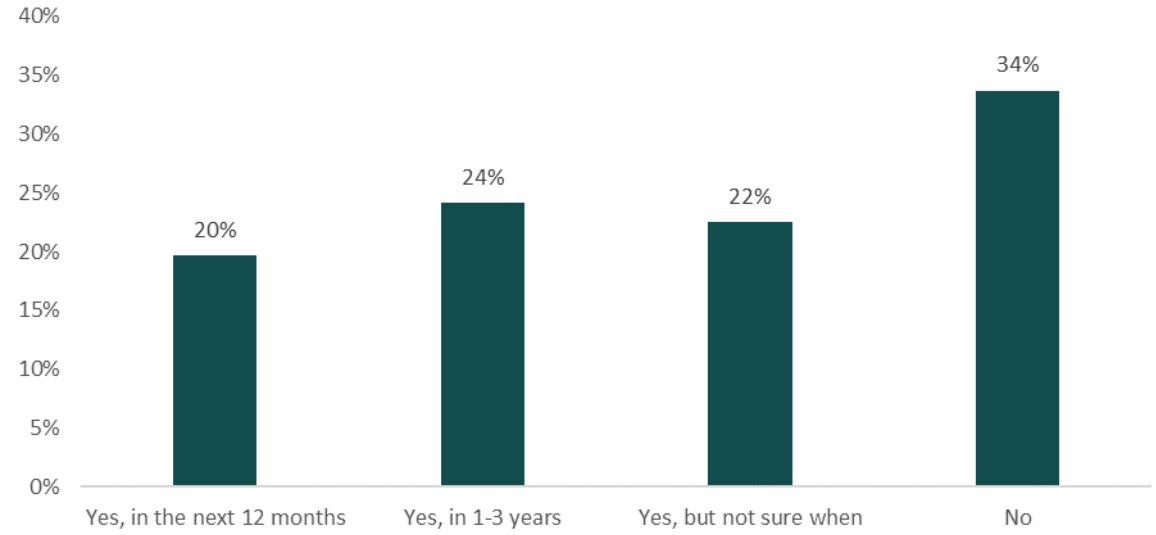

Figure 5. Do you have any plans to buy (or buy another) 4K or better definition TV?
(Source: Venture Insights consumer survey, n = 1,003)

Pay and On-Demand Viewing Patterns

Pay TV viewing

We asked the survey respondents about the services they use to watch pay TV. About half of households (54%) do not watch pay TV. Among those who watch pay TV, approximately two-thirds watch Foxtel pay TV and the rest watch Fetch TV.

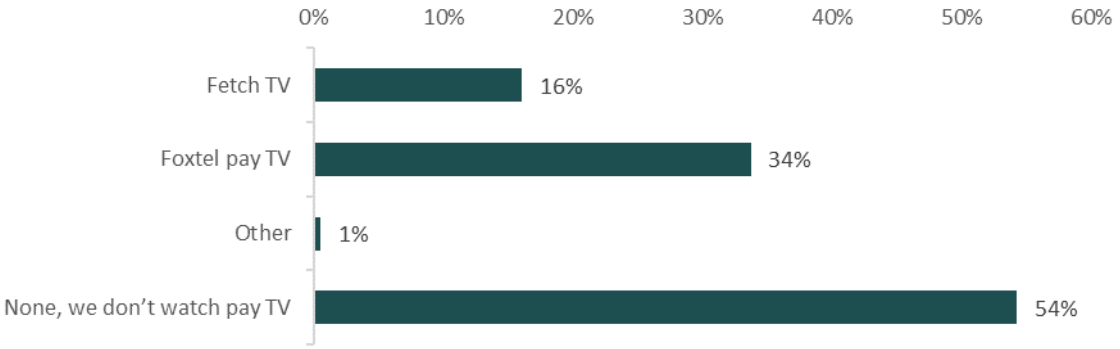

Figure 6. Services used to watch pay TV in the households
(Source: Venture Insights consumer survey, n = 1,003)

We asked the respondents the reasons for not watching pay TV. Affordability was the main reason chosen by 36% of the respondents. The next two major reasons were a lack of interest in their programming (27%) and the perception that they were not value for money (24%).

BVOD viewing

Of our survey respondents' households, 57% watch BVOD (including "catch-up") services at home. The top two reasons for not watching BVOD were a lack of time to watch it (54%) and TV not being equipped to access catch-up TV (21%).

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Among the respondents who watch catch-up TV, a majority (71%) watch it on their television. Computers and tablets are the next two popular devices, with 39% and 30% of the households using them to watch catch-up TV.

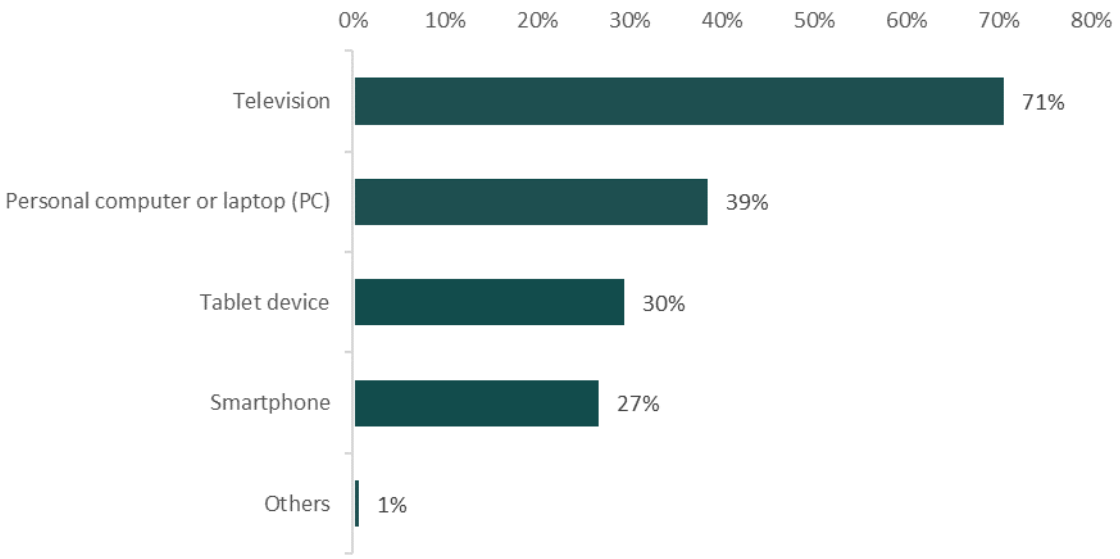

Figure 7. Kinds of devices used to watch catch-up TV in households. (Respondents could pick multiple options.) (Source: Venture Insights consumer survey, n = 576)

SVOD viewing

Over the last five years, the growth of SVOD has driven a significant transformation in TV viewing habits. Audiences today have unprecedented choice when it comes to content and how to watch it. SVOD has led to intense competition in the video market and is responsible for a general decline in FTA and pay TV minutes over time (barring the COVID-19 period). The result is fragmentation of the industry, with a move away from a single, homogeneous bundle of channels to a much more diverse set of content choices. Venture Insights estimates that SVOD subscriptions overtook pay TV subscriptions in Australia in 2016. COVID-19 has provided a massive boost to SVOD revenues, which will continue to grow at a 9.3% CAGR through to 2024. For details, read our latest Video Entertainment Market Outlook (Venture Insights, 2021).

Netflix has maintained its dominance of the Australian SVOD market. We estimate that Netflix has 5 mn+ paying subscribers in Australia. However, the SVOD market is entering a new era of streaming wars with new international players with deeper pockets emerging. We expect new players like Disney+ and Apple TV+ to focus on grabbing market share over revenues. Both Disney+ and Apple TV+ are priced about 50% cheaper than the comparable Netflix or Stan plans.

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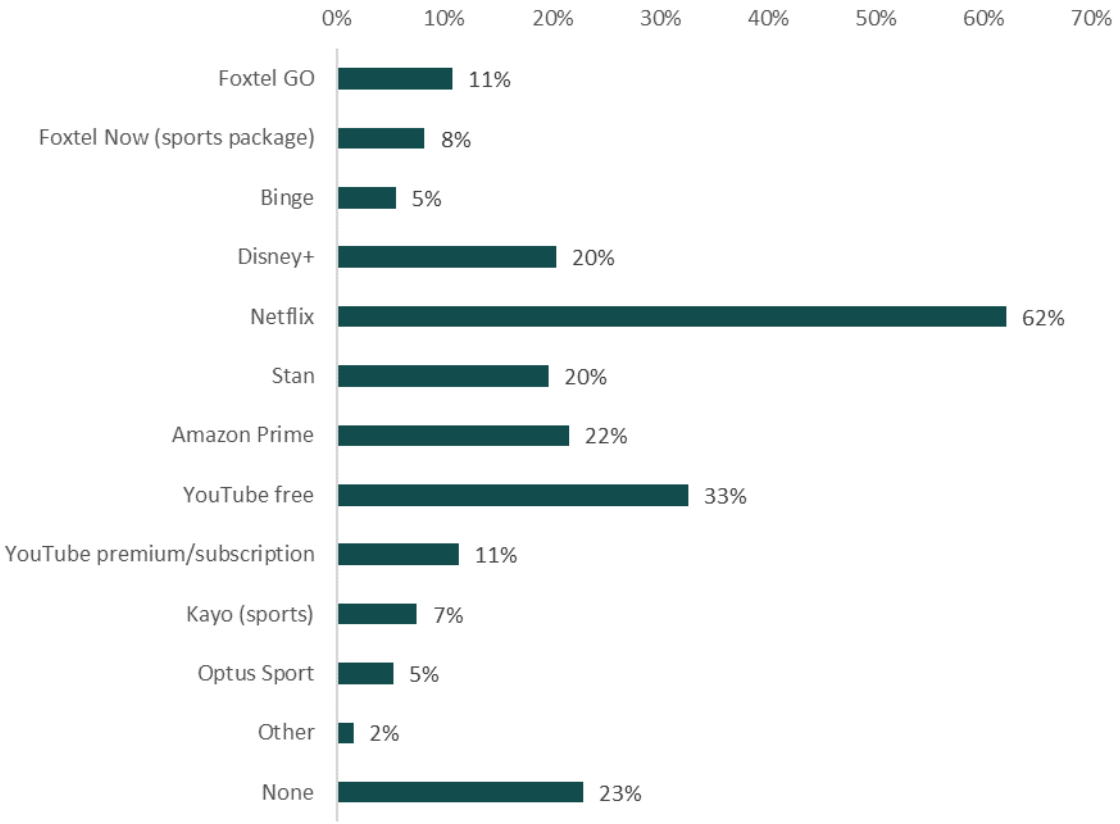

Figure 8. SVOD services used in households
(Source: Venture Insights consumer survey, n = 1,003)

We asked our survey respondents which SVOD services are used in their households. Netflix was the most popular service with 62% of the Australian households using it. Disney+, Stan and Amazon Prime were being used in approximately 20% of the households each. About a quarter (23%) of the households did not use any SVOD service, the top three reasons for which were cost of the SVOD services (35%), uninteresting programming (31%) and lack of time (21%). YouTube Free is not a subscription service but was included for comparison (see Figure 8).

Of the respondents whose households watch SVOD services, only 6% were planning to cancel SVOD service(s) in the next 12 months. On the other hand, we also asked *all* the households if they had plans to subscribe to any new SVOD service during this period: 8% of all respondents had plans to subscribe to a new SVOD service in the next 12 months. The difference between respondents cancelling and joining was within the error margin for this survey, and thus we expect the SVOD penetration to remain stable in the next 12 months. This is consistent with our forecast that the SVOD growth rate will fall significantly in 2021.

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Future Viewing Trends

We asked the survey respondents who were already watching FTA TV, pay TV, catch-up TV and SVOD TV how they thought their viewing of those services would change over the next twelve months.

The future behaviour of consumers is hard even for the respondents to predict, and much depends on how events develop over 2021. In addition, this survey was taken in late November/early December 2020, at the end of a long period of lockdowns and border closures. The economy was recovering, but clarity had not emerged on the vaccination program. To some extent, we expect these responses to reflect a pessimistic view of 2021, and an expectation of ongoing restrictions on live entertainment, cinema and similar activities. They also reflect an expectation of more working from home, which would reduce travel time and increase time available for TV viewing. We therefore interpret them as a ceiling on TV viewing, which would not be met if these pessimistic assumptions are not borne out.

The pattern of responses was remarkably similar for each kind of television. Solid majorities did not expect their viewing time to change, but those who expected more viewing outweighed those who expected less in all four cases.

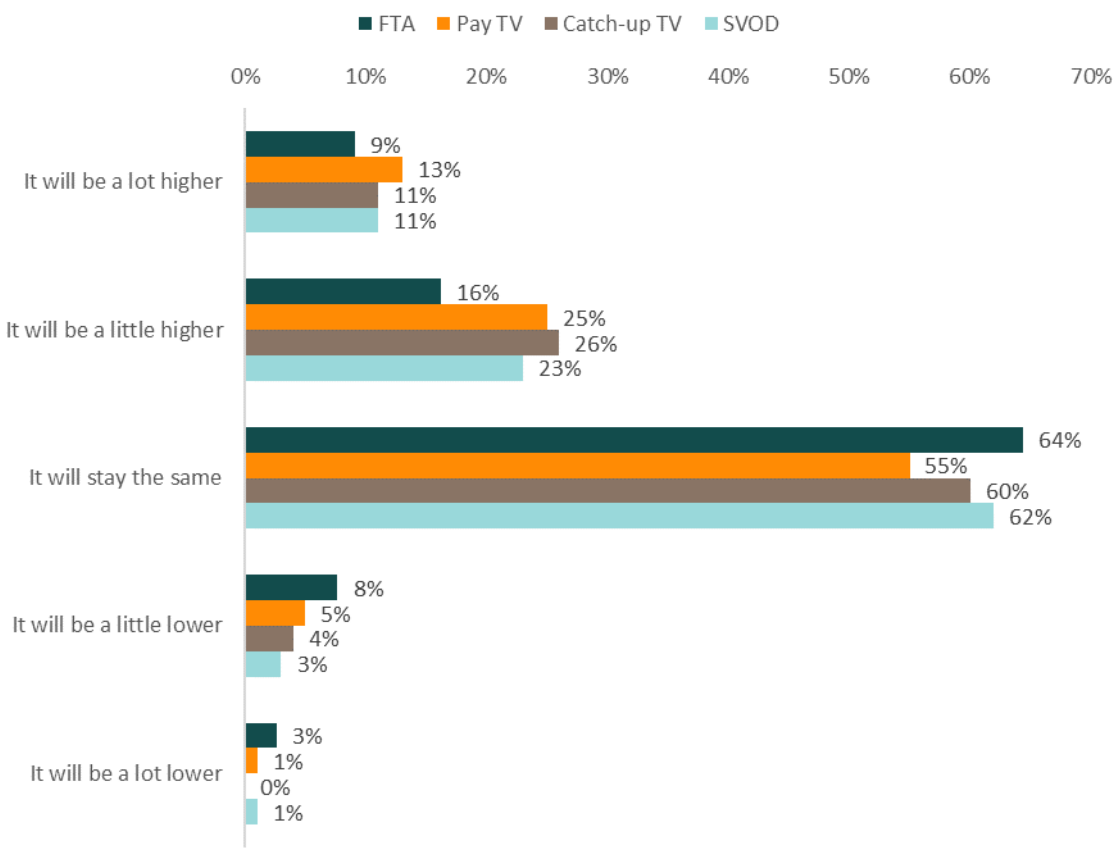

Figure 9. How do you think your household consumption will change over the next twelve months? (Source: Venture Insights consumer survey, n = 1,003)

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A majority (64%) did not expect FTA TV consumption to change during this time, 25% expected it to be higher, and 11% expected it to be lower. We anticipate that the survey respondents who said it will be higher in the next 12 months might be influenced by the increase in the FTA viewing due to COVID-19 lockdown and the increase in working from home.

Regarding pay TV, 38% respondents said it will be higher in the next one year, and only 6% said it will be lower. Although average viewing time for pay TV had been declining over the years, there was an increase in viewing in the twelve months to June 2020 due to COVID-19. Of the respondents who watch pay TV, only 5% were planning to cancel the plan in the next 12 months. On the other hand, we asked all the households if they had plans to subscribe to any new Pay TV during this period: 8% of all respondents had plans to subscribe to a new pay TV service in the next 12 months. Within the margin of error, these results do not indicate a significant movement in pay TV subscribers over 2021.

For catch-up TV over the next 12 months, 37% of respondents said it will be higher, and only 4% said it will be lower. This response is similar to pay TV and FTA TV, as described above.

For the household consumption of SVOD over the next 12 months, 34% of respondents said it will be higher, and only 4% said it will be lower. This is consistent with Venture Insights' SVOD forecasts.

In summary, the survey respondents expected their viewing to be stable or slightly increase in the next 12 months across all formats. Overall, we think this response reflects the pandemic impact and an associated increase in working from home.

Conclusion

This report has presented our survey results across 1,003 households and highlights their video viewing habits, video devices used, and viewing expectations over the next 12 months across FTA, Pay TV, Catch-up TV and SVOD formats.

TV remains the most ubiquitous device to watch video. Almost all households surveyed had one or more TV sets. In the survey, 88% of the households also watch video on PC(s), 65% on Tablet(s) and 88% on Smartphone(s).

Internet-connected and 4K TVs are now common: 69% of households have an Internet-connected TV. In contrast, only 24% currently have a 4K TV or better, but 44% of households anticipated buying a 4K TV set (or another 4K set) over the next 3 years. These results have clear implications for network demand as 4K content becomes more available on VOD services.

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Netflix has maintained its dominance in the Australian SVOD market with 62% of the Australian households using it. Disney+, Stan and Amazon Prime are being watched in approximately 20% of the households each. About a quarter (23%) of the households do not use any SVOD service, the top three reasons being the cost of the SVOD services (35%), uninteresting programming (31%), and lack of time (21%).

Most survey respondents expect their video consumption to remain stable across formats (FTA, Pay TV, Catch-up TV and SVOD) over the next year. Venture Insights forecasts that FTA TV and Pay TV viewing will decline over the long term. However, COVID-19 and an associated increase in working from home has led to an increase in viewing across formats. This survey suggests that viewing could remain stable in the near future if the economy opens slowly, restricting non-TV entertainment options.

Reference

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