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Reconfiguring human-machine relations in the automation age: An actor-network analysis on automation's takeover of the advertising media planning industry

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ABSTRACT

In this age of "big data", automated technologies have entered into the advertising media planning industry to significantly alter the client servicing process. This process involves the planning and buying of media spaces to target consumers with relevant advertisements. This study examines how the roles of human advertising media planning professionals are transforming vis-à-vis the machines by using actor-network theory and in-depth interviews with senior professionals in the field. Findings reveal how these actors conceive of automation, and map out important changes to human–machine relations through the advertising media planning process, from the conception of the media brief and media plan, to the programmatic buying of advertising spaces, tailoring of creative assets, and reporting of results.

1. Introduction

In this current age of "big data", an unprecedented amount of information is generated and circulated on a daily basis, and available to be mined and analyzed. The greater use of data, technology and automation has been increasingly discussed in advertising and marketing research, particularly in the field of programmatic advertising and consumer profiling, where "an adequate assessment of effects throughout the customer journey is absolutely essential to avoid making false estimates and incorrectly allocating resources" (Busch, 2014). Indeed, automation has the ability to boost productivity and efficiency as media consumption habits change.

While there has been research into how automation has impacted different processes in advertising media planning (Turow, 2012; Busch, 2014; McGuigan, 2019), there has yet to be a systematic investigation into how human–machine relations are changing across all stages of the client servicing process. How is the work of humans in advertising media planning agencies impacted by the use of automated technologies? To what extent do they still hold the reins in the advertising media planning process? This study aims to discover the processes in these agencies that are currently being automated, how the roles of human professionals are transforming vis-à-vis the machines, and in the final analysis, to offer an assessment of the power dynamics between human and machine in the advertising media planning industry.

As it is, automation has been lauded for its ability to help organizations reduce costs and increase productivity and output (van Dalen, 2012), as well as free up the humans to pursue more challenging and creative tasks (Clerwall, 2014). Within the advertising media planning profession, news reports and commentaries have centred on the ability of automation to perform tasks involving market forecasting, programmatic buying, customer segmentation and content generation (Fagella, 2016), suggesting the extensive infiltration of automation into the industry.

This paper aims to reveal how each stage of the client servicing process has been transformed by automation by using the actor-network theory – its value lies in its key premise, that actors themselves should define their own realities rather than have fixed definitions of what reality is imposed upon them, and that reality is not "already existing" but rather, is made up of momentary processes whose component parts may be assembled in new ways that may be uncovered and analyzed (Latour, 2005; Primo and Zago, 2015). The collation of such empirical accounts can then paint a holistic picture of what the current state of the field looks like.

To discover how client servicing in advertising media planning

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agencies is evolving, in-depth interviews were conducted with 14 advertising media planning professionals that hail from regional and international advertising media planning agencies based in Singapore. Singapore makes for an interesting geographical locale given that it is one of the most wired countries in the world, and in 2014, the government launched a "Smart Nation" initiative that focused on the effective use of technology to improve lives (Watts and Purnell, 2016).

1.1. An actor-network theory perspective on advertising media planning

Actor-network theory (ANT) has been deemed by many scholars as highly suitable for the study of technological innovation in media organizations. This theory, also known as the "sociology of associations", believes that reality is not "already existing" and bound by preconceived categories or definitions, but rather, that its formation must be scrutinized from the ground up, by looking at how different elements relate to one other in different ways. "Society" is therefore made up of associations between elements that may be assembled in new ways (Latour, 2005). This theory is particularly useful when the presence of new actors and interactions hinder the use of traditional social explanations to make sense of the social. Instead, it advocates that actors involved in these interactions define the reality for themselves, so that new pathways may be accounted for (Latour, 1996). These new pathways may be created by human agents, as well as non-human actors, or "actants", that is, material objects that work alongside their human counterparts to form new assemblages (Primo and Zago, 2015).

ANT has been used considerably in automated journalism literature, but much less so in advertising media planning research. Its contribution to this field could be a significant one. Turner (2005) suggests that ANT's value lies in its ability to identify "hybrid actors" in "multi-media environments", suggesting the need to account for the use of different media to aid in the advertising media planning process, and the fact that products generated are now created partly by human and partly by machine. At the same time, Primo and Zago (2015) purport that technology should not be seen as a channel through which information flows but rather, as a "co-creator" of content. Within the advertising and media planning sphere, this may be seen as the machine playing transformative roles in the client servicing process and exerting its power to alter and transform meanings in its resultant products, like the media plan, the creative asset or advertisement, the campaign outcomes, and the campaign reports.

Notably, ANT advocates that media practice should not be bound by fixed definitions, but rather, should be seen as "momentary processes that take place while specific associations are maintained" (Primo and Zago, 2015). Changes to the advertising media planning profession should therefore be traced to reveal new assemblages formed between human and machine in the automation age, where the client servicing process becomes a "momentary" one, tied to how certain elements fit together in certain ways, rather than how this process has been traditionally conceived (p. 42). Thus, "humans and non-humans constitute a hybrid collective" (Primo and Zago, 2015, p. 49), and it is through their associations that advertising media planning practice becomes enacted. It will then be interesting to discover if these changes have reached a stage of "normalization", that is, the moment technological use in the agency becomes so seamlessly executed it finally becomes invisible to the process and "marked by silence" (Plesner 2009, p. 613). This is also when it is most powerful in creating systemic effects.

This study's final analysis will also determine how much "autonomous power" the machine has to influence the client servicing process. The notion of "power" as it relates to the machine to augment this process may be analyzed by tracing how technological actants interact with other actants, human or non-human, to "enable others to do something, force them to do it, or stop them from doing it" (Domingo et al. 2015, p. 58). Actants are therefore seen as capable of "exerting" power when they can "make others do something or prevent them from doing something" (Domingo et al. 2015, p. 59). The extent to which machines are able to do this autonomously, or independently of human intervention, will be revealed in the findings of this study.

1.2. Automation in advertising media planning: Processes in flux

The advertising media planning industry, traditionally concerned with the planning and buying of media spaces to target consumers with relevant messaging (Katz, 2017), has seen significant change in the digital age, with thousands of websites available for advertising, and highly fragmented audiences (Turow, 2012). Emerging in recent years have been processes like programmatic advertising, a process enabled by technology to allow media planners to create "mass customized" messages for targeted customers across multiple media outlets (Fisher, 2019), and search engine marketing (SEM), where advertisers use SEM specialists to understand the intent of online users using their search terms to create content targeted to them (Jen et al., 2019). With audiences consuming multiple media simultaneously, there is now more focus on individualized advertisements generated through "a dynamic, automated process that serves advertisements based on information streams of consumer intentions and actions".

The practice of audience targeting is certainly not new, dating back to the 1920s in the US, when focus was on the size of the audience reached (Turow, 2012). After World War 2, in the 1960s and '70s, companies increasingly turned to media channels that could reach more targeted consumer segments and supporting research that would reveal their buying and leisure habits (Turow, 2012). With the beginnings of the Internet in the 1990s, the digital advertising industry took shape, as marketers scrambled to make sense of an increasingly fragmented space – success in the industry is today defined by the ability to find more accurate ways of measuring audience and improve returns on investment (Alaimo and Kallinikos, 2018). Modern ad-tech has facilitated this – using algorithms and "optimization models", computers are able to "reformat calculative capacities in advertising" and enable "mathematically precise decision-making" (McGuigan, 2019, p. 2372).

Indeed, the industry, more than ever before, is "looking to newer tools such as big data and artificial intelligence to understand and develop better offerings, in addition to managing omni-channels" (Kumar, 2018, p. 2). Major publishers, in pushing their advertising platforms, often promise advertisers a data-backed approach when determining where to advertise and create mechanisms to allow media buyers to work with greater efficiency and accountability of advertising spend. This greater focus on the use of big data and automated technologies to appeal and reach out to audiences in the digital age with mass customized messages can be seen in the skyrocketing figures spent on programmatic advertising in recent years – US$167 billion was spent in 2021 in the US alone, and US$418 billion globally (Statista, 2022). Indeed, some advertisers have publicized their success with the use of automated technologies. Campbell's Soup used Youtube's "Director Mix", an automated technology that allowed it to customize over 1700 video advertisements using different backgrounds, copy and voiceovers to match their diverse target audiences (Perez, 2017).

On the scholarly front, research has only just emerged on how automation is used in the advertising media planning process. Qin and Jiang (2019) examined how automation has played into the larger field of advertising in China's advertising firms, specifically in consumer insight discovery, advertisement creation, media planning and buying, and advertising impact evaluation – big data and algorithms have "reorganized and upgraded the traditional advertising process and improved advertising efficiency" (p. 338). Chen et al. (2019) made a distinction between programmatic buying and programmatic creative in the programmatic advertising process, pointing out that artificial intelligence can be further integrated into the advertising creative process, to create greater benefits for agencies who have already involved such technology extensively in the media buying process. At this point, how humans and machine work together across all stages of the advertising media planning process remains undiscovered.

2. Method

Applying ANT as a theoretical framework to a study on automation use in advertising media planning, this study takes effort to not impose pre-existing categories on what the client servicing process should look like, and attempts instead to discover how humans and machines interact through "momentary processes" to make up the practice of client servicing (Primo and Zago, 2015, p. 42). As such, concepts like "automation", "client servicing", and "advertising media planning" are not mapped out for the respondents, allowing them to instead define these terms themselves. The following research questions guided this investigation:

RQ1: How do advertising media planning professionals define "automation"?
RQ2: Based on these definitions, what types of processes are currently being automated in the servicing of clients and to what extent?
RQ3: What roles do advertising media planning professionals play in relation to the machines?

In the final analysis, the power of the machine to enable, stop or force an outcome in the client servicing process will also be discussed (Domingo et al., 2015), with particular focus on how machines might be changing the power dynamics within advertising media planning agencies.

Face-to-face interviews were conducted with 14 advertising media planning professionals working across 14 regional and global advertising media planning agencies with offices based in Singapore, a global city in Asia and an international media and communication hub. These offices would typically share knowledge and use of automated technologies with the other offices belonging to their parent company around the world. Of these interviewees, five were female and the rest were male, with a majority in their 20s and 30s, holding positions in management, media planning, and digital innovation (see Table 1). These respondents were located using the snowball technique, beginning first with contacts from the authors' professional networks. Effort was made to interview established firms with local, regional, and international clients across a wide range of sectors including retail, healthcare, banking, consumer goods, travel and hospitality, and telecommunications, among others.

Interviews are deemed as an effective method to gain information from insiders or experts on a new trend (Montal and Reich, 2016), and is a popular technique used in ANT-related studies (Plesner, 2009; Anderson, 2013; Wu et al., 2018). The interviews were conducted from November 2018 to January 2019, and interviews were between 30 minutes to an hour long. As semi-structured interviews, a list of questions was prepared beforehand, pertaining to the respondents' definitions of automation, the current and future use of automation in their advertising media planning agencies, the changing roles of human advertising media planning professionals in relation to the machines, the reasons for automation use, and the types of obstacles, challenges, and resistance faced in the implementation of automation. Where elaborations or clarifications were needed, the interviewees would then be asked follow-up questions. Wherever possible, interviewees also gave short demonstrations on how automation was used in their performance of specific client servicing tasks.

All the interviews were digitally recorded and transcribed, producing close to 200 pages of transcripts that were then manually coded line by line by a single researcher, in discussion with the research team. Codes generated were then placed into unifying conceptual bins, enabling a list of themes to surface that addressed the research questions (Tracy, 2013). Study findings would then shed light on how advertising media planning professionals defined automation in their profession, their perceived make-up of the client servicing process, and how automation is playing into the processes associated with client servicing in the industry.

Table 1
Study participants.

Code	Age Range	Gender	Designation
A	40–50	F	Managing director
B	40–50	F	Head of Global Data Innovation Centre
C	30–40	M	Head of Business Technology
D	20–30	F	Senior Media Planner
E	30–40	M	President for Digital and Innovation
F	30–40	M	Chief Executive Officer
G	20–30	M	Digital Manager
H	30–40	M	Asia-Pacific Chief Executive Officer
I	30–40	M	Digital Connection Director
J	30–40	M	Consultant
K	30–40	M	Programmatic Lead
L	30–40	M	Media Planning Manager
M	20–30	F	Senior Media Planner
N	20–30	F	Senior Digital Manager

Note. Since the study participants were granted confidentiality, we are providing general descriptions so as not to make any of them identifiable.

3. Results

3.1. "Automation" defined

With regards to RQ1 and how advertising media planning professionals define "automation", most of the respondents point to the notion that machines are taking over tasks in their agencies that are traditionally "manual" and "repetitive" in nature, such as the need to check back constantly on campaign performance, or calling different publishers to negotiate advertising space. It also tends to be work that is of "low value" in the client servicing process, like collating numbers for reports. Participant J discusses it as such:

> A machine, an algorithm, a programme, a tool, or anything that saves my time, repeats and can perform what I do as a human, so I can go home earlier. It must do exactly what I do with the same level of quality or better.

Some respondents specifically state that they are wary of describing machines as "replacing" humans in the agency, preferring instead to use other terms – Participant E refers to it as machines "augmenting the work that humans do" while Participant I says that machines can help humans "enhance their work".

Respondents also tended to elaborate on their definitions either with 1) examples of instances where automation has played a part in the client servicing progress, such as in the management of data or the optimization of bids in the programmatic buying process, or 2) in terms of the positives associated with automation in their agencies. These positives are many, including the automation increasing work efficiency, taking over repeatable work, saving time and money, alleviating the manpower crunch, facilitating decision making, and as Participant E says, "freeing up humans to do what they do best", that is, to add value to the project.

3.2. Processes and roles

Discussions tied to RQ2, which asked about processes currently being automated in the servicing of clients, and RQ3, which asked about the roles of humans alongside the machines in these processes, generated responses that could be analyzed together in this segment. Keeping to ANT's key tenet of not offering fixed definitions, respondents were asked to describe the processes that made up client servicing themselves, before talking through how these processes were being automated – or not – and the subsequent role of the advertising media planning professional through these stages. The processes of client servicing are listed here as beginning with 1) the media brief from the client, 2) the media

plan or strategy developed by the advertising media planning agency, 3) programmatic buying conducted by the advertising media planning agency, 4) the varying of creative assets for audiences, and 5) the reporting of campaign results from the advertising media planning agency to the client.

3.3. Media brief

Respondents seem to have a consensus that this first portion of the client servicing process is largely still human in nature. At this step, the client company seeking advertising or media planning services – termed as the advertiser – comes to the agency with a document containing information on their business needs and goals for the campaign. As the respondents explain, such goals can vary from increasing the awareness of their brand, to increasing the sales of their product or any other action the advertiser may like the audience to take, e.g. to sign up for something, complete a survey, etc. This is also when success metrics are negotiated and drawn up, for instance, the target number of "conversions" or clicks to purchases the advertiser would like to have. Humans are integral at this stage because of the "human relationship" that must exist between the agency and the client. As Participant M says, establishing a good relationship and communication with the advertiser will allow the agency to "sell their ideas better to the clients" – this in turn helps to build trust when results of campaigns are communicated and recommendations are given on next steps. Participant B agrees that this is a process that cannot be automated:

> When we sit with the client, we want to really understand their business challenges, what keeps them awake at night, that can never be automated. You want to hear the nuances, the pausing, the worried looks. I'm sure everybody has had the experience, when you are desperately trying to figure out how to do certain things and have to interact with a chatbot – that will probably be suicidal. That part of the process must be humanized.

Interestingly, Participant M, who describes his company as being quite advanced in the automation curve, sees his company's product as being able to do what the advertising media planning professionals do at this point – to question the media brief. He admits that while an account manager is needed to maintain a relationship with the client, the asking of the "why" question – for example, why a specific target audience is preferred by the client over others, or why a client prefers to use certain media channels over others – may in fact be tried and tested by a machine, rather than by a human.

> With our platform, we can challenge the media brief by running simulations and simulated experiments. For example, the client says they want to target five media markets based on five regions in the US because their product is very unique and niche. But from a simulation or experiment on our platform, we may realise that the returns on investment for this media brief will be very low, so we go back to the client and say "why don't you do this instead".

3.4. Media plan or strategy

This is the stage where decisions are made on the best and most efficient way to communicate an advertising message to the target audience, by determining how, when and where the audience might be reached. At this stage, machines are able to perform the task of data integration and management. Participant A speaks about its ability to discover profiles useful to the client and locate where these audiences might be found, based on historical data, to "create a more robust audience segmentation". The ability to make sense of and learn from historical data also allows the machine to look for new consumers with similar profiles who have responded positively to the advertiser before, and/or to bring existing consumers back for repeat purchases. Participant B refers to this process as the ability to hunt through data and find out how to "maximize conversions".

The machine can then recommend suggestions on the media plan, based on the information entered into it by the media professional, such as the campaign objective, budget, and target audience, according to Participant M. As Participant K explains:

> So when we enter the campaign settings into the platform, the platform goes through data that is seated on the platform about the audiences, the media channels, and will offer a media split between different channels for us, like how much to spend on TV, on digital, on search. It's the whole process of delegating the budget. That's the first cut for campaign planning.

The machine can also cut down on the manual task of contacting different publishers, or aggregators of different media or websites, such as Yahoo and Facebook, as part of the media planning process. Rather than calling these publishers individually to negotiate rates based on the spaces or spots the clients wanted to buy, and having the publisher check their catalogue of sites to determine which channels contained the client's desired target audiences, this process is now automated. Participant N says that using a dashboard, automated platforms can determine, based on the campaign settings, which sites have the right target audiences for their client.

Once the publishers are determined, the machine can further help the planner reach different publishers at the same time with their creative asset or advertisement. Participant L says this is done by the machine generating a link for the advertisement which gets distributed to all the publishers listed, as opposed to the media planner sending the same advertisement individually to each publisher.

The human's role in this process, according to the respondents, would pertain to higher-level strategizing. Through experience dealing with past campaigns of the client or similar campaigns from other clients, data across different platforms that result from the agency's different data partnerships, as well as real-time reports on how the campaign is performing, the media professional can make decisions to alter the media plan, prior to the campaign implementation or during it. For instance, Participant L speaks about decisions to change the selection criteria of audiences, so that only audience profiles most likely to convert to sales will be retained, while Participant D refers to the reallocation of budgets towards certain target groups over others.

At the same time, it is also the media professional who will determine the components of the creative asset, or advertisement, that the machine can permutate based on the characteristics of different audiences. As Participant C explains, the different formats, sequences, and component text and images of the advertisements will first have to be drawn up by the media professional at this stage. Participant B agrees that the creative component is difficult to be taken over by a machine, because of its inability to think out of the box:

> An AI copywriter won't be good. Because today, all machine learning models can only work off what they have seen. There is no way any machine in the world can work off something it hasn't seen. It's all tied to training data, so to suddenly tell the machine to randomly write an ad, there's no way that it can even start.

3.5. Programmatic buying

This is the stage when target audiences are reached with the advertisement, with the hope of achieving the business goal set out on the media brief. It is a stage that is mostly automated, according to respondents. Previously, once advertising spots are bought, contracts would be signed – it would not be possible to "move things around" anymore – and media planners would have to rely on and trust the figures given to them by the publishers on the audiences reached.

Programmatic buying today involves a "programmatic dashboard" that works faster and more productively. As Participant M explains:

> You can filter specific categories in your dashboard. So if I have a banking client and I want to buy finance sites, I can select that as a category and then that platform has access to thousands of sites. I can see what the estimated costs would be almost immediately. And then if I wanted to drop a site, I can just untick the box. Whereas if you had committed to an ad network, you were kind of stuck and limited to the pool of sites that they communicate with.

The process of audience selection is also automatic, once search criteria have been entered into the system. As Participant L says, websites are chosen by the machine automatically based on these search criteria, and bidding for audiences with profiles most likely to convert to sales is also automated.

Because audiences that fit more of the criteria will cost more, the programmatic buying process is also one that involves bidding, i.e. the allocation of money to securing certain audience types over others, to maximize conversion to sales. While the actual bidding is done automatically and like Participant K says "in a split second", the human role is important here to set the "bid factor":

> Based on data you have, audiences that fulfil certain criteria might be more valuable to you, so you apply a bid factor of let's say two times (2X). So for example, your base bid is $2, but for an audience that you really want, your maximum bid is $4. As a human being, you have to be the one running the historical data and understanding what factors lead to what kinds of outcomes. Based on the audience's ROI (returns on investment), you will set your bid factor.

Participant L adds that even as the machine automatically learns the types of audience profiles most beneficial to an advertiser, changes to the audience criteria must still be "read by someone before changes can be entered" and that "how the audience criteria is refined is still a human thing".

Participant G agrees that data sources are many, including those owned by the advertisers themselves, those from the technological publishers like Facebook and Google, and those owned by companies that sell niche audience data to corporations – it is the media planner that will be drawing on all of them to gain contextual knowledge on which audiences to target.

3.6. Varying creative assets

The message that advertisers wish to reach target audiences with takes the form of an advertisement or creative asset; at this stage, the key is to ensure that audiences are targeted with the messages that are most relevant and tailored to them. Respondents refer to how creative asset generation before automation involved creating different banners for different websites which was a "very tiring" process. Now, media professionals can just take the creative components generated at the initial media planning stage to populate just one template; thousands of variations of that advertisement will then be produced automatically based on audience profiles. Participant I explains:

> So the clients just need to create one template containing data based on their target audience at the backend – like for a travel company, data like destinations and prices and which places people like to travel to – and information from that data sheet gets plugged into the template and the platform can help generate a few hundred or thousand versions (of the advertisement), since there are different variations (of users).

Participant E agrees, noting that extensive audience fragmentation – he calls them "micro-audiences" – has meant that specific versions of advertisements need to be produced in a way that is "cost-efficient, relevant and customized" and automation has created "very good results" on this front. Participant B says the machine may also be trained through reinforcement learning, where it gets a thumbs-up for pushing advertisements that actually convert to sales and thumbs-down for those that do not, allowing the machine to target the right audiences on the right sites with the right advertisements.

Indeed, to be able to manually generate advertisements that cater to the "nitty gritty level" of "the type of page and the category of page" among others, would not be humanly possible in a media world where there may be thousands of relevant sites for advertisers. The machine, however, can create different versions of the advertisement based on audience profiles.

At this stage, the role of the human is to ensure that the "pipes" are working – or as one respondent describes, the creative asset needs to reach the publisher and through to the audience on the right sites where advertising space has been bought, so that the campaign is spending as intended.

3.7. Reporting

This marks the stage when ongoing or final results of a campaign are compiled and submitted to the client. Automation has played a key role in compiling, visualizing, and verifying report data, according to respondents.

Participant D refers to the ability of the automated platform to reveal up-to-date campaign performance:

> We have an automation platform that pulls in your data from different sources, so that clients can actually see things in real time, like their campaign performance. For us, when we're doing campaign reporting, all these numbers are directly reflected on the dashboard, so we avoid doing the very manual Excel reports that we send to the clients.

Participant A also refers to the process of automatic data visualization where "with a quick query, you are able to pull the trend analysis, assess the performance, do comparisons, and see campaign performance across different markets or regions". Participant K agrees, noting that in the past, media planners had to download a "chunk of Excel sheets", sift through and clean the data, before they can start building charts to make sense of the data. This was described as a very "manual and time-consuming process".

That said, both respondents say that humans still need to be there to first "set up the structure", based off conversations they have had with the client. This involves, for instance, determining what the client wants to track and setting naming conventions for them, so that the machine can pull the right data consistently from different reports.

When it comes to the analysis of campaign results, machines are able to perform part of the work alongside the humans. Participant N refers to the ability of automation to sift through results as third-party moderators to verify data and discard inaccurate or untrue data, such as with Google's Double Click product.

Despite the machine's ability to verify data, the analysis of the campaign results and their implications still lies with the human media planner. Participant M says the "analysis of the numbers" cannot be automated, while Participant D says machines "can't write insights for you". Participant N adds that the presence of "walled gardens", where each technological giant has its own platform, tools and datasets, is preventing campaign reports to be consolidated and deciphered by machines:

> For example, Facebook is a walled garden, it is its own world; you can't use Google's Double Click to track anything in there. Also, crucial information like spends and other metrics are not shared from Facebook. So at the end of the day, I get maybe four or five different reports – I need to combine that into one holistic view, to see if this campaign is effective and what we can do (next).

In such instances, Participant J says it is the responsibility of the media planner to "do their research" by pooling together "analytics and proprietary data that the advertisers have" and make conclusions based on contextual information to properly inform the client.

4. Discussion and Conclusion

This paper began with the goal of discovering how automation is influencing the client servicing process in advertising media planning agencies and how the roles of humans are evolving vis-à-vis the machines. Using ANT as a theoretical framework that emphasizes the role of the non-human actants, i.e. the technology, alongside the human actors, this study interviewed 14 advertising media planning professionals working in regional and global agencies based in Singapore, an international media and communication hub, and asked them to offer empirical accounts of automation in their day-to-day work.

Results pertaining to RQ1 on automation definitions see the professionals view it as machines taking over "manual", "repetitive" or "low value" tasks in the agency, in ways that "augment" or "enhance" the work of the human. They also defined automation using examples of the machines' involvement in the client servicing process, such as in data management and programmatic buying, as well as the benefits that it brings, such as the saving of time, labour and money, and freeing up the media professionals to perform more strategic value-added tasks like "problem solving" and "generating big creative ideas".

In response to RQ2 on the processes that are currently being automated as part of client servicing, results show that the machine is playing an increasingly transformative role in the media planning, programmatic buying, varying creative assets, and reporting stages, compared to about a decade ago, when processes were still very "manual" and "labour-intensive" for media professionals. Here, machines are seen to be able to 1) determine audience profiles, recommend the media mix, and connect the creative asset to publishers in the media planning stage, 2) locate audiences, and bid for the most relevant audience profiles using machine learning in the programmatic buying stage, 3) create multiple variations of the same advertisement to suit different audience profiles in the creative assets stage, and 4) present campaign performance in real time, visualize the data in charts and graphs, and verify the data for inaccuracy in the reporting stage (see Table 2).

Table 2
Machine and human role relationships.

Process	Machine role	Human role
Media Brief	- Challenge the brief	- Establish relationship with client - Determine business needs and goals - Determine success metrics - Challenge the brief
Media Plan or Strategy	- Read historical data to determine audience profiles that can maximize conversions - Recommend media mix based on campaign information - Determine and connect to publishers with creative asset	- Make decisions to alter media plan based on contextual knowledge (e.g. change audience selection criteria, reallocate budget, etc.) - Determine key components of creative asset (i.e. text, images, sequences, formats)
Programmatic Buying	- Locate audiences based on search criteria - Bidding of relevant audience profiles - Machine-learn audience profiles most likely to convert to sales	- Determine and fine-tune audience search criteria - Set the bid factor/ budget on how much to pay for specific audience profiles
Varying Creative Assets	- Targeting audience profiles with different variations of the creative asset	- Ensure the "pipes" work (i.e. that the creative gets through to the right audiences on the right sites and the campaign is spending)
Reporting	- Reveal campaign performance on dashboard in real time - Data visualization for analysis - Verify data and discard inaccurate or untrue data	- Set up the reporting structure (i.e. determine what to track, how to name them) - Analysis of campaign results across different reports (i.e. overcome the "walled gardens")

Within these stages, humans take on a more strategic, creative, and monitorial role, such as making changes to the media mix and audience search criteria that are recommended by the machine, deciding on the key components of the creative asset, determining the allocation of the budget, ensuring that the advertisements are reaching audiences, and analyzing the campaign results using contextual information. Where humans are seen to still take on a dominant role seems to be in the stage of the media brief – humans are able to have conversations with the client to understand business needs and in turn challenge what they see in the brief.

The question of autonomous power of the machine in the advertising media planning industry then becomes an interesting one. Given that power can be defined as the ability of the machine to "enable, stop or force an outcome" (Domingo et al., 2015, p. 58), the study findings reveal that machines do have autonomous power to independently influence outcomes in the advertising media planning agency, such as by its location and bidding of relevant audience profiles, which will directly translate to sales for their clients, or their presentation of campaign performance on the reports they generate, which will directly shape the campaign's next steps. When glitches in the system happen and the "pipes don't work", such as the creative asset not reaching the audiences and the campaign fails to spend, campaign outcomes will be affected as well. These indicate that when left on their own without human intervention beyond the initial programming, machines can have the power to enable, stop or force an outcome.

That said, advertising media planning professionals assert that they continue to be the bridge between the technology and the clients, stressing the importance of the human element in the client servicing process. A good "trusted" agency will oversee the work of the machine and ensure the smooth running of the campaign. Power, therefore, still lies very much in the hands of the humans – they are responsible for setting and fine-tuning the right instructions for the machine to perform the tasks, monitoring the work of the machine, checking the machine output for glitches or errors, and making sense of the reports produced by the machine. Respondents point out that machines "can only work off what they have seen", i.e. the training data that they have been fed, or instructions that they have been given; otherwise, they would be "unable to even start". Ultimately, it is also the humans that will educate and sell to clients the positives of automation use, or make decisions to move away from unreliable platforms.

This is not surprising. In instances when new entrants into a field might threaten the job security of actors operating within it (Wu et al., 2019a; 2019b), efforts may be made by these actors to legitimize their roles by demarcating the work they do as inherently "human" in nature and irreplaceable. Here, advertising media planning professionals may be seen as legitimizing their positions by stressing their continued relevance and importance to the field as the enablers of automation to begin with – by enabling the finalization of the media plan, audience search criteria, budget, component parts of the creative asset and the items to track on the campaign's reports – without which the machines will not be able to function.

Some respondents reveal however that as research continues to create machines that are more capable of self-learning and self-judgment, more work that seems "human" in nature may be taken over at some point, especially in the advertising creation space. For instance, they referred to the "training" of machines to make decisions like the best creative minds in the field, such that they learn to generate advertising copy using the same criteria that these individuals would use. At the time of this study, machines could already suggest audience profiles and media mixes by scanning through historical data, to the extent that they could sift through multiple variations to arrive at the most suitable conclusions based on relevance or strategy. Today, advertising creation may in fact be automated – some forward-thinking

agencies are using algorithms to write advertising copy using natural language processing and natural language generation technologies (Kaput, 2022). In the advertising media planning space, a multitude of platforms have emerged to perform the myriad of tasks mentioned exactly by the respondents in this study, including AiAdvertising, OneScreen, Pathmatics, Beam.city, and Albert (Kaput, 2022).

Notably, discussions on the significant contributions of automated technologies in the field have not been "marked by silence" and/or viewed as a potential threat (Plesner, 2009, p. 613); especially when the automated technology is a proprietary tool created in-house, and advertising media planning professionals are eager to show off their agency's technological offerings. This comes with an awareness of those in the field that unless they promote their firms' relevance and unique selling points, that their entire profession might risk being made obsolete. Indeed, advertising media planning agencies are facing competition from "consultancies, in-house teams (working with advertisers), and technology companies as platform players", according to Participant E and if agencies do not keep up on the technological front, they are "not going to be relevant in the next five to 10 years".

Thus, these agencies feel the need to validate their existence precisely on the basis of the technology that they provide that enable them to do more and better for their clients. Unlike some media professions who feel they might lose their jobs to machines, advertising media planning professionals feel they might lose their jobs without them. Hence, especially where automated tools are produced in-house by the agency, the importance of the human role is discussed in conjunction with the power of the machine in the advertising media planning industry.

Some limitations that pertain to this study need to be discussed, however. In-depth interviews, while useful for gaining insights into personal experiences and perspectives, might not be representative of the outlook of the larger population; this study attempts to widen the scope of respondent perspectives by ensuring that representatives hail from different regional and international advertising media agencies. Additionally, because representatives are based in Singapore, perspectives they hold and experiences they have may differ from those who work within other media contexts. Finally, because of the empirical nature of ANT, further inquiry can be made into the power imbalances that exist outside the advertising media agencies that may shape the uptake of automation in this industry, such as the agency's relationship with the advertisers, the technological firms that are now the publishers, platform suppliers, and third-party data moderators, the in-house teams that produce the proprietary tools, and the audiences that convert the clicks to sales.

CRediT authorship contribution statement

Shangyuan Wu: Writing – review & editing, Writing – original draft, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Pei Wen Wong:** Investigation, Writing - review & editing. **Edson C. Tandoc:** Writing - review & editing. **Charles T. Salmon:** Conceptualization.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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