10-8-2021

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In January of 1996, the Associated Press (AP) (1996) published a short news article in their *West Virginia News Log* announcing the publication of a centennial anniversary picture book "The Olympics at 100: A Celebration in Pictures" to coincide with the upcoming summer Olympic Games in Atlanta, Georgia. In doing so, The AP entered the *agenda-setting* phase of diffusion by showcasing their contribution to the craft over the past century. The AP proudly identifies itself as a pioneer in the journalism space and a champion of innovation in the industry since its inception, in 1846.

Innovation and technology have been integral to the progress of news photography since even before the term *photojournalism* entered the lexicon of journalism in 1942. Capturing, processing, editing, and distributing images is entirely reliant on technology and largely unseen by the public. The camera, and the technology inside, is the most visible instrument that the photojournalist uses. By the 1930s, news photographers had already begun the slow adoption of 35mm camera technology. This camera design would eventually take the place of larger, sheet film cameras that had been used since before the turn of the century. Some twenty years later, in the 1950s when the use of the 35mm camera was becoming fully routinized, new color film technology became the predominant technological innovation (Jones 1954). Then, in the 1990s, a new digital single-lens-reflex (dSLR) camera technology provided an innovative alternative to 35mm film cameras (*The AP Log* 1996a). This paper focuses on that adoption of digital camera technology to replace 35mm camera and film technology and the role actor-organizations and mega-events played in the diffusion of innovation process.

While technology can be viewed as a centralizing point around which photojournalism has grown, photographer's reliance on technology should not be mistaken for determination. In fact, technological determination has been argued inconclusive regarding any association with the social. Technology cannot be considered the primary factor in shaping society, culture, values, life-style, or (importantly) institutions (see: Edgerton 1999; Kranzberg 1986; Zelizer 2008). The institutional aspect Kranzberg (1986) specifically addresses in rejecting technological determinism is important to note because this research focuses on the discipline of journalism as an institution, which has (since its origins) been dependent on technology to serve its function. Dependance, in this context, should not be defined as *being determined by*.

Kranzberg (1986) writes, quoting Lynn White Jr., that "a technical device 'merely opens a door, it does not compel one to enter'" (p. 545) though an argument against this claim could be made. Kranzberg criticized White Jr.'s presumption that technology produces no motivation and went on to associate factors which are tethered to a technology as a more appropriate causation. However, those assumptions rest on thinking of associative factors in a discrete and decoupled state. Compel is defined as driving or urging by way of force or irresistibility, or to cause doing or occurrence via overwhelming pressure (Merriam-Webster n.d.). In other words, to compel could be perceived as a form of motivation. Technology is often spurred by economic forces to make a thing be more efficient. This entangles technology, economy, and efficacy. Once bound, the introduction of a technical device, one that is capable of creating a more efficient workspace and therefore reducing the cost of production, is compelling. This construction could be causational in determining our social reality and while there is value in establishing this entanglement, the debate whether technology is capable of inducing motivation is not the purpose of this paper, nor does it attempt to describe entanglement involving technology and

economic forces. Either would require far greater space, time, and attention than what is given in the present research. Rather, the intention of this paper is to investigate the historical role of the Associated Press (AP) as a champion of innovation and the Olympic Games as a central innovative space in the diffusion of innovation process with the aid of perception through Actor-network theory.

Specifically, this paper addresses the role of the AP and the Olympic Games in the diffusion of innovation process of digital camera technology used for photojournalism from 1996 through 2014. The Olympic Games, which can be described as a *mega-event*, during this period (from the 1996 Summer Olympics in Atlanta, Georgia, USA to the 2014 Winter Olympics in Sochi, Krasnodar Krai, Russia), provided a central innovative space. Champions of innovation gravitated to this space to produce mass-appeal as part of the diffusion of innovation process. Combing through historical archives from this period, three questions were investigated.

RQ1: What role does The AP play in the diffusion of innovation process?

RQ2: Is The AP's role in the diffusion of innovation process contingent on significant historical moments or events?

RQ3: What role has the Olympics played historically in the diffusion of innovation process?

Literature review

Innovation is defined by Rogers (2003) as the perception of an idea, practice, or object as new by the adopting unit (individual or otherwise) and *diffusion* as members of a social system processing this innovation by way of communication through relevant channels. Put another way, diffusion of innovation is a type of communication through pathways between members of a social system. The extent to which an innovation becomes adopted relies on the effective

movement of knowledge between the involved social members, which can be described as social agents or actors. Actor-network theory may provide greater insight into how that knowledge moves through the social.

There are five stages identified in the innovation process: agenda-setting, matching, redefining/restructuring, clarifying, and routinizing (Rogers 2003). In specific context, such as information technology, researchers have reinterpreted the process stages and added a sixth to include: initiation, adoption, adaptation, acceptance, routinization, and infusion (Zhai, Ding, and Wang 2018). Across contextual reassignment, these stages in the innovation adoption process specify strategies that are perceived as linear and sequential, however, some researchers have suggested the process may likely be a more iterative and recursive process (Zhai, Ding, and Wang 2018). One thing which researchers agree on is that value is not equally distributed across the stages. The rate at which an innovation will spread through a population and the time it takes for adoption to occur varies across stages and time (Rogers 2003).

Latour (2005) refers to this diffusion process as *translation.* In Actor-network theory (ANT), translation is the movement of a thing between connected actors transporting, or transforming, the thing which is being moved (Latour 2005). This performance creates the social. ANT defines social by its etymological origins *"socius*: 'someone following someone else'" (Latour 2005, 108). This does not immediately imply causality the same way as Rogers talks of directional flow outward from the innovator in a linear or sequential manner. Instead, ANT describes the transportation of a thing between connections as simply meant to bring about the coexistence of two or more mediators that now have formed a relationship around this thing that is being transported (Latour 2005). At this point, a social still does not exist because there is no *following* taking place. There is an exception in the translation process, however, that introduces

the concept of mediators being placed in strategic positions intended to induce causality by predictable, routine patterns (Latour 2005). In other words, causality may be determined and intentional. Rogers (2003) refers to this type of mediating actor in diffusion of innovation theory as a *change agent* (or *opinion leader*) in social systems and *champion* in organizations.

A change agent is motivated to positively influence decision making during the diffusion of innovation process in favor of the change agency (Rogers 2003). Within an organization, this change agent is known as the champion of an innovation (Rogers 2003). Looking through an ANT lens, the organization itself could be viewed as the champion of an innovation thanks to Latour's flattening of any hierarchy within an organization (Latour 2005). The organization becomes treated as a single node within the network.

As Rogers (2003) identified, innovation is a process that moves through a population. A population without some form of valued intention is less likely to coalesce around a new idea. Without intention, movement between mediators is not enough to form a social, a social realm, or even social ties. There only exists the *possibility* of forming a social through traceable associations between mediators (Latour 2005). When that possibility is realized through causational relations, the motivation required to produce the social realm of Rogers' innovation is established. Except, ANT supposes a symmetrical network of equivalent agents, which left alone, poses a threat to causality from hierarchy. This is to remove privilege from human actors, make agency of the material world visible, and to see human and non-human actors on equal footing in a flattened landscape (Kaptelinin and Nardi 2009). While this process is necessary to reveal bidirectional exchange dependence between human and non-human actors, this loss of causality removes the motivational factor which must then be reasserted for diffusion to occur.

In studying the failed innovation of producing ethanol from wood, Miettinen (1999), reinserts intentional causality into the translation process of ANTs symmetrical conceptualization by infusing dialectical cultural-historical activity theory (AT) with ANT for richer analysis[1]. The artifact-mediated structure of human activity constructed in AT reasserts relevance of human actors with causational intent. In other words, it reintroduces motive without assuming hierarchy. Motivation is an integral element of diffusion and the innovation process. This inclusion reasserts intentional causation by giving special treatment to certain actors. These special interest actors in ANT are identified as *"macro-actors"*. In the diffusion of innovation process, these special actors are identified as change agents and champions. They are considered social entities which have "interests" which can reveal them as "agents in their own right" (Kaptelinin and Nardi 2009, 246).

Diffusion of innovation consists of multiple actors involved in a variety of different activities, some at different times entering and exiting, all entangled in the diffusion process. ANT suggests it is important to look at each actor involved in the exchange to describe the relationship that is formed (Latour 2005). This is a limitation of ANT, however, as the theory can only describe. ANT does not assume to explain. Latour (2005) also defines *network* as a concept and not a *thing* to be observed[2]. So the network in actor-network allows us to trace the relationships that congeal and dissolve around a central node (Latour 2005). In other words, observing the network in actor-network allows for viewing translations, assertions, and clarifications in an exchange or communication among the actors entangled in the diffusion process. It was introduced at the start of this literature review that diffusion of innovation is a method of communication with a purpose and Latour's definition of *network* provides a way to

study this communication/exchange process occurring between actors while they are involved in the diffusion of innovation process.

In the next section, the role of the Olympic Games as a mega-event in the diffusion of innovation process is discussed.

Olympic Games and other mega-events

What do the World Wars, Korean War, World Cup, Olympic Games, and the Superbowl all have in common? They are all mega-events. Mega-events are useful to the diffusion of innovation process because of the affordances they convey. Innovation does not occur in a vacuum. A coalition of loyalists in support of an innovation reduces opposition and resistance. Beyond support from ardent supporters, promoting innovation is necessary to recruit widespread adoption. Support, defense, and promotion are necessary to initiate adoption of an innovation and maintenance of these pillars is essential to ensuring an innovation moves from adoption to routinization.

Mega-events attract a global audience, stimulate interest by prospective investors, provision infrastructure necessary to facilitate optimal performance, and improve on capacities an innovation may accommodate (Ferrari and Guala 2017). World War II and the Korean War were central moments in the adoption process of 35mm camera technology (Creech 2017). Two activities promulgated interest in the technology. One, there was a high demand for images from the warfront by audiences and, two, US military logistical structures provisioned for the rapid delivery of images made by reporters embedded with deployed troops (Creech 2017). In the case of urban development, mega-events have been known to provide accelerated opportunity for urban transformation processes because they provide the motivation which propels creative,

ambitious renewal projects along with access to expansive public and private funds (Ferrari and Guala 2017).

Rio de Janeiro became an exemplar city of how mega-events are used as a central hub to promote the diffusion of innovation process. Hosting the Pan-American Games in 2007, Rio+20 in 2012, FIFA World Cup in 2014 and the Summer Olympic Games in 2016 resulted in the transformation of a declining city, with poor infrastructure investment and economic downturn, into a beacon example of smart-city innovation and renewed positive city governance (Paschoal and Wegrich 2019)[3]. Researchers studying the diffusion of innovations championed by then mayor Paes found the results to have profound effects on city governing and they created widespread institutional change in Rio (Paschoal & Wegrich, 2019).

Aside from opportunities for host cities to innovate city infrastructure and governance, mega-events such as the Olympic Games have had a positive effect on the host nation's exports. Researchers have termed this phenomenon as "the Olympic Effect" (Rose and Spiegel 2011). Rose and Spiegel (2011) concluded that evidence of a persistent effect on national exports and overall trade can be directly associated with hosting the Olympic Games[4]. These effects are the result of promoting new and innovative methods and developments similar to Rio de Janeiro's successful transformation led by mayor Paes.

Mega-events provide a closed system with heightened global attention and sensitivity. They can serve as an accelerator for diffusion of innovation to pass through its stages from initiation through adaptation. However, the typically short lifespan of a mega-event does not provide enough time for the later stages of diffusion to develop in a single mega-event instance.

35mm camera technology - Previous innovative technology adoptions in photojournalism

Most innovations, including technological innovation, requires a longer narrative to pass through each of the stages of diffusion. Diffusion of the 35mm camera from initiation to routinization began in the early 20th century but did not become fully adopted as routine until the second half of the century.

Leica, the brand made famous by such masters of 20th century photography as Henri Cartier-Bresson, David Douglas Duncan, Robert Capa, and Alfred Eisenstaedt, is responsible for bringing about the 35mm format camera (Pasi 2004)[5] [6]. By 1940, Contax, Olympus, and Nikon had their own version of the 35mm camera system, each providing competitive technological advances, such as increased shutter speed, interchangeable lenses, and internal winding mechanisms for film advancement (Creech 2017). Also, by this time a split between the rangefinder design and the new SLR design had occurred. The Leica rangefinder design was composed of a case housing a composition viewing window alongside the recording lens. The newer SLR design provided a pass-through view of the composition directly through the recording lens by way of a hinged mirror assembly that reinverted the image in the viewfinder. This new technology allowed the photographer a superior composing experience. While a market continues to exist for rangefinder camera (both digital and film) development, this SLR format became the common 35mm format camera which is more familiar today thanks largely to the speed at which a photographer could accurately and more precisely compose the photograph. This technological innovation alone was insufficient to rapidly supplant existing camera technology, however.

Photographers were critical of 35mm film at the outset for being difficult to process and found 35mm cameras more often prone to missing focus and being more difficult to operate than

their familiar large-format cameras (Creech 2017). More positive reception only began in the 1930s when improvements in film development made reproduction and image touch-up more manageable (Creech 2017). Early champions of the smaller 35mm camera format, such as Walker Evans, Robert Capa, and Helen Levitt were already producing mentionable photography by the mid 1930s. However, photojournalists would continue to predominately use large-format cameras through the 1950s (Creech 2017).

While photographing "View of Morgantown, West Virginia, 1935" and "Furniture Store Sign, Birmingham Alabama, 1936", in addition to his large-format camera equipment, Walker Evans also carried with him a 35mm Leica to record candid moments of ordinary people going about their day in ordinary ways (Johnson et al. 2012). On his advice, Helen Levitt began photographing on the smaller 35mm format in the 1940s (Johnson et al. 2012). The smaller form factor allowed Levitt to record moments unobtrusively, leaving the "essential nature and spirit of the activity" unaffected by her presence (Johnson et al. 2012, 616). Erich Salomon also became famous for his inconspicuous recordings of ordinary behavior. His subjects were the political elite and society's wealthiest upper-class. Before photojournalism was coined a term, Salomon attended dinner parties and other events of the social and political powerful as a journalist and took along with him, first an Ermanox, then later a Leica 35mm camera, to surreptitiously record the goings-on of the wealthy elite for publication in newspapers (Johnson et al. 2012)[7]. Clarifying the value that the 35mm camera's form factor afforded the photographer to go unnoticed is often remarked in scholarly literature. Robert Capa, immortalized as the archetypal war photographer for his famous photographs of the D-Day invasion on Omaha Beach in 1944, captured those famous beach assault images with a Contax 35mm rangefinder camera (Capa 2001). Before that fateful day, when Capa was just beginning as a dark room assistant in Berlin,

1931, he was already following the style of Erich Salomon. Given an assignment to photograph Leon Trotsky speak in Copenhagen, Capa made his way into the meeting closed to press photographers armed with a Leica 35mm camera (Johnson et al. 2012). With the Leica, he was able to make his first published news photograph of Trotsky mid-speech during the event (Johnson et al. 2012).

While some early champions of the technology were displaying innovative news approaches to making photographic records of events, others resisted the trend. Bill Brandt, made famous for his fine art photography, began as a photojournalist in England, 1931 (Johnson et al. 2012). Brandt preferred the square 6x6 medium format image recorded using the Rollieflex camera (Johnson et al. 2012). Apart from stylistic appreciations, other acceptance challenges came from newspapers that resisted shifting to the smaller 35mm format mostly due to cost (Creech 2017). Only the process of chemical film processing, and the chemicals themselves, carried over from large-format sheet-film photography to the smaller 35mm roll-film technology. Cameras, processing equipment, and storage would all have to be updated to accommodate the new technology. Newspapers were slow to take up this effort. Through the 1940s, only a few major publications were willing to take on the cost of supporting the new format. *Life* and *Look* magazines were among the premier champions of 35mm film technology (Creech 2017). However, even here the publishers still relied on large-format photography as well. Often, the magazines would publish images from each film size together in ways that presented 35mm images as indistinguishable from its larger sibling (Creech 2017).

This level of adoption at the larger scale of major publications helped to foster wider acceptance of the format by the photographic community. During the 1950s and 60s these magazines, and others, bolstered the voices of early adopters by showcasing their photography in

ways that drew more reader attention from general audiences and other photographers (Creech 2017). Joel Meyerowitz is a master photographer of the 20th century, made famous by his use of color film to capture street photography beginning in the 1960s. Meyerowitz cites his inspiration from the work of Robert Frank, whose photographic project *The Americans*, published in 1958, documented the everyday lives of Americans across the country. Johnson et al. (2012) quoted Meyerowitz as saying the 35mm camera "taught me energy and decisiveness and immediacy…" (p. 666).

Routinization of 35mm film format eventually came about in the 1960s, when most newsrooms had shifted their commitment to the standard and photojournalists most often relied on 35mm SLR cameras to document their news coverage (Johnson et al. 2012).That routinization of the technology lead to innovative new image capturing techniques. The affordances of the smaller, faster, lighter format changed how scenes were recorded and how events were depicted. The Vietnam War saw photojournalists placing themselves in life-threatening situations far more often than in previous wars (Johnson et al. 2012). Larry Burrows, a *Life* photographer best known for his coverage of Vietnam, documented the war until he was killed when his helicopter was shot down in 1971 (Johnson et al. 2012). The iconic image *Reaching Out* and photo essay *Yankee Papa 13,* are among his best known photographic works (Johnson et al. 2012).

By the 1970s, widespread adoption of 35mm camera technology had altered the culture inside newsrooms photojournalism departments as well. The technological affordances (35mm cameras being smaller, faster, lighter) encouraged photojournalists to take greater personal risks, placing themselves into precarious situations. "Being at the heart of a conflict had become standard photojournalistic practice" (Johnson et al. 2012, 678). Routinization of one

technological innovation led to normalization of new cultural, professional, and ethical standards, suggesting the cyclic nature of innovation compelling new innovation.

This section of the paper has attempted to illustrate the historical significance of the diffusion of 35mm camera technological innovation and categorically define the importance of mega-events to the diffusion of innovation process. Recognizing that importance while facing time and space limitations of research intended for scholarly journal inclusion, some sacrifices have been made to the depth and scale of immersion into the nuances of this chapter in history. This literature review attempts to provide an overview of the diffusion process of 35mm camera technology as an innovation in the journalism industry by highlighting the importance of individuals who championed the technology as early adopters, otherwise known as innovators. This paper does not attempt to document and describe, in its entirety, every phase of the diffusion of innovation process that 35mm camera technology went through, or all the actors involved in the process. Limitations are addressed later in the paper when discussing future research.

Rogers (2003) Diffusion of Innovation theory focuses mainly on diffusion at the individual level. However, the theory does support diffusion at the organizational level as well (Rogers 2003). This research asks what role the AP and the Olympic Games played in the diffusion process of digital camera technology. The next section details the methodological approach used to conduct this research.

Methodology

This research relies on a case study analysis of the adoption process of digital camera technology to supplant existing usage of 35mm film camera technology in the photojournalism industry. Attention is placed on The AP as a champion of innovation and the Olympic Games as a

mega-event. An analysis of The AP in-house publication, *The AP World* and *The AP Log*, Canon's press releases, and popular trade publications circulated among members of the professional photographic and technology communities: *Digital Photo Pro, DPReview, Gizmodo, Imaging Resource, No Film School, PetaPixel, Poynter, ResourceMagOnline, Reuters,* and *Shutterbug* during a 20 year period from 1996 until 2016 was conducted. A preliminary analysis of the in-house publication at The AP identified the organization committed to digital camera technology beginning in 1996. This analysis informed the start of the 20-year timeframe. Preliminary analysis also revealed that by 2016 the industry had routinized the adoption of digital camera technology. This information indicated a closing year for this case study analysis. Once the timeframe was established, an expanded keyword search in publicly accessible data archives was used to generate the dataset of trade publications for analysis. A total 23 articles from 12 trade publications referencing the adoption of digital camera technology by major organizations associated with the photojournalism industry (e.g., Associated Press, Getty Images, and Canon) and/or use of digital camera technology at the Olympic Games was collected into the dataset for analysis. In the next section, an analytical narrative details the events which took place between 1996 and 2016 that involved The AP and the Olympic Games. The function of this narrative is to describe actor roles in the diffusion of digital camera technological innovation by the photojournalism community.

Analysis and discussion

The start of this paper opens on The AP's centennial celebration of documenting the Olympic Games with a picture book showcasing their contribution to the history of recording the Games. On March 10, 1996, two months after that article was published in their internal magazine, The AP published an announcement committing all future photographic coverage of

major events would be done using digital SLR cameras instead of film (*The AP Log* 1996a). This statement reaffirmed The AP's position as a champion of innovation.

Elements of matching, redefining/restructuring, and clarification are all visible in this article when viewed through the lens of diffusion. In the article, the vice president of The AP and executive photo editor, Vin Alabiso, is quoted calling attention to two upcoming mega-events that would showcase The AP's new capabilities: the summer Olympics and the presidential campaign (*The AP Log* 1996a). The article also mentions a third mega-event that had recently taken place – Superbowl XXX. This was the first mega-event ever fully documented using only digital camera technology and the cameras used were the result of a four-year developmental partnership project between The AP and Kodak to test and refine digital camera technology for photojournalists (*The AP Log* 1996a). The article touts the improvements made in this new model of the "News Camera 2000" and that The AP had already seen some newspapers shift their photography departments to digital (*The AP Log* 1996a). Highlighting the advancements in economic efficiency and image-render quality may have been meant to assuage similar concerns cited in newsroom resistance against 35mm film cameras in the early phase of that diffusion process. This article more firmly established The AP's agenda setting priorities by matching the innovation to a problem (speed of time from capture to transmission to client) in the organization, illustrating preparations to restructure, and clarifying the observed and expected future widespread adoption. All of this effort to maximize adoption through promotion relied on three mega-events to take place in a single year.

In April, 1996, The AP sent out another (smaller) news release restating some of the highlights from the previous announcement. Again, Alabiso's commitment to cover the

Olympics and the presidential campaign fully digital was referenced and the article highlighted the improved affordances made possible with the updated technology (*The AP Log* 1996b).

In their Spring/Summer 1996 edition of *The AP World,* The AP (1996) published a two-page, full-color article touting the benefits and features of this new digital technology. Once again, The AP was investing in the matching phase of diffusion. In this instance, also redefining how The AP photographers worked using digital camera technology. The article sets out with a quote spotlighting how much ahead of the competition The AP is by adopting this innovative new technology (*The AP World* 1996). This narrative continues through the article, calling attention to the various ways digital camera technology outperforms film photography (*The AP World* 1996). "The speed with which we're getting photos out is driving our competition crazy…The digital camera is really giving us the upper hand" (*The AP World* 1996, 7). The article went on to revisit their all-electronic photographic coverage of the Superbowl, a crowning achievement from the start of the year (*The AP World* 1996). This mega-event was framed as the rehearsal for their greater ambition to, according to another quote by Alabiso, solely "rely on electronic cameras to cover the 1996 Olympic Games and the US presidential campaign" (*The AP World* 1996, 7). Once again reminding readers of the importance of these mega-events to hyper-stimulate adoption of the technology.

Deep in the article, The AP begins to identify significant individuals as pioneering early adopters. Eight lines are dedicated to recognizing The AP photographers by name who were already covering the presidential campaign through the primaries, extolling the virtues afforded them by the new technology, namely speed (*The AP World* 1996). The article included six color photographs made of the candidates on the trail (*The AP World* 1996). Another paragraph referring to The AP photographers by name, Elise Amendola and Beth Keiser, compared

efficiency of the new technology by pairing Amendola, a photographer still photographing on film, with Keiser, a photographer using Canon's digital camera (*The AP World* 1996). According to Keiser from her remarks, they were able to photograph, edit, and transmit photographs three hours faster using digital technology (*The AP World* 1996). In an industry where time matters and "first to publish" is a guiding mantra, this amount of savings is remarkable. For the last individual early adopter referenced in the article, The AP spotlighted the 1992 Pulitzer Prize winner, Stephen Savoia, as saying "The digital camera changes traditional workflow processes – for the better" (*The AP World* 1996, 8). With this quote, The AP is relying on the recognition of journalism's most prestigious award. A winner of the coveted prize is seen championing innovative processes and is shown capable of navigating through the restructuring phase of diffusion.

For the Summer 1997 issue of *The AP World*, Jill Arabas wrote a six-page feature praising The AP's dedication to innovation and technology (Arabas 1997). A year after the trifecta of mega-events focused on promoting digital camera technology, The AP, with this feature article, invigorates readers with page after page of innovation projects The AP is fervently developing. Latour (2005) refers to this as maintaining the social assemblage which has been created. Without constant attention, the actors risk disentanglement and the social assemblage they have created may come undone (Latour 2005). Rogers (2003) talks about this as *sustainability*. During the diffusion process, an innovation must continue to receive attention by the champion innovator until it achieves routinization (Rogers 2003). Even once routinization is achieved, attention cannot ever be fully abandoned if the champion/early adopter expects to retain this position of opinion leader (Rogers 2003).

Eight years later, for the 2004 Summer Olympic Games in Athens, Greece, Getty Images announced it would convert to an all-digital infrastructure to cover the games (Duran 2004). Expanding on The AP's adoption of digital camera technology from the 1996 games, Getty Images highlighted technological innovative support for the digital camera platform with fiber optic technology that could expedite transmission of images "directly from the photographer's camera to the photo editor's PC" (Duran 2004, para. 3). During the same year, The AP published two articles referencing the Games in *The AP World*. This article reestablished The AP's role as an opinion leader in the industry during a period when other significant influential organizations were promoting their own contributions to the innovation of digital camera technology. In the Summer 2004 issue, a feature article on long-time photographer for The AP Horst Faas chronicled the photographer's legacy with The AP up through the latter decades of the last century to the present (Horton 2004). In the article, the author gave attention to Faas' innovative enterprising solutions. Faas would pass out free film in Saigon during the Vietnam war to any photographer willing to bring the rolls back to The AP for pay and he outfitted all photographers there shooting for The AP with 35mm cameras (an innovative move seen again at the 1996 Olympic Games when The AP supplied all of their photographers with e2000 digital cameras) (Horton 2004). A quote from the article recalls Faas' instructions to the photographers, "Shoot everything at f/11 and 500, and we save you in the darkroom" ("f/11" and "500" refer to exposure settings, aperture and shutter speed, on the camera)(Horton 2004, 18). The relationship between the article and the timing of the Summer Games appears at the end of the article when Faas is identified as The AP's "go-to" organizational planner for Olympic Games coverage (Horton 2004).

The only other in-house report from The AP regarding the Summer Olympics that year was published in the Fall issue. The focus was on praising professional endurance and resolve of The AP reporters and support staff to cover the Games with anecdotal evidence (Kole 2004). Innovative camera technology was referenced in one photograph. The AP photographer, Mark Terrill, was photographed installing a remote underwater camera at the bottom of the pool (Kole 2004). The camera would be used to record swimming events from a perspective beneath the athletes. Despite its sparce reference to innovation compared to events eight years prior, this article falls in line with Rogers' sustainability and Latour's social maintenance, reminding actor-clients of The AP's persistent champion role of innovation.

In February 2014 during the Winter Olympic Games in Sochi Russia, a general online news publication which caters to a technology audience, *Gizmodo*, published an article detailing the technology used by The AP and Getty photographers at the games to create the images appearing in audience's news feeds (Aguilar 2014). In the article, the author spotlights each stage of the process from image capture to posting online for purchase. The infrastructure of cables and wireless transmitters necessary to facilitate speedy transmission of those images are featured in the description as well as detailing the time it takes for pre-event planning (Aguilar 2014). The article addresses nearly every stage of the diffusion of innovation process. Beginning with agenda-setting and matching, the article reports Getty and The AP begin planning two to four years ahead of a scheduled mega-event by identifying what performance gaps are present (and where) then they begin mapping and installing a network of cables and wireless transmitters to link photographers at the sideline of an event with editors at PC terminals (Aguilar 2014). There is a quote in the article that addresses restructuring and redefining. "Digital photography has completely changed the way the Olympics are shot" (Aguilar 2014, para. 7).

Two years later, reporting how the 2016 Summer Olympic Games in Rio were photographed, two main themes can be identified: one, support of digital camera technology, and, two, technological innovations emerging around communications infrastructure inside The AP. On August 3, 2016, Canon announced how they would be supporting photographers in Rio by providing support staff and a stockpile of digital camera equipment on the Olympic grounds (*Canon* 2016). In the press release, Canon called attention to its relationship with The AP to provide The AP photographers exclusively Canon electronic camera equipment (*Canon* 2016). The director of photography at The AP was quoted in the article saying Canon's EOS-1D X Mark II digital camera and L-series EF lenses were a key element to The AP's successful reporting of the games (*Canon* 2016). "Canon provides innovative technology and world-class optics that give us the solutions we need to create compelling images" (*Canon* 2016, para. 5). Reporters at *PetaPixel*, a popular online trade publication catering to the photographic community, appeared first to pick up the story from Canon. A brief news report showcasing the company's arsenal of camera equipment Canon would be bringing to Rio published on the day of Canon's press release (Zhang 2016a). A second online news publication also ran the story of Canon's commitment to the summer games with an expanded article mentioning the alliance between Canon and The AP to outfit their photographers exclusively with Canon digital camera equipment (Schneider 2016). The article highlights a widening adoption of digital camera technology as spurring Canon's commitment to support photographers in Rio (Schneider 2016). "Part of the reason Canon brings so many pieces of equipment to the Olympic Games is because they are expecting many of the on-site photographers to request access to the latest equipment" (Schneider 2016, para. 3). The following day, August 4, a reporter from *No Film School*, another popular online trade publication that caters to video photographers, published a similar brief

news article from Canon's press release which also called attention to The AP using Canon technology exclusively, and the popularity of Canon's digital camera hardware in the US (Fusco 2016). By the time a journalist at *Digital Photo Pro*, an online trade publication catering to professional photographers, published the story of Canon's commitment to the summer Olympics on August 10, they had secured an interview with Canon's Director of Professional Services, Elizabeth Pratt, to include in the article (Younker 2016). The article opens on Canon's running commitment to provide support at the Olympic Games year after year, illustrating the company's maximization of the mega-event effect (Younker 2016). In the interview, Pratt talks about how Canon supported The AP's innovative use of robotics in place of human camera operators by supplying the actual camera that would go inside the remotely controlled housing units above and under water (Younker 2016).

On August 15, as the Games were ongoing, The AP released a short, 55-second video showcasing the innovations they relied on to cover the Games (AP Digital Products 2016). The video spotlighted robots, remote cameras, 35 miles of network cabling, the manual human investment of installation, and the benefits their customers reaped (AP Digital Products 2016). Days later, trade publications began to pick up the video release for additional reporting. *PetaPixel* was first to produce an article on August 19. A short two-paragraph hard-news report rearticulated captions from the video in story form for readers (Zhang 2016b). The same day, *Poynter* published a report which included an interview with one of The AP's photographers, David Phillip. *Poynter* is a well-known institution for learning and information in the photojournalism industry. Phillip was responsible for installing the robots and remote camera equipment in Rio (Hare 2016). In the article, Phillip recounts how the process of incorporating these technological advancements into the routine workflow of sporting event coverage is an

ever-evolving process which challenges them to constantly evolve their thinking and learn new ways of functioning with the technology (Hare 2016). Three days later, on August 22, a journalist from *Imaging Resource* posted a short news article referencing The AP video release (Gray 2016). On the same day, *Shutterbug*, a legacy trade publication which photographers have relied on since it was publishing in print before online publications were possible, published their article based on The AP video release (Leach 2016). Imaging Resource and Shutterbug did not include any new information that wasn't already reported in either of the previous two news articles. It is important to recognize how these articles published at different online news publications widens the exposure lens of readers becoming aware of the routinization of digital camera technology.

By the 2016 Summer Olympic Games in Rio routinization of digital camera technology in photojournalism had been established. Articles published around the 2016 games highlighted new technological innovations (robotics, faster fully-networked operational fields, and remote-controlled equipment) that have come into place around the now established normative digital camera technology.

Conclusion

Leading innovation in news has been a hallmark of The AP since its inception nearly 200 years ago. The organization reminds a worldwide audience and its clients of this on the front page of its organization website. "Since 1846 The Associated Press has been a leader in news innovation with a commitment to producing world-class journalism and advancing the power of facts" ("The Associated Press" n.d.). In keeping with this reputation as a champion of innovation, The AP was at the forefront of the technological evolution switching from 35mm film camera technology to digital camera technology. The *AP World* (1996a) identifies, in their article, how

the organization is not always the first to innovate, but always a champion of innovation. Smaller newspapers had already made the transition to fully digital photojournalism departments which means that although The AP prides itself on its authoritative position of opinion leader in the industry, the organization is not always the earliest adopter. Although it was not the first news operation to commit fully to an all-electronic photography process, The AP, committed to an all-digital camera workflow at the outset of 1996 when they photographed Superbowl XXX electronically. Announcing plans to provide fully digital coverage of the Olympic Games and presidential election later that year means that The AP were the first of the large, industry-leading newswire providers to adopt this new technological innovation.

This provides useful insight into addressing what role The AP plays in the diffusion of innovation process. The earliest innovators take on the highest risk levels. The size of the organization appears to play a role in determining the level of risk willing to be taken. This decision process may involve other factors such as financial risk, return on investment, and additional economic considerations. This paper has sought to describe the diffusion of innovation process that took place with the digital camera shifting from the previous dominant 35mm camera format by analyzing the roles played by the AP and the Olympic Games.

Diffusion is a process involving members of a social system who, together, function to communicate the adoption process of a new idea, practice, or object, otherwise called innovation (Rogers 2003). Through this analysis of trade publications reporting on the diffusion process of digital camera technology innovation between 1996 and 2016 at historically significant moments marked by the running of the Olympic Games as a mega-event, five stages of the diffusion of innovation process were identified: agenda-setting, marking, redefining/restructuring, clarifying, and routinization. This analysis also supports the alternative six-stage approach to diffusion:

initiating, adopting, adapting, accepting, making routine, and infusing digital camera technology into the production workflow of photojournalists while covering news events.

The research shows that The AP championed widespread adoption of the technology by initiating a public commitment to digital coverage of the 1996 Olympic Games. In 2004, when Getty Images announced they would also commit to an all-digital format to cover the games in Greece, they demonstrated wider acceptance of the technology in the photojournalism industry and compounded the innovation by exhibiting how the organization redefined their workflow through use of the technology by increasing efficiency. Adding network cabling to restructure their workflow process from photographers at the sidelines to photo editors in the photo editing and broadcast booth could be interpreted as being within the restructuring phase of diffusion. By 2014 and the Winter Olympics in Sochi, use of digital camera technology to cover events had become routine. The analysis shows that by the 2016 Summer Olympics in Rio, digital camera technology had become infused into the workflow of photojournalism so much so that The AP and other early adopting organizations (E.g., Canon) had proceeded to illustrate how they are moving forward with new innovations stemming from use of digital camera technology.

From what has been described, it appears that The AP's role as champion of innovation is not contingent on external events such as mega-events like the Olympic Games. Rather, The AP presents clear, concerted efforts to utilize these mega-events to showcase their ability to lead innovation and influence the industry with new emerging innovations. Based upon this case study, mega-events appear to provide a space for the hyper-stimulation of promoting innovation and they allow for innovation leaders to clarify how an innovation is anticipated to match to existing frictions or inefficiencies. This answers the second and third question of this research:

whether, in the diffusion of innovation process, The AP's role is contingent on external sources, and describing the role played by mega-events, such as the Olympic Games.

Limitations of study and future research

There are limitations to the research that this paper could not fulfill which could be addressed in future research. A narrative analysis based on archival data is limiting in what it can reveal about motivating factors behind decision making. Reliance on limited archival data impedes the ability to fully view this social exchange through an actor-network lens. While some elements can be described by having general external knowledge of events, to best account for each exchange, translation, and controversy that would arise during this relationship a more discrete analysis of historical archives should be performed. Another limitation of this analysis is derived from a lack of direct knowledge of events taking place between actors within and across these organizations. Interviews with opinion leaders and decision makers who were in place at the times described in the archival data could widen an understanding of events as they were perceived by members of this assembled social exchange. Future analysis could expand into a critical discourse analysis of historic texts between actors engaged in this social assembly and move beyond simple description of events into more discrete motivations for actions. This may lead to better understanding of the diffusion of innovation process and social entanglement in actor-network theory. Lastly, this paper does not fully address the effect of an organization's size on its role in the diffusion of innovation process. Economic forces may have varying degrees of effect on organizations depending on their size which could influence their position in the diffusion of innovation process. A future study into the size and economic responsibility of an organization may help to better understand strategic positioning of actors attempting to engage in the diffusion of innovation process.

Footnotes

[1] Miettinen (1999) asserts ANT, on its own, displays significant shortcomings when applied to the innovation process. Inside a heterogeneous network, ANT avoids establishing any criteria by which to define the nature and scope of actors involved, marginalizes contributions made by non-critical actor-members, and most importantly does not provide an explanation for human intentionality (Miettinen 1999). When the innovation process can be studied as a "network of activity systems" (p. 183), those actors otherwise marginalized (non-human entities, designers, users) are able to be included in the analysis through their historical contribution and relevance within an activity system (Miettinen 1999).

[2] "[Network] is a tool to help describe something, not what is being described" (Latour 2005, 131). *Network*, then, is used to "designate flows of translations" (Latour 2005, 132).

[3] In 2008, Eduardo Paes was elected to be the city's mayor by running on a platform of major city redevelopment and investment strategies (Paschoal and Wegrich 2019). His city management strategies were hailed internationally as innovative governance that provided opportunities for the city to shed its corrupt, fragmented, and unpopular politicized past (Paschoal and Wegrich 2019). Relying on mega-events hosted by his city, Paes championed three significant innovations: the Rio Operations Center, a Unified Service Hotline, and the Social Participation Laboratory (Paschoal and Wegrich 2019). To champion these innovations, Paes strategically placed allegiant supporters of his plan to implement his design. Modernizing the city meant using innovative methods to transform Rio into an attractive global city for competitive international investors (Paschoal and Wegrich 2019). Doing so required centralizing management and enlisting loyalists to occupy critical positions necessary to provide support for each of three innovations used to redefine the city and reduce opportunities for opposition and resistance to emerge (Paschoal and Wegrich 2019). In the case of Rio, that resistance would have come first from executive and legislative offices within Paes' government. In an effort to try to recruit widespread adoption, Paes allotted large sums of money to pay for advertisement and advertisement space at key media channels to gain support, or at least complacency (Paschoal and Wegrich 2019). Paes applied the same strategies he employed in the initial steps of diffusion to maintain control over his agenda through the routinization phase (Paschoal and Wegrich 2019).

[4] In their findings, national exports rose by 20% or greater and greater openness had positive impacts on the host country's economy (Rose and Spiegel 2011).

[5] In 1913, Oskar Barnack assembled a prototype metal-casing camera called the Ur-Leica which housed rolled negative feature film stock (Pasi 2004). By running 18x24mm feature film stock transversely, he came up with the 2:3 ratio 24x36 format known today as 35mm film photography (Pasi 2004).

[6] The earliest versions of Leica 35mm cameras did not receive a warm welcome by professional journalists working with photography; calling the camera a "precision-made toy" (Creech 2017, 1127).

[7] The Ermanox camera was a compact large-format camera capable of being concealed in clandestine ways. Leica 35mm film cameras were smaller than the Ermanox and designed to use 35mm roll film.

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