

<b>Institution: Edinburgh Napier University</b>
<b>Unit of Assessment: 19 Business and Management Studies</b>
<b>Title of case study:</b> The Power of Social Networks
<p><b>1. Summary of the impact</b></p> <p>The focus of the case is Social Network Analysis (SNA) which allows patterns of relations between actors (human and other entities) to be modelled and combined with actors' attributes. Edinburgh Napier University has applied these methods across a wide range of fields, achieving impacts both in the UK and internationally to make improvements in areas of health, commerce and policy. Methods have been applied to improve: the well-being of women and substance abusers in Bangladesh; the performance of supply chains; to demonstrate the effectiveness of prisoner management in reducing recidivism; and, to assess the effectiveness of health promotion initiatives.</p>
<p><b>2. Underpinning research</b></p> <p>The study of interactions between entities, mainly people, and how information is communicated is the focus of social network analysis (SNA). This has emerged as a major contributor to knowledge in the disciplines of demography, health and business and has given insight into how and why decisions are made. At Edinburgh Napier University (ENU) this SNA research has been developed from a PhD undertaken by Kaberi Gayen in 2000 supervised by Robert Raeside (employed in ENU since 1987), of the Employment Research Institute (ERI), and work undertaken by Michael Pearson, Principal Research Fellow at the ERI, (employed at ENU since the early 1990s) for the Medical Research Council (MRC) in 2002 to investigate smoking behaviour of school children. This has led to attracting almost £750,000 in research funding to three completed PhDs and two continuing PhDs in the area of SNA, four main international collaborations and various national collaborations and has positively affected the lives of many, especially women in developing countries.</p> <p>This excellent work involved the innovative use and methodological development of:</p> <p>a) SNA combined with conventional statistical methods to: investigate how information on reproductive health and child care diffused into the decision-making of women in rural Bangladesh. This involved collecting, by interview, data on 725 women in rural Bangladesh. The study showed that where women were connected to networks of "progressive" women then awareness of modern methods of contraception and access to health professionals was more likely. Alternatively, if they were connected to those with more traditional ideas then they were resistant to change. [3.1, 3.2]</p> <p>b) Study the longitudinal behaviour of adolescents' engagement with alcohol and drugs in Glasgow. This work was undertaken jointly in collaboration with the MRC Social and Public Health Sciences Unit, Glasgow University and allowed peer influence to be identified and understood. From this work several influential papers were produced [see as an example 3.3]. The application of methods developed in a longitudinal perspective allowed input into an international team to facilitate the development of software.</p> <p>Social network methodology was further developed under the supervision of Raeside by Hancock (a part time PhD student who worked in the Scottish Prison Service), to demonstrate that effective communication between prison officers and those who provided prisoner services led to reduced prisoner recidivism. This involved questionnaire based survey work in a Scottish prison. [3.4]</p> <p>Gayen followed her PhD study in 2005 to 2006 by leading a funded project by EU Equal Access Fund (£37,000) with McQuaid (Professor and Director of the ERI until 2013) and Raeside to use SNA to understand the types of barriers to employment faced by those aged over 50 who had been made redundant. This showed the importance of connection to people with high job status to enhance the employability of older people.</p> <p>In 2008, Raeside recruited Gayen K. to work with a Bangladeshi psychologist Gayen T. and Elliot, professor of public health at ENU to use SNA to study the lives of drug users in the slums of Dhaka in Bangladesh. This found that those who engaged in risky behaviours (injecting heroin and sharing needles) tended to isolate themselves from society and other drug users. [3.5]</p> <p>Work with Elliot continued in the supervision of Pow who undertook a PhD in 2009 to evaluate the efficacy of a public health demonstration project called "Healthy Respect" which aimed to improve teenage (sexual) health. This developed SNA to allow the network of communication between organisations to be modelled. Pow is now a research fellow at ENU.</p> <p>Starting in 2010 Pearson in collaboration with Selex (UK) and Denso (Germany) developed, from his research, a self-assessment tool which assists companies to identify trans-regional tendering</p>

and partnering opportunities and so minimise disruptions arising from poor partner choice and to help suppliers meet trade and quality standards.

In 2012 Raeside as part of a team led by Kennedy (Professor of digital computing, ENU) obtained a Knowledge Transfer Partnership with an Edinburgh based business Games Analytics. This involved the use of SNA and computer visualisation methods to research the social interactions of people playing premium online computer games. SNA techniques allowed the company to identify key influential players and permitted marketing strategies to advise gamer developers and producers on how to target these players in order to derive increased revenue and retain players.

Numbers in brackets refer to outputs listed in section 3.

**3. References to the research**

3.1 Gayen, K. and Raeside, R., (2007). Social Networks, Normative Influence and Health Delivery in Rural Bangladesh, *Social Science and Medicine*, 65, 900-914. Google Scholar citations 15, five year impact factor 3.688.

3.2 Gayen, K. and Raeside, R, (2010). Social Networks and Contraception Practice Of Women In Rural Bangladesh, *Social Science and Medicine*, doi:10.1016/j.socscimed.2010.08.002, Google Scholar citations 15, five year impact factor 3.688.

3.3 Steglich, C., Snijders, T. and Pearson, M. (2010). Dynamic Networks and Behaviour: Separating Selection from Influence, *Sociological Methodology*, 40 (1): 329-393. Google Scholar citations 248, impact factor 3.167.

3.4 Hancock, P. and Raeside, R., (2009). Modelling Factors Central to Recidivism, *Prison Journal*, 89, 1: 99-118. Google Scholar citations 7, impact factor 1.444

3.5 Gayen, T., Gayen, K., Raeside, R. and Elliot, L., (2011). Cohesive Subgroups and Drug User Networks in Dhaka City, Bangladesh, *Global Public Health*, 7, 3, 219-231.

3.6 Pearson, M., (2008). Prioritising Edge over Node: Process Control in Supply Chain Networks and Push-Pull Strategies *Journal of Operational Research Society*, 59, 494-502. Google Scholar citations 15, Five year impact factor 31.282

**4. Details of the impact**

The work referred to in this case has had policy impacts, health benefits, social and economic impacts.

From Gayen's original work in 2000-2004 and consequent papers the importance was demonstrated of Family Welfare Assistants to rural Bangladeshi women's health by advising on contraception and ensuring professional medical help was sought rather than relying on traditional healers. The Family Welfare Assistant programme was discontinued in 2003 but, after lobbying, the Government of Bangladesh reintroduced the programme in 2004 and introduced the "Info Ladies" in 2012 where women travelled to villages with web connected laptops to enhance the connectivity of women. The research contributed and enhanced the case forwarded by DNET, the organisation promoting the new programme. The impact was the contribution to ideational change in Bangladesh and allowed modern approaches to public health to reach rural women in Bangladesh. To disseminate this work, Raeside gave three seminars in Bangladesh which were attended by policy makers and academics (at each seminar around 30 attended and of these around 10 senior civil servants and government officials attended), [for corroboration see 5.1, 5.2]. In 2009, research conducted by Gayen, Elliot and Raeside with CREA, a drug rehabilitation centre in Dhaka, provided evidence to the Bangladeshi police to change their policy of managing heroin users in slum areas. On finding a drug-using group, the police had a policy of dispersing group members. However SNA based research showed that the drug- using groups were very cohesive and isolated themselves from the rest of society. By scattering group members, risky behaviour e.g. drug injecting was spread into the wider drug using community. As a consequence of this research the policy of scattering group members was discontinued in 2011. This approach helps protect drug-using groups who do not inject from being influenced by those from groups where they engaged in riskier behaviours. Gayen T provided an important role in lobbying for change and was awarded UNAID's award in 2013 for excellence in Leadership in the National AIDS Response

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in Implementation of Injecting Drug User's program [see 5.3 for evidence].

Pearson developed methods facilitating the longitudinal study of networks which enhanced the understanding of peer group influence and selection in substance abuse (publication 3.3). From this, and collaboration with Steglich (University of Groningen) and Snijiders (University of Oxford), advice to Government and medical policy was generated to reduce substance abuse through the targeting of and intervention by key individuals identified through their role within the mechanisms of influence and selection. This work is part of the ESF European Collaborative Research Project "Dynamics of Actors and Networks across Levels: Individuals, Groups, Organizations, and Social Settings" and has social network sociological and business applications.

The research conducted by Gayen, Raeside and McQuaid that undertook investigation in Edinburgh on how the networks of people aged over 50 who had been made redundant might influence the chances of being re-employed was widely reported in the press [see 5.4] and the importance of fostering active networks has been recognised by the City of Edinburgh council in their City for All Ages programme to enhance the active involvement of older people in the community and improve their wellbeing. This work was the basis of seminars given by Raeside to the Faculty of Actuaries (attended by around 50 delegates) as part of their continuing professional development programme.

In 2006 to 2009 as part of his PhD supervised by Raeside, Hancock used an SNA approach to show that educational programmes in a Scottish prison were effective in helping to reduce recidivism. This has now been incorporated into Scottish Government policy [see 5.5]. In 2008 to 2010, Pow, in conjunction with Elliot and Raeside, applied an SNA approach to develop a methodology to evaluate the effectiveness of "Healthy Respect", a programme of connecting together organisations providing information and assistance to young people particularly in regard to sexual health. The method developed can now be applied to other evaluation programmes, [see 5.6].

Research on the application of SNA continues via a Knowledge Transfer Partnership in April 2012 with an Edinburgh business (GamesAnalytics) and has enabled the company to rapidly grow in size, almost doubling in terms of revenue and number of employees between April 2012 and October 2013, [see corroboration 5.7]. Pearson as part of his work to develop a European Business Network produced methods to improve the supply chain of participating companies in trade between Baltic countries and the East Coast of the UK. This was launched at a conference in 2012, [see corroboration 5.8] and a self-assessment tool was created which has proven to be of great value [5.9].

The work on SNA helped to secure participation in two FP7 EU projects (numbers 244909 and 320136) of which the ERI's share is around £180,000 and £200,000). These projects are to investigate young peoples' transition into work and to effectively function in society. This research is confirming the importance of support networks (other individuals or institutions) to enhance the likelihood of a positive outcome for young people.

### **5. Sources to corroborate the impact**

References to support

5.1. Invited workshop on SNA (2011): <https://sdhi.wordpress.com/news-events/page/16/>

5.2. Dissemination in Bangladesh: [http://www.bangladeshstudies.org/zz\\_2012\\_04\\_07.html](http://www.bangladeshstudies.org/zz_2012_04_07.html)

5.3. Gayen Award <http://www.crea-society.org/news/tarun-kanti-gayen-chief-executive.php>

5.4. Older people employment: <http://www.s1jobs.com/newsandguides/who-you-know-not-what-you-know-is-key-asset-for-job-hunters.html>

5.5. Impact on Government Policy: <http://www.scotland.gov.uk/Publications/2011/07/08121214/28>

5.6. Paper on Partnership working arising from involvement in Healthy Respect Project (<http://www.healthyrespect.co.uk/Pages/default.aspx>)

5.7. CEO at GamesAnalytics LTD, considers involvement in KTP with Edinburgh Napier to be of great strategic value and helped secure substantial funding. Personal letter from CEO available.

5.8. North Sea Supply : Workshops etc.

<http://www.northseasupplyconnect.eu/index.php/conference/workshops/>

5.9. Self Assessment Tool: See letter of recommendation from dienst-iT.