Let \( \{X,Y,U,V\} \) be separable Hilbert spaces on which are defined the following system of stochastic evolution equations,

\[
\begin{align*}
\frac{dx}{dt} &= Ax(t) + B(t)x(t-\nu(dt)) + \sigma(t)dW(t), \quad x(0) = x_0, \quad t \geq 0, \\
\frac{dy}{dt} &= H(t)x(t-\beta(dt)) + \sigma_0(t)M(dt), \quad y(0) = 0, \quad t \geq 0,
\end{align*}
\]  

where \( A \) generates a \( C_0 \) semigroup on \( X \) and \( \{B,\sigma,H,\sigma_0\} \) are operator valued functions and \( \{\nu,\beta\} \) are countably additive signed measures. The processes \( \{W,M\} \) are \( U \) and \( V \) valued Brownian motion and Martingale measures on a filtered probability space \( (\Omega,\mathcal{F},\mathcal{F}_t,\mathcal{F}_t^y,P) \) with covariance operators \( Q \) and \( R\tilde{\beta}(dt) \), \( \tilde{\beta} \) a positive measure. Problem is: Find the best estimate of \( x(t) \) given the history \( \mathcal{F}_t^y \) which is given by \( \hat{x}(t) = E\{x(t)|\mathcal{F}_t^y\} \). This is equivalent to the control problem: Find \( \Gamma \in B_{\infty}(I,\mathcal{L}(Y,X)) \) that minimizes the error covariance functional \( J(\Gamma) = \int Tr(\lambda(t)K(t))dt \) with \( K \) satisfying the evolution equation

\[
\frac{dK}{dt} = (AK + KA^*)dt + (BK + KB^*)\nu(dt) + \dot{Q}(t)dt
\]

\[
- (\Gamma HK + KH^*)\beta(dt) + (\Gamma R\Gamma^*)\tilde{\beta}(dt), \quad t \geq 0,
\]

on the Banach algebra \( \mathcal{L}(X) \). (Received August 25, 2008)